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ADOPTION OF MOBILE BANKING SERVICE IN RURAL NIGERIA

Master´s Thesis
in Information Systems Science (Global Information Technology Management)

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Table of Contents

List of figures

List of tables

1 INTRODUCTION

1.1 Research area

A lot of progress has been made in electronic banking and financial services in developing economies. Most individuals in the cities of developing countries have relatively easy access to open bank accounts. It has become the norm for banks to provide several channels of banking services outside the banking hall such as ATM, online and mobile banking services. This enables account holders with access to such channels to use services such as paying bills, transfer money and pay for goods and services online. Despite this progress, there is a large population in developing countries without bank accounts otherwise referred to as the unbanked. Nevertheless, high penetration of mobile phones in developing countries has provided a means through which banks and other financial services can reach out to the unbanked. For instance, 89% of the people surveyed in Nigeria by the Pew research centre have either smart phones or cell phones (Pew Research Center 2015). On the other hand, 64% of Nigerians do not have access to financial services (CBN 2013). The proliferation of mobile phones in Nigeria presents a channel through which to increase access to digital financial services.

1.2 Research gap

Several studies have been conducted to shed light on what factors influence the adoption of mobile banking services in developing countries such as India, Bangladesh, Ghana and Nigeria (Bhatt 2016; Rahman & Sloan 2015; Tobbin 2012; Oluwatayo 2013). A literature review on the study area identifies two research gap. The first research gap identified is that most research within the study area in Nigeria have mainly concentrated on user adoption of online (not mobile) banking service. This leaves out detail on mobile banking services which by design and concept offers an alternative solution to providing banking services to the poor and unbanked in developing countries. The second research gap is a lack of sufficient regional and urban/rural context in the study area. User adoption of mobile banking service is highly dependent on the context such that one dimension that contributes significantly in one context may not be applicable in another context (Jeong & Yoon 2013). For instance, the adoption of mobile money banking services has been very successful in Kenya but it has had limited success in Nigeria. Though both countries share similarities in context

as developing countries, high penetration of mobile telecommunications and high population of poor and rural areas (Llewellyn-Jones 2016). A significant part of similar studies on the adoption of mobile banking services in developing countries have focused on either urban/metropolitan areas or particular groups within the population such as students, teachers and citizens of the developing country living in the diaspora (Olasina 2015; Dalhatu et al. 2014). This thesis is an attempt to bridge the research gap in adoption of mobile banking service in rural context of northern Nigeria. The Northern part of Nigeria has a relatively high poverty percentage and rural population compared to the southern and western parts of Nigeria (NBS 2012). Further discussion on this section is provided in subsection 3.4 – literature gap.

1.3 Research question

The motivation for this research is based on the linkage between an improvement in socio-economic development and the use of mobile phones and mobile banking services (Renteria 2015). Nigeria still has a high number of unbanked population that are excluded from participating in the formal economy. For instance, farming is a major means of livelihood in rural areas. Farmers need access to facilities such as credits, fertilizers, machineries, seeds among others. Having a bank account makes it easier to access some of these facilities provided by the government and other agencies. A large population of the rural areas have mobile phones as indicated in research studies. Hence, mobile banking can be used as a viable channel to reach out to the poor and unbanked rural population. Given the research gap in the previous section, the research question that guides this thesis is to examine:

What factors influence the adoption of mobile banking service in rural Nigeria?

Addressing this research question could help reduce the barriers of access to financial institutions in the rural areas. The research question is answered by a review of previous literatures in the topic area and a quantitative research approach. The quantitative aspect relies on data gathered from conducting a survey in rural areas of Nigeria.

1.4 Scope of the study

The thesis research attempts to cover adoption of mobile banking services which in this research is defined as the use of a mobile phone as a means of financial platform to conduct any form of banking service. The banking service could be accessed through the phone by a browser, a downloaded app or short message service (SMS). An SMS

can be dialling a format of code or sending text to execute a service transaction. By implication this covers services that are provided by conventional banks and mobile money operators.

1.5 Chapter outline

The chapters of this thesis study are ordered into the following themes: Introduction, Background, Literature Review, Theoretical Approach and Research Model, Empirical Study and finally Discussion and Conclusion. Chapter 1 presents a brief introduction into the context of the research topic and identifies the gap in research. It proceeds with specifying the research question that guides the thesis study and defines the scope study. It then concludes with a brief description of the chapters that constitute the thesis study.

Chapter 2 provides a necessary extensive background of the study. It expounds on the context of key themes that are connected to the study. The key themes are discussed by providing term definitions, historical relevance and a current assessment of the situational context with regards to the sphere of study.

Chapter 3 presents an overview of the main theories and empirical results from prior literatures. It starts with an outline of the methodical approach adapted in conducting the literature review. The chapter then continues with a delineation of key theories and empirical results in relation to the research question that drives the study. The identified gap in literature which culminated from the discussed literature review is then enumerated to conclude the chapter.

Chapter 4 looks at both the theory and hypothesized research model. First, it examines the technology acceptance model as the theory adopted in the empirical study investigation by explaining the foundations of the theory and justification for its use in the study. Secondly, the chapter details an overview of the adapted research model and further expounds on each of the theoretical constructs in the model.

Chapter 5 begins with an explanation of the foundations and framework that guides the research. The structure of the elements in the framework is then adapted as a blue print for narrating the philosophical assumptions and chosen research approach of the study. It is upon this basis that the steps from data collection to the presentation of the findings are detailed.

Chapter 6 provides a general discussion on the research results and brings the thesis to a close by reiterating the answer to the research question of this thesis. In conclusion, it presents an outline of the practical and theoretical implications that can be drawn from the study and the limitations of the study is noted.

