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Complaints of electronic banking juxtaposed with financial inclusion – a South Africa perspective

Abstract

The bank industry has experienced a phenomenal growth in adopting technology in its processes and products. These have brought a renewed sense in cost cutting measures and bringing efficient banking services to the banking customers. However there are a lot of gripes and issues arising from the adoption of technology in delivering banking services. The banking ombudsman as of May 2015 shows that the highest complaints within the banking services relate to ATMs and Internet banking. It is imperative in this study to find out how the complaints in electronic banking statistics relate to issues of financial inclusion and bank service efficiency. In this study electronic banking complaints lodged with a public service complaints service – Banking Ombudsman of South Africa and statistics on: ATM usage, ATM availability, branch banking usage and availability, cellphone usage, internet usage, financial exclusion and financial inclusion were used for analysis. Using a time series data for the period 2007 to 2013 a multi regression analysis was done. The study proves that internet and cellphone banking is proving to be a difficult channel to use in fostering financial inclusion in South Africa for the period under study. However ATMs are the most populous channel for financial inclusion in South Africa. Surprisingly branch banking has not been as successful as well. On the other electronic banking complaints faintly explain why the financial excluded are not eager to use electronic banking.

Keywords: electronic banking, South Africa, mobile banking, financial inclusion.

JEL Classification: G28, G21, O31.

Introduction

Financial inclusion is a growing phenomenon in issues aligned to availing financial services in all its forms to those who cannot formally access it. The concept of financial inclusion involves availing financial services to poor strata of populations in developing countries at the lowest cost possible. Demirguc-Kunt & Klapper (2012), define financial inclusion as well function financial systems that allow broad access to financial services without price or nonprice barriers to their use. These inclusive financial systems should especially benefit poor people and other disadvantaged groups. The advent of mobile banking has accelerated the process of banking the unbanked. Mobile banking can be defined as an extension of banking and financial services onto mobile networks and devices (Lee et al., 2015). In South Africa inclusive banking has been strategized as a consensus through the South Africa's Financial Sector to redress perceived restrictive access to banking services to the poor black population due to apartheid policies (The Banking Association South Africa, 2015). The National Development Plan (NDP) of South Africa has set a target of increasing the proportion of population that is banked from 63% to 90% by 2030 (National Planning Commission, South Africa, 2012).

The Banking Association of South Africa (2015) indicates that the financial sector set targets in the Financial Sector Charter (FSC) for a five year period which ended in 2010 were as follows; (1) access to housing finance – about R55 billion; (2) SME finance – about

R16 billion; (3) agriculture finance – just over R3 billion; (4) transformational Infrastructure – about R12 billion; (5) Mzansi accounts totaled 4.6 million; (6) access of LSM 1-5 to bank branches within a 15km radius was 74.4 percent and; (7) access to branches and ATMs within 10km radius was 79.2 percent (FSC target 80 percent of LSM1-5). World Bank (2014, p. 25), indicates that financial inclusion is now well entrenched in South Africa through the targets outlined in the FSC. The report by the World Bank goes on to indicate that there is a considerable progress in terms of financial inclusion in South Africa from 2004 to 2012 with the proportion of banked people rising from 46 percent to 67 percent. However Finscope & Finmark Trust (2014) indicates that since 2004 the number of adult population using cellphones increased from 12 million in 2004 to 33 million in 2014. However despite this huge increase in cellphone usage only 24% of the adult population uses cellphone banking as of 2014. Though there is a remarkable increase in cellphone usage, there is no corresponding increase in cellphone banking and this is the issue this study intends to investigate.

Branchless banking can only be achieved through cellphone banking or mobile banking. According to Berndt, Saunders & Petzer (2010), cellphone is an important technology in expanding the provision of financial services to the unbanked population. This study investigates the possibility of customer complaints being an indicator of mobile or cellphone banking as an indicator of success or failure of financial inclusion in South Africa. The purpose of this study is to ensure that mobile banking can be used as an effective tool for banking the unbanked in South Africa. According to Mobile Ecosystem Forum (MEF) (2015) survey, Kenya, Nigeria and South Africa are leaders in

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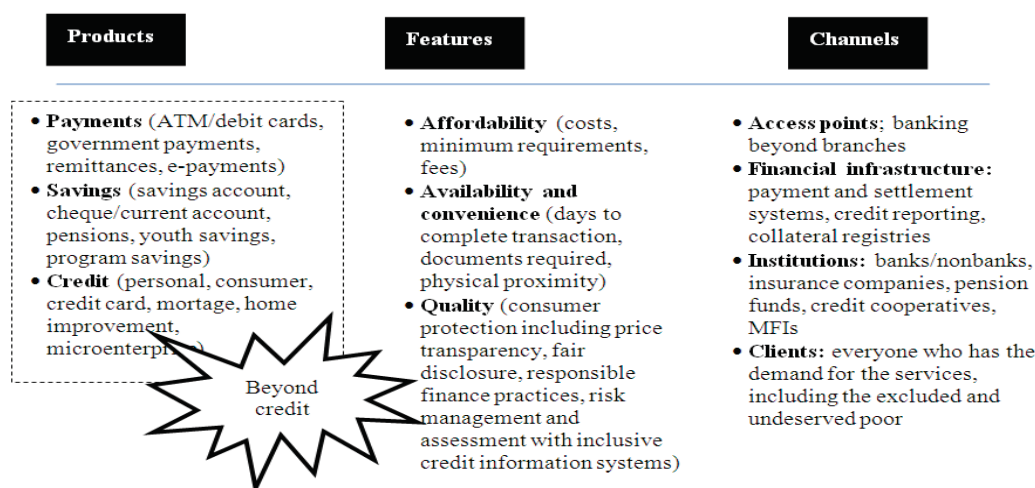
mobile banking in the world. In the same MEF survey report they indicate that mobile banking activity has a global average of 66%, with Kenya with 92%, South Africa 78%, Nigeria 76%, USA 74% and UK 72%. This might explain why M-Pesa, a mobile app product was successful in Kenya and unsuccessful in South Africa, but South Africa (79 million mobile connections) has a higher mobile penetration than Kenya (33.6 million mobile connections). With such a background it is imperative to find the answers of why electronic banking especially internet banking, ATM and mobile or cellphone banking might be facing challenges in achieving financial inclusion in South Africa. This study aims to explain the intersection of electronic banking, the quality of electronic banking service and its role in financial inclusion. It is envisaged through this study, a tool for analyzing branchless banking and financial inclusion will be created.