2 BACKGROUND

World bank report states that the percentage of adults without bank accounts fell from 49 % to 38% between 2011 and 2014 (The World Bank 2015). This trend is largely driven by the increase in account ownership in developing countries and the role of technology such as mobile money accounts in Sub-Saharan Africa. Despite the decreasing trend of people in the world without a bank account, there is still about two billion unbanked adults in the world. Among the several reasons there is still so many people without bank accounts is poverty, illiteracy and lack of infrastructures in developing countries. In these countries, financial institutions such as banks and insurance companies often leave out rural areas as target market. Because of the scope of study, further illustration is limited to banking institutions. Banks are not so eager to penetrate the rural areas or provide banking services to the poor as compared to the urban areas (Mohan & Potnis 2015). The number of bank branches in rural areas is far less compared to urban areas. Therefore, rural population has less access to financial services compared to their urban counterparts in developing economies.

High penetration of mobile phones in developing countries has provided a means through which banks and other financial services can reach out to the unbanked. For instance, 89% of the people surveyed in Nigeria by the Pew research centre have either smart phones or cell phones (Pew Research Center 2015). With 27% of the respondents having smart phones and 62% have cell phones but not smart phones. Use of mobile phones is increasingly becoming part of people's everyday life in developing countries such as Nigeria. Financial and non-financial institutions such as telecom companies have developed different services that target people with mobile phones and do not have bank accounts. There are three ways by which a user can access banking services with a mobile phone. The user accesses a banking service through a web browser, a downloaded application or by sending an SMS message (Donner & Tellez 2008).
Mobile banking covered in this thesis is defined as ''*banking transactions using mobile devices such as cellphones, PDAs (Personal Digital Assistants), smart phones and other devices (except for laptops)*'' (Lee & Chung 2009)). The banking service is provided by either a conventional bank or a mobile money operator. Mobile money operators (MMO) provide two forms of banking service. One requires the user to own and use a mobile phone as a platform for making financial transaction. Another banking service provided by an MMO do not require the user to own a mobile phone. In this case, banking services are offered through an agent. Subsection 2.5 of this chapter is dedicated to discussing the concept of mobile money operators and its implementation in Nigeria.

Tobbin discusses two models in which mobile banking services can serve as an "additive" model or "transformational" model (Tobbin 2012). As a transformational model, mobile banking services is used to target the unbanked that are predominant in largely poor regions. The impact of such transformation can be witnessed in countries like Uganda, Kenya and Zimbabwe (EFInA 2016). A transformational banking model can also help the Nigerian government to achieve its' vision of reducing cash flow and the digital financial exclusion of people from the formal cash economy. As an additive model, mobile banking services complement other banking services such as ATMs, telephone banking, smart cards, point-of-sale networks and internet based banking. This type of service is very common in the developed world and presumably in urban regions in developing countries. Adopting a transformational model of banking service can help transform the lives of the poor and unbanked through the economic opportunities and market opportunities that can be derived from access to financial services (Mohan & Potnis 2015). As a platform, mobile phones can be used for banking service in rural areas thereby making banking accessible and affordable (Donner & Tellez 2008). Mobile banking service provide an effective means to save and have easy access to finance which provides a safety net in emergency situations such as payment for hospital bills in life threatening situations.

2.1 Rural areas in Nigeria

The rural areas in Nigeria like any other developing country is far less developed than the urban areas. A significant proportion of the rural population depend on agriculture as a means of livelihood (Ogunkoya et al. 2015). There exists a structural equality difference between rural areas in terms of access to basic infrastructure, level of literacy, training and employment opportunities (Unicef 2012). This results in a social-economic difference and marginalization of rural areas. Nigeria's population is about 182 million (NPC (National Population Commission) 2016). It has the largest population and economy in Africa (IMF (International Monetary Fund) 2016). However, fifty-two percent of its population live in rural areas (The World Bank 2016). Sixty-six percent of the rural population of Nigeria live in absolute poverty when poverty is defined as a dollar per day an adjusted with the purchasing power parity (PPP) of Nigeria. The Nigerian government has rolled our several programmes and policies targeted towards the development of rural areas. However, much of these efforts have had limited success (Ogunkoya et al. 2015).

2.2 Adoption of information technologies as channels of branchless banking

Adopting new technologies in different sectors of a country brings improvement and modernization of different sectors such as banking, commerce and government. New technologies help to improve the lives of people and society. The extent to which they bring transformation depends on the degree to which such society accepts and adopts the technologies (Tarhini et al. 2015).

According to Tarhini et al. (2015), internet technologies has incredibly impacted how banks operate and how they serve their customers. Their article specifically discussed adoption of online banking in the context of internet. Availability of internet provides the option of online banking to customers which enable them to pay bills, check account information and transfer funds from anywhere and at any time. Banks and their customers both benefit from the adoption of online banking. Online banking can help banks save cost, improve quality of service and increase revenue.

Rapid growth and advancement in information technologies led to the evolution of alternative channels of banking services such as branchless banking. The significance of this evolution is seen in how banks continue to develop the means to service customers by offering branchless service. Branchless banking is defined as the delivery of "*financial services outside conventional bank branches, using agents and relying on information and communications technologies, such as card-reading, point-of-sale (POS) terminals or mobile phones, to transmit transaction details*" (Lee & Jaramillo 2013). This affords the customer to access bank services around the clock and remotely without having to visit a bank branch. The Automated Teller Machine (ATM) was deployed as the first Self-Service Technologies(SST) utilized by banks that led the way for banks to provide banking service for customers outside the four walls of the bank branches.

Along the line, telephone banking emerged in which banks offered customers the means to carry out financial transactions through phone calls. The exploration of the use of internet technology in the mid-1990s and mobile telecommunications technology led to the era of online banking as a channel of performing financial activities conducted over the worldwide web platform (Callaway & Jagani 2015). High penetration of mobile phones and a large presence of tele-communication companies in urban and rural areas makes mobile phone based banking a viable and promising form of branchless banking. In view of mobile telecommunications being a key part of the form of branchless banking that this thesis addresses, the following section gives a background on mobile telecommunication in Nigeria.

2.3 Mobile telecommunications in Nigeria

The Global System for Mobile (GSM) technology was introduced in Nigeria in 2001. The decision by the Nigerian government which is widely credited to the then President Olusegun Obasanjo facilitated the entry of private companies into the telecommunication sector. Four mobile telecommunication companies were granted license between year 2001 and 2002. Since then there has been a remarkable increase in the number of mobile phone users (Ubabudu, 2013). There are still four main mobile telecom operators in Nigeria namely MTN, Airtel, Globacom and Etisalat. The telecom sector has grown to become a significant part of Nigeria's economy. It makes up 8.83% of the Nigeria's GDP (NBS 2016).

The number of GSM subscribers has increased exponentially from 2.27 million registered lines (NBS (2015) to about 147 million in March 2016, (NBS 2016). It is not uncommon for one individual to subscribe to two or more mobile network operators in Nigeria especially in the urban area. One of the reason for owning more than one mobile line is the variation in quality of network coverage. Another reason is that people try to take advantage of the various offers by different mobile network operators. The number of GSM internet subscription is approximately 92 million (NBS 2016). However, the penetration of internet in rural areas is poor (Okeke et al. 2015).

2.4 Mobile banking services provided by banks

Mobile banking in Nigeria is relatively a new phenomenon compared to developed countries. Banking reforms and a bid for Nigerian banks to be competitive on a local and global landscape has led to the use of technologies as an alternative means to serve customers outside banking halls. The development and deployment of these mobile technologies by banks provide an alternative means for banks to improve the quality of their service, reduce cost of operation and increase bank penetration. This is also in line with the central bank of Nigeria's cashless policy.

The cashless policy of the central bank of Nigeria drive issues such as reducing the high cost of managing cash by encouraging electronic based transactions, drive digital financial inclusion and reduce the cost of safety and security risks associated with moving cash. (CBN (Central Bank of Nigeria) 2014). To make opening a bank account easier the central bank of Nigeria introduced a three tier Know Your Customer requirements for banks (CBN 2013). The first tier of the requirement enables banks to register customers with just passport photographs and without a valid identity card.

However, there is a restriction on the amount of money and transactions made by the account. Banks have started to implement these requirements.

Mobile banking services are provided in part as an extension of a bank's online service. Banks also offer SMS banking services. For example, a bank account holder can send a specified format of an SMS to transfer money to a recipient in same or different bank as the sender. Despite the advantages that mobile technologies bring to the users, banks and Nigerian economy, the use and adoption of these technologies in Nigeria is very low compared to many developing countries and some other sub-Saharan countries. About two-thirds of Nigerians with banks accounts have never tried their bank's online platform (KPMG 2016). Some of the issues that inhibit the adoption of mobile/online banking identified in research are , security, trust, difficulty in the usage, lack of awareness of the benefits, religion or cultural believes (Tarhini et al. 2015).

2.5 Mobile banking services provided by Mobile Money Operators

Mobile money is a form of limited mobile banking service that started with enabling consumers without bank accounts to send and receive money with mobile phones. It has currently evolved into a platform that offers limited additional financial services such as taking loans and insurance. Mobile Money Operators (MMO) are the service providers that provide these limited banking services such as Firstmonie in Nigeria, M-Pesa in Kenya and G-Cash in Philippines (David-West, 2015; Mohan and Potnis, 2015). These kinds of service are not relevant in developed countries because of the saturation in the number of people with bank accounts and easy access to internet required for online banking. It is very common for telecommunication companies to either lead or partner with other financial institutions in providing the mobile banking service for customers.

In Nigeria, mobile money is licensed and regulated by the central bank of Nigeria (CBN). The service is implemented in two models which are 1) Bank-led and 2) Non-bank led (CBN 2015). In the bank-led model, either a bank alone or in collaboration with other banks or any other approved organization provide mobile money banking services. In the non-bank led model, a licensed organization by the CBN provides mobile money services to its customers. Nigeria, Africa's most populous country has produced less success in comparison to other East-African countries and Kenya.

The success of mobile money in Kenya can be attributed to a telecom led arena with a major competent telecom operator, a low-regulation environment, high telecom penetration, a large unbanked population, and cultural appreciation of market innovation. Nigeria has similar conditions like in Kenya such as a high telecom

penetration and a large unbanked population however, it has achieved limited success in comparison to Kenya (Llewellyn-Jones 2016). Some of the constraints to the success of digital mobile money in Nigeria as discussed by David-West (2015) were categorized as internal and industry issues within MMOs as well as the regulatory framework that governs their operation.

Mobile money schemes provide services such as payment from person to person (P2P), crediting mobile airtime and utility retail payments. Some MMOs offer cash-out services in which cash withdrawal can be made from ATM instead of agents. This can be very useful service in rural areas that have access to ATM. (David-West 2015).

3 LITERATURE REVIEW

3.1 Literature review methodology

There exists a number of approaches and guidelines in the information systems field for writing literature reviews (Boell & Cecez-Kecmanovic 2015). The literature review process adapted in this research is closely related to a less strict version of the systematic literature review as described by Boel and Cecez-Kecmanovic. Criteria for searching and inclusion/exclusion of literatures were predefined. However, the author kept an open mind during the research process to depeen knowledge in topic area and refining what research question emerges. The final research question then emerges through an engagement during the literature review process in line with what interests the author. Therefore, the literature review process is closely associated with the gudielines given by (Wolfswinkel et al. 2013). The guideline follows that an IS researcher should define, search, select, analyze and present their finding through an iterative process. However, the thesis author did not stricly follow the analyze stage in the grounded theory approach proposed by Wolswinkel et al. One reason for this is that the guideline was followed as a process to achieve a systemic process in the literature review stage rather than emerge with a theory or concept from analyzing the literatures.