1. Literature review

1.1. Definition and the forms of financial inclusion.

Financial inclusion is defined in various ways, but

most of the definitions highlight the provision of a range financial services to the low income sector at an affordable price and ensuring that mainly they have unhindered access to the channels and sources of these financial services. Aduda and Kalunda (2012) define financial inclusion broadly as the process of providing a variety of necessary financial services at an affordable price, at the right place, form, time and without any form of discrimination to any member of society by race, religion, creed or belief. Atikson and Messy (2013) present the INFE (International Network on Financial Education) Expert Subgroup definition of financial inclusion as ‘the process of promoting affordable, timely and adequate access to a range of regulated financial products and services broadening their use by all segments of society through the implementation of tailored existing and innovative approaches including financial awareness and education with a view to promote financial wellbeing as well as economic and social inclusion’. Figure 1 summarizes the Key dimensions of financial inclusion in a graphical manner.



Source: adapted from Stein, Randahwa & Bilandzic (2011).

Fig. 1. Key dimensions of financial inclusion

Financial inclusion is based on the notion of financial exclusion, that is, the exclusion of the large poor stratum of society from accessing financial services due to various barriers. Allen, Dermirguc-Kunt, Klapper & Peria (2012) cite the following as the main barriers to financial inclusion, (1) high account fees, (2) large distances and (3) lack of suitable financial products. Ravichandran & Alkathlan (2009) indicate that financial inclusion happens in two ways. Firstly, one is excluded from the payments system in essence not having a bank account. Secondly, a person is excluded from formal credit markets in that they cannot acquire loans and short term credit from the formal system. It can be observed in these two ways of exclusion one is forced to approach informal and exploitative markets to facilitate their payments and credit services.

The type of people who financially excluded largely comprises of marginal farmers, landless laborers, self-employed and informal enterprises, urban slum dwellers, migrants, ethnic minorities and socially excluded groups, the elderly and women.

1.2. Benefits and barriers of financial inclusion.

There are a lot of benefits outlined in literature about financial inclusion mainly looking from the financial excluded portion of society, the economy and the banking institutions. Accion International (2009) indicates the seven broad benefits of financial inclusion being; (1) to facilitate economic transactions, (2) manage day to day resources, (3) improve quality of life, (4) protect against vulnerability, (5) make productivity enhancing investments, (6) leverage assets and lastly (7) build eco-

conomic citizenship amongst the financially excluded. Beck, Demirguc and Honohan (2009) indicate that overall financial development is not only pro-growth but pro-poor. They provide econometric evidence that financial development disproportionately boosts the income growth of the lowest income quintile and reduces the dollar of people living less on a dollar. Bansal (2012) cites financial inclusion benefits from a financial institutions point of view. From a bank point of view financial inclusion will provide mainly two advantages, (1) a low cost and source of stable funds which will assist in improving asset-liability management, (2) high potential of receiving deposits from untapped markets of rural areas and therefore having a good balance between the urban and rural sources of funds.

Barriers to financial inclusion are well enunciated in literature being mostly classified by distance from source of financial services, pricing of financial services and quality of financial systems. Beck, Demirguc and Honohan (2009) indicate that (1) geography or physical access, (2) lack of proper documentation and (3) high prices, minimum account requirements and fees are the three main barriers to financial inclusion. Karpowicz (2014) cites also three main categories to financial inclusion being access, depth and efficiency. The elaboration of access by Karpowicz as a barrier is explained in the same way by Beck et al. With regards to depth, Karpowicz defines it as the depth of the financial markets in requiring collateral requirements because of weak rule of law (creditors rights, information disclosure requirements and contract enforcements) and weakness in institutions (public credit registries and private credit bureaus) that govern them. Intermediation efficiency refers to competition and pricing of financial services and information asymmetry which crowds out the low income portion of the society. Technology – mobile phone and internet use – can alleviate the physical distance of accessing financial services. A number of documents are needed for one to open access and operate in the formal financial system and people in the low income countries who are confined in rural areas lack such papers. The minimum requirements for opening a bank account is also beyond the reach of many in the low income countries more so coupled by the bank fees charged on operating the bank accounts.

1.3. Successful models of financial inclusion. A host of financial inclusion models are presented in literature. Bansal (2012) states that there are about five common types of financial inclusion being (1) no-frills accounts banking, (2) branchless banking (business correspondent model), (3) banking without a bank (using mobiles as conduits for financial transactions, and (4) micro lending. Bansal goes on to indicate that there is no “one size fit all” to these

models and all of them have succeeded differently in different contexts. In Table 1 below, Gwalani and Parkhi (2014) show the extent to which these models have been used. It can be observed how Kenya has been successful in the mobile banking of banking without a bank account which has proved how mobile technology is superior in the realization of complete financial inclusion. Bansal (2012) cites a number of features of a successful model of financial inclusion. First of all banks should offer customers a clear proposition of a customized bouquet of product offerings. In this instance a financial services package which includes all the basic financial requirements by the poor, such as government payments, savings, credit remittances and insurance charged on one nominal low value. Secondly, banks need to craft a pro-poor-friendly, transparent pay-per-use model where customers are charged a small fee for every withdrawal. Thirdly, banks should use scalable business models with simple user-friendly low cost technologies. Fourthly, teaming up with retail outlets in low income, is often difficult to reach areas to offer finance to rural masses, thus creating value to the banks and the customers. Fifthly and lastly, to offer financial literacy on these financial products thus stimulate uptake by these financial excluded portions of the population.

Table 1. Models of financial inclusion – international experience

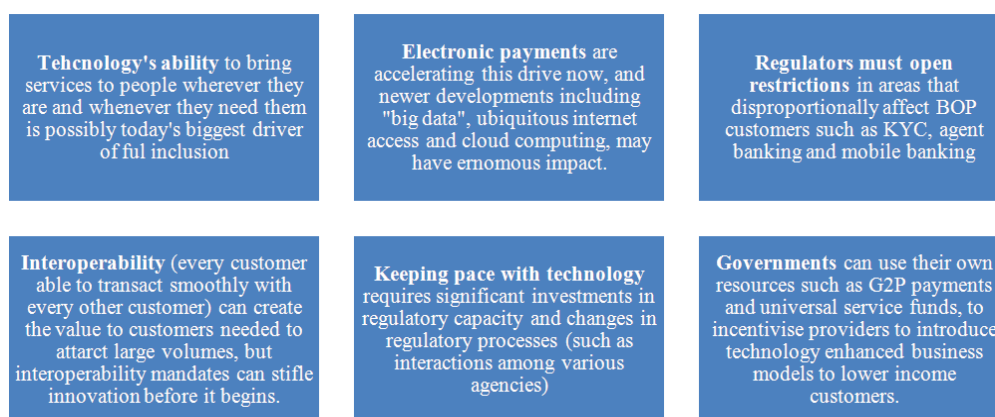
Country	Model used	Details of the application of the model
South Africa	No-frills banking:	Basic bank accounts with negligible minimum deposit and a set number of free transactions. The key issue in South Africa was the very expensive banking markets to overcome this problem the central bank asked a collective of five banks to launch a 'Mzansi account' a 'no-frill' bank account which facilitated five free transactions in a month, and as a result 6 million Mzansi accounts in a country of 32 million were opened (2009 report by the non-profit FinMark Trust). But all is not rosy. Only 3.5 million out of the 6 million accounts are active, the usage rate of only 58 percent.
Brazil	Branchless banking	Spread access to banking through agents called banking correspondents (BCs). BCs had existence in Brazil since the 1970s, but the active push came a little more than a decade ago with the regulation to broadened the range of services within the ambit of a BCs and ease in several other restrictions to increase the penetration of banking services in that country. As a result the total number of bank accounts doubled within a span of 8 years from 200 to 2008 from 63.7 million to 125.7 million thanks to 150,000 BCs account for about 62 percent of the total number of points of service in the financial system.

Table 1 (cont.). Models of financial inclusion – international experience

Country	Model used	Details of the application of the model
Kenya	Bank without a bank	Use the mobile phone company as a conduit for keeping and transacting money. Kenya has demonstrated the best use of technology for improving the inclusion. Increased use of mobile phones gave the opportunity to penetrate the banking market. M-Pesa is banking ecosystem launched by Safaricom-Vodafone with a cap of \$500 on a transaction followed by M-KESHO a venture providing deposit facility. 40 percent of Kenya's adult population which comes around at 10 million became the client base of the service.
Mexico	Super-efficient lending mission (micro-lending)	A mission led by micro credit and allied products. How a nonprofit based model can exhibit the importance of being extremely profitable for its shareholders was shown by Banco Compartamos, a microfinance unit, this with the combination of efficiency, innovation and a tight leash on costs and generated a base of 1.5 million clients even with interest rates being above 100 percent.

Source: Gwalani and Parkhi (2014), author.

1.4. Impact of technology on financial inclusion. The Global Financial Development report (2014) indicates that technological innovations are crucial in lowering the cost and inconvenience of accessing financial services. The report remarks the rapid growth in new technologies, such as mobile payments, mobile banking, internet banking and biometric identification technologies and these should facilitate a greater reduction in costs leading to increased financial inclusion. Dittus and Klein (2011) describe the demand side and supply side of financial inclusion, with the demand side being the plight of poor people to engage in financial transaction in a simple and cheap way and the supply side being the technological innovation that enables new business models for financial inclusion. They indicate that the financial excluded portions of the society would like to engage in financial services that are not complex, easy to understand and affordable. The current leaps in technology have managed to simplify and reduce the costs of transacting or using financial products.



Source: Adapted from Centre for financial Inclusion: Accion, author.

Fig. 2. Technology enabling factors for financial inclusion

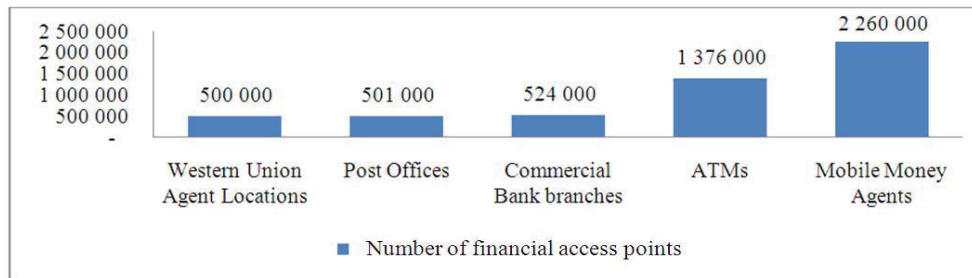
In Figure 2 it can be observed that there are factors required to make technology successful in achieving the aims of financial inclusion. Accion cites about seven inhibiting factors that can prevent technology-enabled financial services from making technological-enabled financial services assist in achieving financial inclusions and these are; (1) fear of technology (by prospective customers, providers and regulators); (2) lack of clear value propositions for providers, governments and individuals; (3) difficulties in establishing effective partnerships; (4) lack of client education (related to both financial and technological innovation); (5) gaps between access and use (as people sign up initially but do not continue to use); (6) lack of scale and linkages (for example, creating many unconnected mobile money platforms); (7) regulation that inhibit new applications of technology. Thus it can be observed that technology brings simplicity in conducting financial services and at a lower cost.

However, on the other hand skepticism from the financial services users and financial services regulators can be the major hindrances to success use of technology in financial inclusion.