Wolfswinkel et al. point out that it is essential for researchers before starting a project review to have an explicit view of the topic and scope of the review (Wolfswinkel et al. 2013). In line with this view, the thesis author had in mind to study electronic/digital banking in rural areas. With more research and gained insight during the review processs in the topic area, it became obvious to narrow the research to mobile banking in rural nigeria. This kind of review process conforms with what Okoli and Schabram (2010) describes as a theory-landscaping review.

EBSCOhost research database is used as the main search engine in this review. The literature review was conducted in two stages. The first stage was a preliminary investigation to gain deeper understanding in the topic area. At this stage, the author carried out searches with 3 keywords: 1. “online banking” & “Nigeria”, 2. “electronic banking” & “Nigeria” 3. mobile banking” & “Nigeria. Identified sources relevant to the topic area were looked into while going through the selected articles that came up from the search. The second stage of the literature review was to narrow down the search to select articles that have specifically examined the adoption of mobile banking services in rural, poor and unbanked countries. The search words were “mobile”, & “banking” & “unbanked” OR “rural” OR “poor”. A set of criterias to determieg which studies to include where applied.

First criteria was that the source should be either peer reviewed or presented in an academic conference. Exceptions were made later such as publications in a reputable instituion and content value of the publication. For example the inclusion of Llewellyn-Jones (2016) article.

Second criteria of selection was that the studies should have a focus on the user or customer perspective of mobile banking. It is very typical that these kind of studies would have sampled the actual users of the technology. Majority of the selected studies for review had users as the main sample with the exception of two articles by David-West (2015) and Llewellyn-Jones (2016). The articles gave very good insight into mobile banking technology and how it affects users of the technologies in Nigeria but did not sample users of mobile technology.

Based on the two selected criteria, nine articles were selected for the first stage of reviewing internet banking in Nigria and four articles for the second stage of the review process of mobile banking adoption in Nigeria. The articles appeared in mostly academic journals and one conference paper between year 2007 and 2016. A cross examination of other relevant studies within and outside Nigeria that provided insight to the topic area are also integrated into the literature review. Appendix 1 presents a list of tables with an extensive list of selected literatures. The next two sections of this chapter discuss first, research work and findings that relate to mobile banking and second, internet/electronic banking in the context of Nigeria.

3.2 Review of literature on mobile banking in Nigeria

Overview: Four articles that have examined adoption of mobile banking services in Nigeria as identified during the search are presented in table 1. Several researches have been conducted on adoption of mobile banking services both in developing and developed countries. There appears to be an overwhelming number of literatures on the topic in recent times from developing countries such as India, Pakistan, Kenya, Ghana by just performing a quick search. However, the number of published articles that have specifically considered adoption of mobile banking in rural areas is scant. Few studies found in the search that have looked into adoption of mobile banking service in rural regions outside Nigeria were conducted by Tobbin (2012) and Kishore & Sequeira (Kishore & Sequeira 2016). Table 8 and 9 under appendix 1 provide details of studies that have considered mobile banking within and outside the perspective of Nigeria.

Table 1 Selected literatures on mobile banking in Nigeria

Article	Research region/location	Sampled population of the studies	Theoretical model
Oluwatayo 2013	Rural	360 farming household	socio-economic characteristics
Olasina 2015	University	500 students and university staffs	UTAUT
Bankole et al.2011	Not Specified	231 experienced users of mobile banking service	Conceptual model based on UTAUT
Faniran & Odumeru 2015	Urban	295 usable response from bank customers	Conceptual model based on TAM

Tobbin (2012) carried out an exploratory qualitative study in rural areas in Ghana. The outcome of his study provides a rich contribution and a model into identifying factors that influence the intention to adopt mobile banking services in rural population. The factors uncovered in his findings were linked to perceived ease of use, perceived usefulness, perceived trust, perceived economic factors, convenience, affordability, age and gender. Kishore & Sequeira (2016) investigated mobile banking service adoption in rural Karnataka, India. The findings of their studies reveal that performance, expectancy, effort expectancy, social influence, attitude, and perceived risk influence on behavioural intention. Age and gender were found to have some moderating effect and will be discussed in detail in below heading. A review of the selected core literature in table 1 identifies several factors that have been found to influence mobile banking adoption in Nigerian context. Aside demographic factors of age and gender, perceived usefulness and perceived ease of use were the most common factors that were used and found to predict intention or usage in mobile banking adoption Nigeria (Olasina 2015; Faniran & Odumeru 2015). There are far more factors found to predict intention and usage outside the research that have focused on Nigeria with regards to mobile banking. Therefore, the author draws on the other literatures especially from developing countries that have considered mobile banking adoption.

Theories: Adoption of mobile banking technology like any technology can be approached in different ways. The study by Oluwatayo (2013) focused only on the socio-economic characteristics in examining adoption. Majority of the literature have focused on using a theory that examines the adoption of mobile banking as a technology and other influential variables. The two most commonly used theories in this context are the TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology) Shaikh & Karjaluoto (2014). At the core of TAM adoption

theory is that perceived usefulness and perceived ease of use are the significant determinants of adopting a technology (Davis 1989). One of the studies in table 1, adopted TAM to develop a conceptual framework to investigate mobile banking adoption (Faniran & Odumeru 2015). The study integrated perceived risk, facilitating conditions, attitude and demographic variables to TAM. Tobbin (2012) used key TAM constructs as a guiding theme to seek for intention to adopt among participants in a focus group discussions. The outcomes of his qualitative study were then used to provide insight to the existing TAM constructs and the design of a model for future investigation of a mobile banking adoption. Interestingly just one of the selected literatures used TAM in examining mobile banking adoption in Nigeria. A systematic literature review conducted by Shaikh & Karjaluoto (2014) on mobile banking in general shows that TAM is the most widely used theoretical model.