It is difficult to find in literature an exclusive support for electronic banking products as a tool of financial inclusion. Mostly in literature, mobile banking is highly recommended as the panacea to successful financial inclusion (Villasenor, 2013; Donovan, 2012; Klein & Mayer, 2011). At the heart of mobile banking systems is mobile money which is the underlying monetary value. Di Castri (2013) describes mobile money as having the following aspects; (1) available to a user to conduct transactions through a mobile device; (2) accepted as a means of payment by parties other than the issuer; (3) issued on receipt of funds in an amount equal to the available monetary value; (4) electronically recorded; (5) mirrored by the value stored in an

account(s) usually open in one (or more) bank(s); and (6) redeemable for cash. However, Scharwatt et al. (2014) define mobile money as meeting service criteria they recommended. The first criterion is that the service should offer at least one of the following products, domestic or international transfer, mobile payments including bill payment, bulk disbursement, and merchant payment. The second criterion the mobile banking service should be highly dependent on trans-

actional points outside bank branches and ATMs to make the service accessible to the unbanked part of the population. The third criterion is that the service should offer a simple interface to the mobile banking agents and their customers on their cell phones or basic mobile devices to initiate transactions. In Figure 3 the use of mobile money agents is more preferred as shown from a survey done by GSMA¹ showing that mobile banking is the panacea to financial inclusion.



Source: GSMA (2014).

Fig. 3. Number of financial access points across developing countries

1.5. Success of M-Pesa in Kenya and its failure in South Africa. It can be noted that from the previous section that mobile banking is the only form of electronic banking that has met success in achieving the aims of financial inclusion. A web poll conducted by African Telecoms News (2011) indicated Africa as the primary market for mobile money with 86% of the market. In the same web poll it was envisaged that the biggest African mobile payments application will be the person to person transfers voted by 42% of the participants and the 32% of the participants voted for mobile banking as second biggest African mobile payments application. This shows that mobile banking is the leading channel in hastening financial inclusion in Africa. M-Pesa is one of the mobile banking platform that has been successful in Africa to incorporate the financially exclude into the formal financial services.

Mas and Ng'weno (2010) indicate that M-Pesa was successful because of three keys: branding, channel management and pricing. Safaricom – the owners of M-Pesa – developed the M-Pesa brand by developing customer trust in their new payment mechanism by quickly building critical mass in order to use the existing customers as the main bait for new customers. The brand was widely and vividly advertised in the communities where people worked and congregated and in retail stores helped M-Pesa's brand to grow widely. The second success factor of channel development was driven by enabling the use of mobile phone to create a retail outlet-based channel for cash-to-digital value conversion. More so consistent branding on these stores, on-the-spot training, frequent visits and

training helped the channel management to be successful. Pricing encouraged customer to experiment with the service through giving free and quick registration to the service, free deposits, ability to send money to any phone subscriber (whether registered or not on M-Pesa). Mas and Morawczynski (2009) agree with Mas and Ng'weno on the success factors of M-Pesa in Kenya.

However, Kimenyi and Ndung'u (2009) agree with Mas and Radcliffe (2011) on the success factors of M-Pesa in Kenya but from a policy view point. The success factors that Kimenyi & Ndung'u and Mas & Radcliffe agreed on are (1) environment conducive for private investors especially in the mobile phone sector, (2) participation of the private sector in public policy process of mobile banking; and (3) close monitoring of technological innovations in financial services by the Kenyan Reserve Bank. These factors are different from those cited in the paragraph above which is more of operational success factors.

Goldstuck interviewed by de Waal (2010) gives some reasons on why M-Pesa was unsuccessful in South Africa. M-Pesa was introduced in South Africa using Vodacom as a platform for mobile banking since in South Africa but going through Nedbank. The first factor of M-Pesa failure is that to engage in any form of banking business in South Africa one requires a license from the Reserve Bank. This is quite opposite from the Kenyan M-Pesa operations which did not use any bank to launch the product. Secondly, the numbers of people who are unbanked are not comparable to those in Kenya, and more so those in South Africa have bank accounts and in no need of alternative banking channels. Thirdly, the remittance culture is not as deeply rooted in South Africa as it is in other

¹ GSMA stands for Groupe Speciale Mobile Association.

African countries. In South Africa there are a number of internal remittance systems that work through the network of major retail shops.

1.6. Consumer complaints in electronic banking.

There are factors that are taunted as important in making electronic banking be adopted by customers in consuming bank services. Liao and Cheung (2002) gave the following factors that affect the perceived usefulness of retail based internet banking (1) expectations of accuracy; (2) security; (3) network

speed; (4) user friendliness; (5) user involvement; and (6) convenience. Daniel (1999) surveyed the provision of electronic banking in UK and Ireland. From this-survey done the following five factors were deemed factors affecting the provision of electronic banking: (1) the organisational culture for innovation, (2) market share strength of the organization, (3) organizational restrictions and limitations; (4) prediction of customer acceptance and (5) vision of the future. In Table 2, the factors from the two studies are given more detail.

Table 2. Factors for adopting electronic banking by customers

Convenience	<ul style="list-style-type: none"> ◆ Access at anytime ◆ Access from anywhere ◆ Wide variety of services readily accessible 	Organizational culture for innovation	The more the company has a reputation for innovation the more it is easier to introduce new products and services. Consumers are ready to use products or services from a proven innovator.
User experience	<ul style="list-style-type: none"> ◆ Enjoyable ◆ Not stressful 	Market share or strength of the organization	Does the market share or resources of the organization have an impact on the customers adoption of electronic banking
User friendliness	<ul style="list-style-type: none"> ◆ Clear easy-to-follow instructions ◆ Simple operational procedures ◆ Light hard- and soft-ware requirements ◆ Comprehensive help menus ◆ Efficiently designed websites 	Organizational restrictions and limitations	Do limitations of lack of finance or staff with suitable skills within the organization affect the customers adoption of electronic banking
User involvement at preferred speeds	<ul style="list-style-type: none"> ◆ Able to control transactions before confirmation ◆ Able to perform transactions 	Prediction of customer acceptance	The process of the organisation understanding how the customers are willing to use electronic banking.
System security	<ul style="list-style-type: none"> ◆ Authorized access only ◆ Customer information kept confidential ◆ Restrictions on high-value transactions ◆ Strong commitment to security measures 	Vision of the future	What perception do the customers have about electronic banking in the future
Transactions speed	<ul style="list-style-type: none"> ◆ Faster than branch banking ◆ Quick response from e-bank 		

Source: Liao and Cheung (2001), Daniel (1999).