The other widely used theory is UTAUT which was developed by Venkatesh et al. (2003) and is an extension of TAM. At the core of UTAUT theoretical model, is that the motivation of a user's behaviour such as performance expectancy, effort expectancy, social influence, and facilitating conditions influence on behavioural intention and eventual adoption (Shaikh & Karjaluoto 2014). Min et al. (2008) revised the UTAUT theory for investigating adoption of mobile banking and based on this revised model Bankole et al. (2011) devised a conceptual model based on UTAUT in their studies mobile banking adoption in Nigeria. Another study that adopted UTAUT in examining adoption of mobile banking in Nigeria revealed that gender, customer service, type of bank, perceived usefulness, perceived ease of use, social influence, behavioural intention and ICT skills are all significant in influencing behavioural intentions (Olasina 2015).

Demographics: The impact of demographic characteristics on a user's adoption of mobile banking service has been extensively studied. For example, Riquelme and Rios (2010) and Yu (2012). Age, gender, educational status and income level or poverty level have been examined to be important elements that influence on the use of mobile phones as a banking platform.

Oluwatayo (2013) examined the role mobile phones in the use of mobile banking services among farming households in southwestern region of Nigeria. His studies show that age and gender both influence on the adoption of the mobile banking services. Same study also found that as age and literacy level increases, the usage of mobile phones as a banking platform increased. The influence of age appears to be a weak determinant based on empirical evidence.

Kishore & Sequeira (2016) , also noted in a recent study that examined adoption of mobile banking service in rural Karnataka, India that age strengthened the relationship between attitude and behavioural intention. Tobbin (2012) noted that age and gender may have an impact on how individuals in rural areas perceive the ease of use of mobile

banking services based on a qualitative study. However, Faniran & Odumeru (2015) arrived at a different conclusion in their study that gender had no influence on the adoption of mobile banking in a survey conducted in Lagos state.

Another study that conducted a research on how gender moderated the adoption of mobile banking reveals that the moderating effect of gender of perceived ease of use is evident among women that have used their mobile phones for electronic banking (Riquelme & Rios 2010). Same study also shows that the significance of social influence is more relevant among women than men. Contrary to Oluwatayo's (2013) findings that there is positive association between increase in education and adoption, Mustapaha's (2016) research outcome, shows a weak negative relationship between education level and the adoption of mobile banking services provided by mobile telecom operators.

A similar study conducted in Ghana highlights the significance of social and cultural environment on adoption in relation to demographics factors (Crabbe et al. 2009) with regards to income or poverty level. Another study conducted in rural Nigeria indicates that an increase in household size and poverty status are negative determinants for mobile phones to be used as financial platforms for transactions. Part of the reason for this as noted in the study is the significant cost for poor people to charge their batteries and buy recharge cards (Oluwatayo 2013). However, the results of another study conducted in an urban region on the impact of income level on usage suggests that individuals with low income are more likely to use electronic banking (Okeke & Okpala 2014).

3.3 Review of internet/electronic banking in Nigeria

A recap of the definition of mobile banking adopted in this thesis is that mobile banking is viewed as transactions using mobile devices such as cellphones, PDAs (Personal Digital Assistants), smart phones and other devices laptops excluded'' (Lee & Chung 2009). As mentioned earlier in the background section, a user can access banking services with a mobile phone through a web browser, a downloaded application or by sending an SMS message (Donner & Tellez 2008; Bhatt 2016). Accessing a bank service through a web browser or a downloaded application both require access to the internet. It is the view of the thesis author that internet/electronic banking are a component of mobile banking as discussed in literature. The scope of study of many studies on internet/electronic banking have not explicitly excluded people that use their mobile phones to access their online banking via internet. Hence, the discussion of the literature of internet/electronic banking applies in some ways to mobile banking services accessed through a mobile phone's web browser or a downloaded application.

Tahrini et al. (2015) took a qualitative approach in investigating the adoption of online banking across a range of demographics such as age an income level while Okeke and Okpala (2014) research only focused on the relationship between demography and electronic banking in Nigeria.

The studies on online banking in Nigeria has not only been about adoption. Some studies have also examined the level of customer satisfaction when bank customers adopt online banking (Okeke et al. 2015). Okeke et al., (2015) examined customer satisfaction within online and e-banking services among Nigerian banks using the service quality dimensions.

Salimona et al. presented a conceptual study with a set of hypotheses that is yet to be tested empirically on the adoption of E-banking in Nigeria (Salimona et al. 2016). Perceived usefulness, and perceived security are hypothesized to have positive influence on adoption of e-banking, electronic satisfaction and electronic trust. Electronic satisfaction is hypothesized to have positive influence on adoption of e-banking, a mediating relationship between PU and adoption of e-banking as well as a mediating factor in the relationship between perceived security and adoption of e-banking. Electronic trust is hypothesized to have positive influence on adoption of e-banking, a mediating relationship between PU and adoption of e-banking as well as a mediating factor in the relationship between perceived security and adoption of e-banking.

Maiyaki & Mokhtar were the only researchers that conducted a study from the northern region in Nigeria with regards to electronic banking. Their work examined the effects of electronic banking facilities, employment sector and age-group on customers' choice of banks in Nigeria (Maiyaki & Mokhtar 2010).

Several studies have used an extended TAM model to investigate adoption of online banking such as (Oyeleye et al. 2015; Adesina & Ayo 2010; Dalhatu et al. 2014). Oyeleye et al., (2015) integrated TAM with customer's educational attainment while Adesina and Ayo (2010) integrated computer self-efficacy and perceived credibility into TAM. Perceived credibility as used by Adesina and Ayo consisted of security and privacy elements.

Okpala and Okeke's (2014) research reveal that males and graduates are more inclined to use electronic banking. Occupation also plays a role with electronic banking adoption while traders and technical/administrative officers are less inclined to using electronic banking. Students (secondary, graduate and post graduates) and apprentice are more inclined to use electronic banking. This might be related to the fact that they are young. In terms of ethnicity, the empirical evidence suggests that Yoruba's and Igbos have positive probability to use electronic banking. However, the sampling of ethnicity in a city predominantly consisting of the Igbo ethnic group is not very convincing. Despite this, the researchers concluded that ethnicity plays a role in adoption of electronic banking although the number of ethnic groups among the 246

observations was not explicitly stated. Singles have highest probability to use e-banking (Okeke & Okpala 2014). Another interesting aspect of their research is that it shows that people with lower income are more likely to use electronic banking.

Tahrini et al. (2015) grouped their findings of factors that influence online banking into literature based themes which are: 1) functionality, 2) risk and 3) context/convenience. Functionality consists of awareness, accessibility, and ease of use. Risks consists of trust, privacy and security. Understanding the context such as the convenience that online banking provides to customers influences on the adoption on online banking. Dalhatu et al. (2014) investigated online banking adoption by Nigerian retail bank customers by sampling Nigerian students and staff members at the Nigerian High commission in Malaysia. They added external constructs of trust, awareness and technology quality consisting of convenience and security and privacy. In line with the outcome of Tarhini et al. (2015), all the added component add influence on the perceived usefulness and perceived ease of use of online banking. Other reasons highlighted that influence the adoption of online banking is culture, relative advantage, support knowledge and literacy level (Tarhini et al. 2015).

Omotayo and Adebayo's (2015) research found no significant relationship between demographic characteristics of post graduate(PG) students and intention to adopt internet banking This may be due to the social context of which the studies were conducted. Oyeleye et al., (2015) research finding reveals that a customer's educational attainment plays secondary significant contribution to a customer's adoption of electronic banking. In other words, perceived usefulness and perceived ease of use of electronic banking was found to be positively influenced by the literacy level of customers. It is not hard to imagine that PG university students are within the set of demographics of higher educational attainment. Therefore, in line with the studies carried by Omotayo and Adebayo (2015), postgraduate students should not exhibit distinct characteristics when determining adoption of internet banking.

Okeke et al. (2015) result findings in investigating customer satisfaction indicate that price, security, perceived risk and responsiveness have influence on enhancing customer satisfaction. The implication of their findings emphasizes that security continues to be an issue before and after customers adopt online banking.

According to Maiyaki and Mokhtar (2010), age has an influencing factor on the choice of banks, old adults chose old banks and young adults chose newer banks. The employment sector also influences the bank choices. Public sector workers are more likely to bank with older banks when compared to private sectors worker.

Appendix 1 table 10 and 11 provide further details on the literatures that were reviewed on adoption of internet banking in and outside the context of Nigeria. Some of the main factors found to influence on adoption of internet banking are discussed below aside perceived usefulness and ease of use that are the most common factors found in

adoption literature. The discussion of these factors aims to provide the reader with a deeper insight and context into what the author reviewed from literature.

Awareness: Several non-users of online banking expressed that they have never heard of internet banking or considered it as an option. Other users thought using online banking was a very complex channel of banking with little importance. (Tarhini et al. 2015; Dalhatu et al. 2014).

Accessibility: Access to infrastructures such as internet, electricity and telecommunication services has been revealed by many researches to influence on adoption of internet technology. Both users and non-users complained of having access to limited internet both at work and at home. Those who have access to internet at work could be restricted by internet access policies. Cost can also limit access to online banking. Cost has two dimensions, one is the cost associated with the use of internet activities and another is the cost associated with the bank charges (Sathye 1999). For instance, Tarhini et al. used cost to refer to the cost of paying for internet and the lack of electricity which influences why users perceive it is not worth adopting online banking service. Internet access subscription in Nigeria is based on data consumed. Therefore, it can cost a fortune from one's income to spend time accessing the internet Okeke et al. used the term price as a definition of the two dimensions of cost charges as defined by Sathye. (Agwu 2012; Tarhini et al. 2015; Okeke & Okpala 2014)

Trust: Some of the people interviewed by Tarhini et al. expressed their lack of trust in the bank and banking staffs (Tarhini et al. 2015). It is very common for people to be suspicious of other people when it comes to sharing sensitive information and their money. Agwu pointed out that some customers do not trust the bank resolving their issues within rescannable time when they encounter problem using online banking (Agwu 2012). Okeke et al. used perceived risk as a construct but in similar meaning as trust in the sense that customers think what will happen if something goes wrong when using internet banking (Okeke et al. 2015).

Privacy: Users and non-users did not consider the use of their details by authorized or non-authorized parties as an important factor to consider when adopting online banking. (Agwu 2012; Tarhini et al. 2015; Adesina & Ayo 2010; Dalhatu et al. 2014).

Security: Security was found to be a highly significant reason why non-users of online banking chose not to use the technology. A lot of people have been affected by online fraud, credit card scam and feel insecure about using online banking technologies. A lot of these non-users use ATM and are very comfortable with the convenience it affords them. However, they are aware of the security risks in using ATM cards such as stolen ATM cards and technical issues resulting in a payment being made twice. Therefore, they are wary of using another technology which means to them another security risk. (Agwu 2012; Tarhini et al. 2015; Adesina & Ayo 2010; Dalhatu et al. 2014; Okeke et al. 2015)

Literacy and occupation: Agwu's (2012) research finding suggests a link between occupation and literacy level influencing on the adoption of online banking. People with occupation such as a fisherman, bus driver, farmer are most likely to be less educated and less aware of internet banking services. (Agwu 2012; Okeke & Okpala 2014).