Other empirical studies confirm these factors of adoption of electronic banking but less does so with an emphasis on financial inclusion. A study by Medhi, Ratan and Toyama (2009) studied the factors that make low income and low literate stratum of the population adopt mobile banking. The study covered India, Kenya, Phillipines and South Africa and shown that the following were the factors for low income and low literate stratum of the population to adopt mobile banking: (1) Household characteristics – location of family members a rural – urban migration splitting the families and the form of employment forced them to adopt the mobile banking service; (2) services adopted – services offered if they matched the customer needs it was likely to be adopted, pricing of mobile banking compared to other channels, reliability with respect to informal channels and service paradigm (most customers would not use the ancillary services offered with mobile banking like ATMs and so forth); (3) pace of uptake – was affected by level of awareness of the features of mobile banking and trust of mobile banking services; (4) frequency of usage – agent proximity and ubiquity and transaction time at agent stores assisted in adoption of mobile banking; (5) ability to

transact on the application – interaction design of the mobile banking application gave challenges encountered in interacting with mobile banking services and the use of mobile phones. The degree of human mediation was also an important factor as well. These factors of adoption are the sources of customer complaint from customers in using mobile banking.

2. Research methodology

The aim of the study is to find if customer complaints can explain the contribution of electronic banking to financial inclusion. We therefore conduct an empirical analysis using secondary data to find out if the customer complaints on electronic banking products can explain if electronic banking is inhibiting or assisting financial inclusion in South Africa. Therefore the conceptual research methodology framework is illustrated in Figure 4. Therefore, three themes are created as informed by the literature review, (1) financial inclusion; (2) customer adoption of electronic banking and (3) customer complaints of electronic banking. Under these themes variables are extrapolated from databases which have this information.

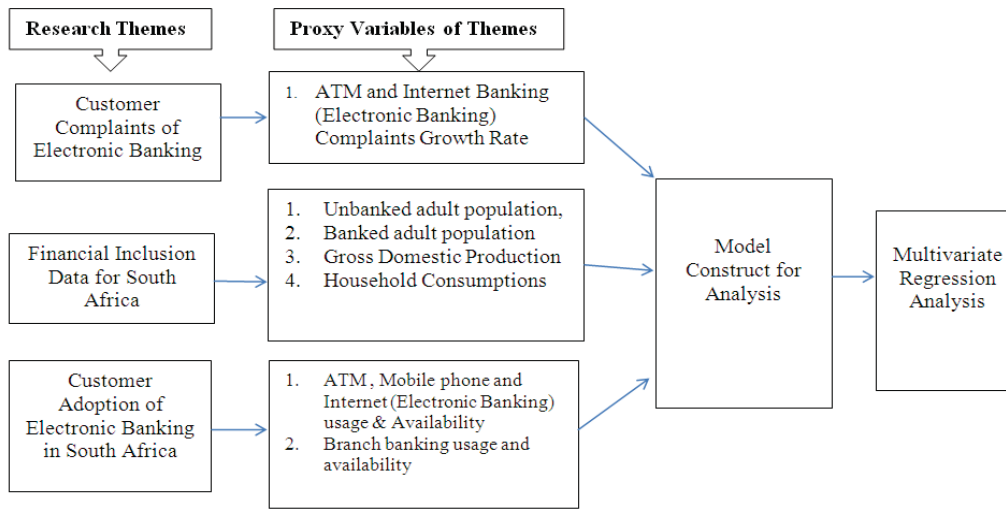


Fig. 4. Conceptual framework of research methodology

2.1. Sources of data. There are three themes that are used to find data to be used in answering the research question. The data for customer complaints is extracted from the banking ombudsman of South Africa annual reports. The data for customer adoption of electronic banking and financial inclusion is adopted from Finscope surveys, IMF Database and World Bank Database. The data are deemed suitable for the study because they are South Africa specific and have been collected under scientifically tested methodologies for reliability and validity, and thus they are deemed adequate and unbiased for the study. The study is being done for the period from 2007 to 2013.

2.2. Model construct. In order to fulfil the research purpose, the following research questions were crafted:

- ◆ Is there a significant relationship between financial exclusion, bank branch availability, bank branch usage, electronic banking complaints, electronic banking usage and electronic banking availability in South Africa?

- ◆ Is there a significant relationship between financial inclusion, bank branch availability, bank branch usage, electronic banking complaints, electronic banking usage and electronic banking availability in South Africa?
- ◆ The study uses the multivariate regression model to answer the research questions. The model is based on the theory that financial inclusion is driven by electronic banking and the rate of customer adoption. Therefore, various variables have been identified as proxies and have been expressed as follows:
 - ◆ Financial inclusion = f (Electronic Banking usage and availability, Branch banking usage and availability, Electronic Banking Complaints, GDP and Household Consumption).
 - ◆ Financial exclusion = f (Electronic Banking usage and availability, Branch banking usage and availability, Electronic Banking Complaints, GDP and Household Consumption).

Therefore the two functions above are formulated into the following multi regression models to answer the research questions:

$$\log FINC_{usINT} = \beta_0 + \beta_1 \log INTus_i + \beta_2 \log CBBRAus_i + \beta_3 \log ATMus_i + \beta_4 HHcons_i + \beta_5 ATMcomp_i + \varepsilon_i \quad (1)$$

$$\log FINC_{usCELL} = \beta_0 + \beta_1 \log CELLus_i + \beta_2 \log CBBRAus_i + \beta_3 \log ATMus_i + \beta_4 HHcons_i + \beta_5 ATMcomp_i + \varepsilon_i \quad (2)$$

$$\log FINC_{avINT} = \beta_0 + \beta_1 \log INTus_i + \beta_2 \log CBBRAus_i + \beta_3 \log ATMus_i + \beta_4 GDP_i + \beta_5 ATMcomp_i + \varepsilon_i \quad (3)$$

$$\log FINC_{avCELL} = \beta_0 + \beta_1 \log CELLus_i + \beta_2 \log CBBRAus_i + \beta_3 \log ATMav_i + \beta_4 GDP_i + \beta_5 ATMcomp_i + \varepsilon_i \quad (4)$$