As noted in table 2, all the research conducted on internet/electronic banking were in urban region of the country. For instance, Tarhini et al. (2015) conducted a qualitative research by interviewing all its respondent from Lagos which is otherwise referred to as the commercial centre of Nigeria. Lagos state consist of highly and densely urbanized area. Aside, Salimona et al. (2006) that conducted a conceptual study which did not involve gathering field data, majority of the research on the topic were conducted using quantitative method and all have been from urban regions. The implication of this is that

Table 2 Selected literatures on internet/electronic banking in Nigeria

Articles	**Region**	**Sampled population of the studies**
Agwu 2012	Urban	20 interviewees
Tahrini et al. 2015	Urban	30 interviewees
Salimona et al. 2016	N.A	N.A
Adesina & Ayo 2010	Urban	292 bank customers
Okeke & Okpala 2014	Urban	400 retail banking customers
Dalhatu et al. 2014)	Urban	61 Islamic bank customers
Oyeleye et al. 2015	Urban	479 used responses from bank customers
Omotayo & Adebayo 2015	Urban	522 post graduate university students
Okeke et al. 2015	Urban	258 bank customers

while there is a lack of infrastructure as reflected in many developing countries, urban regions fair better in availability of infrastructures, job and income opportunities as well as access to the best banking services available in the country. It should be noted that despite radical investments in the technology within the past years in Nigeria, online banking is a new phenomenon and recent innovation in Nigeria compared to developed countries (Tarhini et al. 2015)). About two third of Nigerians said they have never tried

their bank's online platform (KPMG 2016). Therefore, it is no wonder most of the research on online banking in Nigeria has been focused on urban areas given that innovations tend to spread out first in large cities or urban areas ((De Blasio 2008)). Further, internet penetration is low and poverty is prevalent in rural regions and compared to urban regions. The transformational model of using mobile phones as means to provide banking services to the unbanked and poor population in rural areas makes it an interesting research area to focus on. Table 10 and 11 under appendix 1, present a table lists of selected literatures on internet banking internet banking adoption within and outside the context of Nigeria.

3.4 Literature gap

A review of identified literature with respect to internet banking and mobile banking in the Nigerian context revealed some gap in literature. As noted in the literature review, a cross examination of other similar studies outside Nigeria were integrated in the review. Reviewing literature on internet banking was considered necessary to address mobile banking accessibility through applications and browsers. However, SMS channels of mobile banking do not require internet and its context is left out from online banking literature. The gaps and limitations of the reviewed studies offer a path to which this study is posited. First, few studies exist in literature on mobile banking in Nigeria considering the diversity in Nigeria along the perimeters of urban and rural areas, as well as socio-cultural differences in regions. Social and cultural factors have been found to play significant role in adoption on banking technologies among users in developing countries (Crabbe et al. 2009; Tarhini et al. 2015).

Second, the demographic locations where majority of the studies in Nigeria have been conducted have mainly been in urban and metropolitan cities. Part of the reason might be linked to the relative ease for a researcher to gather data in cities where they have contacts than rural areas. The success of mobile banking in countries such as Kenya and Philippines show that mobile banking is part of the means to include the rural and the poor segments of a society with a large unbanked population. Therefore, research on adoption of mobile banking is needed in Nigeria to provide empirical evidence and help guide policy makers and relevant stakeholders on moving in the right direction. There has been very limited success in mobile banking in Nigeria (Llewellyn-Jones 2016; David-West 2015).

Third, demographic regions where studies on adoption of internet or mobile banking were conducted in mainly western and few eastern regions of Nigeria. Three out of the four selected articles in table 1 are from western regions while the region in the fourth article was not specified. Only one study in which the demographic location was from a

northern Nigeria showed up in the search but it was not included in the selected literatures because it did not specifically address the research topic. Based on the author's experience who is formerly based in the southern part of Nigeria, the proposal to carry out a research in the north aroused a lot of concern within the author's family and friends circle. The North is faced with security issues especially from recent Boko Haram terrorist attack. Hence, choosing a demographic location in the north requires extra care to be taken for a researcher not to end up in an unexpected security situation. Nevertheless, northern Nigeria has a large segment of rural areas and poverty relative to western and eastern part (NBS 2012) and by implication a supposedly large unbanked population. The second and third literature gap relate to urban-rural and regional context of studies specified in the research gap of the introduction chapter. The factors that influence the adoption of mobile banking services in rural area may have peculiar elements that differentiate it from that of an urban area and same might be true for the different regions. A key note here is that there is reason to have an empirical evidence to provide insight into the generalization or specification of factors that influence adoption of mobile banking in rural context.

Fourth, there is a limitation in the sampled population of studies. As observed in table 1 and 2, the study where the sampled region was in rural areas only targeted farming households. Another study targeted only students and university staffs. The study where the sampled region was not specified required all participants to have a functional bank account and already subscribe to mobile banking (Bankole et al. 2011, 7). The fourth study from table 1 implied that respondents from the studies were existing bank customers. The sampled population of the researches that have examined mobile banking adoption present a limitation. Prior studies in Nigerian context have not taken to account a significant section of people without bank accounts to understand what would influence their intentions to adopt the service. For instance, one study suggested a future research work that takes into considerations non-academics and a data-analysis that uses Structural Equation Model (SEM). (Olasina 2015).