$$\log FINC_{usINT} = \beta_0 + \beta_1 \log INTus_i + \beta_2 \log CBBRAus_i + \beta_3 \log ATMus_i + \beta_4 HHcons_i + \beta_5 ATMcomp_i + \varepsilon_i \quad (5)$$

$$\log FINC_{usCELL} = \beta_0 + \beta_1 \log CELLus_i + \beta_2 \log CBBRAus_i + \beta_3 \log ATMus_i + \beta_4 HHcons_i + \beta_5 ATMcomp_i + \varepsilon_i \quad (6)$$

$$\log FINC_{avINT} = \beta_0 + \beta_1 \log INTus_i + \beta_2 \log CBBRAav_i + \beta_3 \log ATMav_i + \beta_4 GDP_i + \beta_5 ATMcomp_i + \varepsilon_i. \quad (7)$$

$$\log FINC_{avCELL} = \beta_0 + \beta_1 \log CELLus_i + \beta_2 \log CBBRAav_i + \beta_3 \log ATMav_i + \beta_4 GDP_i + \beta_5 ATMcomp_i + \varepsilon_i. \quad (8)$$

Where:

$\log FINC$ is the proxy for financial inclusion and is the dependent variable which is the log of banked population as a percentage of the adult population.

$\log FINX$ is the proxy for financial exclusion and is the dependent variable which is the log of unbanked population as a percentage of the adult population.

$\log INTus$ is the log of internet users per 100 people representing the proxy of electronic banking usage through internet.

$\log CBBRAus$ is the log of the Number of branches per 100,000 people representing the proxy of bank branch usage.

$\log ATMus$ is the log of ATMs per 100,000 people being the proxy for electronic banking usage through ATM usage

$\log CELLus$ is the log of mobile phone subscriptions per 100 people representing electronic banking usage through cellphone.

$\log CBBRAav$ is the log of the number of commercial banking branches per 1,000 km² representing the proxy of bank branch availability.

$\log ATMav$ is the log of ATMs per 1,000 km² being the proxy for electronic banking availability through ATM presence.

$ATMcomp$ is ATM complaints cases reported and opened at the Banking Ombudsman and represents electronic banking complaints.

$HHcons$ represents Household Consumption as percentage change from year to year.

GDP is the Gross Domestic Product growth rate
The following subscripts on the financial inclusion and financial exclusion are put to designate the multi variate relationship being analyzed:

$\log FINC_{usINT}$ refers to financial inclusion as a dependent variable in finding the relationship between financial inclusion, electronic banking complaints and electronic banking usage through internet

$\log FINC_{usCELL}$ refers to financial inclusion as a dependent variable in finding the relationship between financial inclusion, electronic banking complaints and electronic banking usage through cellphone.

$\log FINC_{avINT}$ refers to financial inclusion as a dependent variable in finding the relationship between financial inclusion, electronic banking complaints and electronic banking availability through internet.

$\log FINC_{avCELL}$ refers to financial inclusion as a dependent variable in finding the relationship between financial inclusion, electronic banking complaints and electronic banking availability through cellphone.

$\log FINX_{usINT}$ refers to financial exclusion as a dependent variable in finding the relationship between financial exclusion, electronic banking complaints and electronic banking usage through internet.

$\log FINX_{usCELL}$ refers to financial exclusion as a dependent variable in finding the relationship between financial exclusion, electronic banking complaints and electronic banking usage through cellphone.

$\log FINX_{avINT}$ refers to financial exclusion as a dependent variable in finding the relationship between financial exclusion, electronic banking complaints and electronic banking availability through internet.

$\log FINX_{avCELL}$ refers to financial exclusion as a dependent variable in finding the relationship between financial exclusion, electronic banking complaints and electronic banking availability through cellphone.

3. Results and analysis

In the models presented in section 3, eight models with different specifications were estimated. Models 1 to 4, were answering the first research question. Model 1 specified financial inclusion as a dependent variable being predicted by electronic banking usage mostly biased to the impact of using internet ($\log INTus$, $\log ATMus$), branch banking usage ($\log CBBRAus$), electronic banking complaints ($ATMcomp$) and household consumption percentage change Y-O-Y ($HHcons$). Model 2 specified financial inclusion as a dependent variable being predicted by electronic banking usage mostly biased to the impact of using cellphones ($\log CELLus$, $\log ATMus$), branch banking usage ($\log CBBRAus$), electronic banking complaints ($ATMcomp$) and household consumption percentage change Y-O-Y ($HHcons$). Model 3 specified financial inclusion as a dependent variable being predicted by electronic banking availability mostly biased to the impact of using internet ($\log INTus$, $\log ATMav$), branch banking availability ($\log CBBRAav$), electronic banking complaints ($ATMcomp$) and GDP growth rate (GDP). Model 4 specified financial inclusion as a dependent variable being predicted by electronic banking availability mostly biased to the impact of using cellphones ($\log CELLus$, $\log ATMav$), branch banking availability ($\log CBBRAav$), electronic

banking complaints (*ATMcomp*) and GDP growth rate (*GDP*). For models four to eight the dependent variable is financial exclusion, however, the specifications for Model 1 are similar to Model 4, Model 2 specifications are matched to Model 5, Model 3 specifications are matched to Model 7 and Model 4 specifications are matched to Model 8.

The variables were subjected to a correlation analysis as presented in Table 3. The most noteworthy results from the correlation analysis are the perfect correlation between; *logCBBRAus* and *logCBBRAav*, and *logATMus* and *logATMav*. There is a high correlation and significant relationship between the GDP growth rate and household consumption percentage change Y-O-Y, bank branch usage and bank branch availability, ATM usage and financial inclusion, ATM availability and financial inclusion, ATM complaints and financial inclusion, ATM usage and financial inclusion, ATM availability and financial inclusion, and ATM complaints. This shows how these

variables drive financial inclusion since the correlations are significant. However there is a negative and weak correlation between the following pair of variables: financial inclusion and ATM complaints, GDP and internet usage, GDP and ATM complaints, Household consumption and internet usage, financial exclusion and ATM usage, financial exclusion and ATM availability, financial exclusion and cellphone usage, financial exclusion and bank branch usage, financial exclusion and bank branch availability. These correlations are insignificant showing that a decrease in cellphone usage, internet usage, bank branch usage, ATM usage, bank branch availability and ATM availability will lead to financial exclusion. However, financial inclusion and financial exclusion have a significant strong negative correlation meaning that an increase in financial inclusion will lead to a decrease in financial exclusion. Having established these correlations, the study went on to run the 8 models presented in section 3 and the results are in Table 4 and 5.

Table 3. Correlation results of variables

	<i>logCBBRAus</i>	<i>logCBBRAav</i>	<i>logATMus</i>	<i>logATMav</i>	<i>HHcons</i>	<i>GDP</i>	<i>logCELLus</i>	<i>logFINC</i>	<i>log-FINX</i>	<i>logINTus</i>	<i>ATMcomp</i>
<i>logCBBRAus</i>	1										
<i>logCBBRAav</i>	1	1									
<i>logATMus</i>	0.89***	0.89***	1								
<i>logATMav</i>	0.89***	0.89***	1	1							
<i>HHcons</i>	-0.11	-0.11	-0.29	-0.29	1						
<i>GDP</i>	-0.25	-0.25	-0.5	-0.5	0.89***	1					
<i>logCELLus</i>	0.82***	0.82***	0.68*	0.68*	0.25	0.21	1				
<i>logFINC</i>	0.67*	0.67*	0.86***	0.86***	-0.15	-0.30	0.60	1			
<i>logFINX</i>	-0.14	-0.14	-0.54	-0.54	0.29	0.39	-0.19	**0.77	1		
<i>logINTus</i>	0.61	0.61	0.46	0.46	-0.07	-0.14	0.54	0.15	0.07	1	
<i>ATMcomp</i>	0.75**	0.75**	0.86***	0.86***	0.14	-0.07	0.82***	0.86***	-0.61	0.32	1

Source: ***significant at 1%, **significant at 5%, * significant at 10%.

The results in Table 4, for Model 1 to 4, show significant relationships between most of the predictors and the dependant variable. Models 1 to 3 and Model 4 are significant at 5% and 10% confidence level respectively. However, the follow-

ing variables have no significant relationship with the dependent variables household consumption (Y-O-Y), GDP growth rate and Internet usage in Model 1, in Models 3 and 4, and in Model 1 and 3 respectively.

Table 4. Regressions results for Models 1 to 4 financial inclusion as a dependent variable

	Model 1: <i>logFINCusINT</i>	Model 2: <i>logFINCusCELL</i>	Model 3: <i>logFINCavINT</i>	Model 4: <i>logFINCavCELL</i>
<i>Intercept</i>	-1.015631 (0.04577)***	-1.085278 (0.12275)**	-1.191271 (0.057135)***	-1.223234 (0.088802)***
<i>logINTus</i>	-0.00353 (-0.001261)		-0.003088 (-0.002199)	
<i>logCBBRAus</i>	-1.624224 (0.080972)***	-1.772595 (0.171303)**		
<i>logATMus</i>	1.370565 (0.070725)***	1.493008 (0.160193)**		
<i>logCELLus</i>		-0.00182 (-0.006038)		-0.001093 -0.006617
<i>logCBBRAav</i>			-1.64314 (0.104005)***	-1.722659 (0.152316)**

Table 4 (cont.). Regressions results for Models 1 to 4 financial inclusion as a dependent variable

	Model 1: logFINCusINT	Model 2: logFINCusCELL	Model 3: logFINCavINT	Model 4: logFINCavCELL
<i>logATMav</i>			1.405087 (0.086209)***	1.461073 (0.13151)**
<i>ATMcomp</i>	0.00004630 (0.00000162)***	0.0000454 (0.0000045)**	0.00004830 (0.00000226)***	0.0000494 (0.0000038)***
<i>HHcons</i>	-0.073042 (-0.032581)	-0.030875 (0.11784)**		
<i>GDP</i>			-0.081736 -0.053313	-0.090009 -0.11869
<i>R²</i>	0.999901	0.999201	0.99969	0.999103
<i>Durbin Watson</i>	3.18452	2.823079	3.272186	2.218494
<i>F-statistic</i>	2029.376	250.2317	644.8458	222.7354
<i>Prob (F-statistic)</i>	0.016852	0.047956	0.029888	0.050825

Source: ***significant at 5%, **significant at 10%.

In model an increase in 1 unit of bank branch usage will lead to an increase in financial inclusion by 1.3 units, whilst an increase in 1 unit of ATM usage will lead to a decline financial inclusion by 1.6 units. However ATM complaints 1 unit leads to a minute increase in financial inclusion by 0.0004 units. In Model 2, the results for bank branch usage on financial inclusion and cell phone usage on financial inclusion lead to a negative relationship. More so household consumption seems to decrease financial inclusion. But on the other hand there is a positive relationship between financial inclusion and ATM complaints though the magnitude is on smaller scale. The results of Model 3 show a positive relationship between ATM availability and financial inclusion, and also between ATM complaints and financial inclusion. However GDP has no bearing on financial inclusion and this contradicts studies done by Sama & Pais (2010) and Hariharan and Marktanner (2013) where they found that GDP had a significant positive relationship with financial inclusion. However, they used GDP per capita and GDP per worker respectively in their calculations and we used GDP growth rate. More so

their proxies for financial inclusion were formal sector employment and account at a formal institution respectively.

In the results presented in Table 5, it can be observed that Models 5 to 7 show insignificant relationships between the dependant variable and the predictors. Only Model 8 has a significant relationship at a 10% confidence level. In Model 8, an increase in 1 unit of cellphone usage results in an increase in financial exclusion by 0.17 units. More so an increase in one unit of bank branch availability results in an increase in financial exclusion by 2.9 units. However an increase in one unit of ATM availability results in a decrease in financial exclusion by 2.6 units. As well, an increase in ATM complaints results in a decrease in financial exclusion by 0.0002 units. In Models 5 to 8 there is no significant relationships that can be explained. Thus in Model 8 it is conclusive to say that financial exclusion is reduced by people adopting ATMs than using cellphone banking and branch banking. More so ATM complaints have less bearing on explaining why people are not using it for banking transactions.

Table 5. Regression results for Models 5 to 8 financial inclusion as a dependent variable

	Model 5: logFINXusINT	Model 6: logFINXusCELL	Model 7: logFINXavINT	Model 8: logFINXavCELL
<i>Intercept</i>	1.284046 (3.425461)	1.927286 (0.677083)	2.134391 -2.4115	1.521364 (0.245378)
<i>logINTus</i>	-0.024557 (-0.094345)		-0.033904 (0.092804)	
<i>logCBBRAus</i>	5.206751 (6.059992)	3.806502 (0.944851)		
<i>logATMus</i>	-4.031871 (5.293129)	-3.394125 (0.883571)		
<i>logCELLus</i>		0.160599 (0.033302)		0.173845 (0.018285)**
<i>logCBBRAav</i>			5.431993 (4.389704)	2.861326 (0.420880)**
<i>logATMav</i>			-4.255847 (3.638593)	-2.553442 (0.363389)**

Table 5 (cont.). Regression results for Models 5 to 8 financial inclusion as a dependent variable

	Model 5: logFINXusINT	Model 6: logFINXusCELL	Model 7: logFINXavINT	Model 8: logFINXavCELL
<i>ATMcomp</i>	-0.000127 (0.000121)	-0.000137 (0.0000248)	-0.000144 (0.0000955)	-0.000158 (0.0000105)***
<i>HHcons</i>	0.719768 (2.438389)	-1.148624 (0.649965)		
<i>GDP</i>			1.121227 (2.250171)	-1.242699 (0.327964)
<i>R²</i>	0.906896	0.995902	0.906832	0.998845
<i>Durbin Watson</i>	3.18452	2.823079	3.272186	2.218494
<i>F-statistic</i>	1.948144	48.60118	1.946659	172.8961
<i>Prob (F-statistic)</i>	0.494229	0.108457	0.494384	0.057673

From all the regression runs done it can be observed that between the period under study (2007 to 2013), financial inclusion is being done mainly through ATMs. Branch banking with corresponding banking through internet and cellphone banking are weakly driving the financial inclusion in South Africa. The bureaucracies in transacting through the branch are driving most people to use ATMs instead. However with the increasing cases of muggings and frauds related to using ATMs it is surprising that most people would opt to use it for banking during this period. ATM complaints have no strong bearing in explaining whether people are financially excluded by not using internet and cellphone to do banking. It is also a paradox that South Africa has the highest mobile phone penetration in Africa but has no corresponding increase in mobile phone banking. The availability of money transfer agent network through popular retail shops has rendered most money transaction not favorable being done through the cellphone. This coupled with high levels of cellphone banking fraud schemes, it seems most South Africans who were unbanked chose to utilize brick-and-mortar banking than electronic banking. A skewed more urban and less rural population, improved road infrastructure, more cars per 1,000 people and more tarred roads per 1,000 km², might be the additional factors that explain how branch banking and ATM banking is more convenient than electronic banking.

Conclusion

The main implication of this study is that the policy makers will need to reconsider mobile banking as a tool for financial inclusion in South Africa. This explains why M-Pesa failed in South Africa and succeeded in Tanzania based on development factors of road network, bank branch availability, ATM availability per 1,000 people and urbanisation when comparing the two countries. The banking system is so well developed in South Africa in such a way that the large part of the population is so close to ATMs and bank branches compare to Tanzania. Thus the cellphone technology and agent

banking was more convenient in assisting to spur mobile banking in Tanzania compared to South Africa. The main recommendation will be for the policy makers and banks in South Africa to combine mobile banking and agent banking which will foster the use of electronic banking as financial inclusive tool in South Africa. Unlike in Tanzania cellphone technology was the base and the agent banking system was driven from the cellphone banking system.

However in South Africa, the agent banking system is more robust than the cellphone banking system, and therefore it will be imperative that it be driven from the established agent banking systems of the likes of Shoprite, PEP, Checkers, Pick “n” Pay money transfer systems. More so issues of stringent regulations in operating financial services system in South Africa compared to the M-Pesa system in Tanzania has hampered the growth of innovative transactional banking that can increase financial inclusion. Therefore, there is a need to review some of the stringent requirements that hamper financial inclusion through electronic banking.

This study could have been robust if the data series was long enough to give more trends to the analysis. More so the absence of complete data to some initially chosen variables such as Mzansi Account usage, electricity usage, percentage of population in poverty and so forth could have been able to explain the barriers to financial exclusion than those being sought in this study through electronic banking complaints. With data availability in the future, it is recommended that future research be done on financial inclusion barriers of electronic banking in South Africa and unlock electronic banking as a catalyst for financial inclusion. Another important study will be research of the best model electronic banking and financial inclusion in South Africa and thus help the policy makers and bankers in crafting an effective financial inclusive policy. The other subject to be researched is the twining of agent banking and cellphone banking in South Africa. The study concentrated mainly on financial inclusion

with bias to transactional banking and did not look at other financial aspects such as insurance and credit.

The demise of electronic banking as a financial inclusion driver, explained through electronic banking complaints, has been explored in this study. The study has realized that during 2007 and 2013, electronic banking complaints could not explain fully why electronic banking is not being adopted for financial inclusion in South Africa. It has been observed that branch banking and ATMs are mostly used in financial inclusive drive. This can be observed by the increase in Mzansi accounts which

targeted the unbanked. The fact that there is a wide branch network, good road network, ATM availability and alternative formal channels of banking South Africa has rendered internet banking and cellphone banking a privy of the middle and upper income classes. This explains why the proxy for electronic banking complaints remotely clarifies why electronic banking is successful in being a financial inclusion tool and ATM and branch banking is. It is envisaged that this study will help banks in solving the issue of increasing electronic banking in the Mzansi account which is a target for the unbanked and help the bank regulators redefine and foster banking innovation in financial inclusion.

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