4 THEORETICAL APPROACH AND RESEARCH MODEL

4.1 TAM

A recent systematic literature review on mobile banking adoption revealed that 42% of the studies reviewed applied TAM in their theoretical approach (Shaikh & Karjaluoto 2014). TAM as a theory originated from the theory of reasoned action (TRA) which is based on cognitive psychology (Silva 2007) and is widely applied in the field of IS. The TRA has been applied in social psychology to successfully predict smoking intentions and behaviours among smokers. For example, to predict how well a smoker receives advice to change his or her smoking behaviour (Grube et al. 1986). In similar manner, the application of TAM in information systems field has been credited to help in designing better user friendly interfaces and placing emphasis on the how productive and relevant an information system is to a user (Silva 2007). TAM is generally used to address why users accept or reject a technology as noted by Davis (Davis 1993). TAM proposes that an individual's perceived usefulness, perceived ease of use determines the behavioural intention and acceptance to use such technology.

According to TAM, perceived usefulness and ease of use are the two core predictors of usage intentions and actual behavioural use of the technology (Davis 1989). Perception is defined in the Cambridge dictionary as “a belief or opinion, often held by many people and based on how things seem”. Thus, the measurement of perceived ease of use when used as constructs are subject to a person’s belief with regards to accepting or using a technology rather than an objective reality. No matter how useful and relatively easy a technology or application is proven to be, it will likely not be used if a user does not perceive it as such. Perceived usefulness is defined by Davis (1989) as "the degree to which a person believes that using a particular system would enhance his or her job performance”. This definition takes the assumption of an individual working within an organization. Nevertheless, same definition applies to a person’s belief of using a system that could enhance his or her personal task or status. Perceived ease of use, refers to "the degree to which a person believes that using a particular system would be free of effort. TAM proposes that perceived usefulness is influenced by perceived ease of use.

The practical view of applying TAM model is that gaining insight into why users accept or reject a technology can provide awareness of what improvements should be made for a user to adopt a technology. In furtherance with the rationality of this practical view, Venkatesh and Davis (2000) added other constructs to the initial TAM widely referred to as TAM2. The rationale behind it was that perceived usefulness as a TAM construct has consistently and significantly determined intention to use.

Therefore, an understanding of the key determinants of PU would assist in further design of organizational interventions that would improve user acceptance. The theoretical constructs integrated into TAM included two causal categories. One part is classified as social influence processes which included subjective norms, voluntariness and image. Another part of the constructs is classified as cognitive instrumental process which included the constructs: job relevance, output quality, result demonstrability and perceived ease of use. Definitions and causal relationships of these constructs are given in Venkatesh & Davis (2000) . The application of these constructs as determinants of PU in TAM2 over four longitudinal studies showed that significance and consistency of social influence processes and cognitive instrumental process constructs depended on the context of the usage in a work environment. In this case, the work environment constituted of voluntary and mandatory tasks. The outcome of the research highlights that external variables can be added to TAM.

The type of constructs that are added to TAM depends on context. In the study of Venkatesh and Davis (2000), the context was an individual's acceptance of using a technology in an organization and if the work environment that the technology is being used is mandatory or voluntary. TAM2 version has been fairly criticized for not having external variables that explain or determine perceived ease of use. (Kishor 2012, 142). In a study conducted by Venkatesh (2000) to investigate TAM constructs, behavioural experience was found as a significant factor that influences perceived ease of use which has a correlation to behavioural intention to use a system.

The TAM model has been criticized in different capacities. A critical literature review of TAM by Li (2010) identified several inconsistencies in results of TAM models for failing to predict according the expectation of the model. For instance, perceived ease of use was found in many studies not to have significant effect on perceived usefulness. Bagozzi (2007) criticized TAM as a deterministic cause-effect approach that did not take into account the elements of social and cultural influences on individuals to accept a technology. However, Crabbe et al. (2009) investigation on adoption of mobile banking in Ghana points out that TAM can be adapted as a model to examine the impact of social and cultural factors on adopting a technology. Crabbe et al. research outcome demonstrate how TAM can be modified based on the context of the study. Many research studies have also shown the robustness and explanatory power of TAM in predicting the acceptance or use of technology.

4.2 Research model

This thesis study adopts a research model that consists of constructs that have strong theoretical linkage that is drawn from prior literature in adoption of mobile banking.

Perceived usefulness, perceived convenience, perceived financial cost and perceived trust are hypothesized to have influence on behavioural intentions. The integrated constructs were uncovered from literature review of other studies based on an empirical evidence from a similar context that this study posits to explore.

Building the model was initially based on Tobin (2012) proposed model. Tobin's proposed theoretical model was used as a basis for further development by the author because of comparability of the research question and context of Tobin's study and this study. The main research question in Tobin's study was: "what are the key factors that influence the acceptance of mobile banking by the rural unbanked?". While the main research question in this study is: "What factors influence the adoption of mobile banking service in rural Nigeria?". On the other hand, Tobin's study adopted a qualitative research approach that relied on qualitative data from focus group interviews in rural areas of Ghana. The research approach adopted in this study to answer the research question is a quantitative approach from the perspective of Nigerian rural areas. A further in-depth review of the constructs in the Tobin's proposed model was carried out in the literature review process. The purpose of the in-depth review was to unravel their theoretical justification in the context of the study and this led to the emerged model in figure 1.

Perceived ease of use is not included in the model. There have been several criticism on the inconsistencies of perceived ease of use not having any influence on usage intention (Li 2010). One study found that there was no significant relationship between perceived ease of use and adoption of mobile banking among non-users in Singapore (Jeong & Yoon 2013). Whereas there was a significant relationship when tested on users in same study. Another quantitative study conducted in rural Ghana did not find perceived ease of use to have significant influence on attitude towards mobile banking (Crabbe et al. 2009). As mentioned in the introduction and background chapter, rural residents are largely unbanked. There is very low awareness of what people can do with their phones for example accessing bank services is still in its primitive stage (Tobbin 2012). Hence, most people in rural areas can not relate to the ease of use of using a service they are not aware of. Rather they can relate with deciding if such service will be useful, convenient, cost money or worthy of trust. The following sections provide explanation to the key constructs used in the hypothesis development of the model.

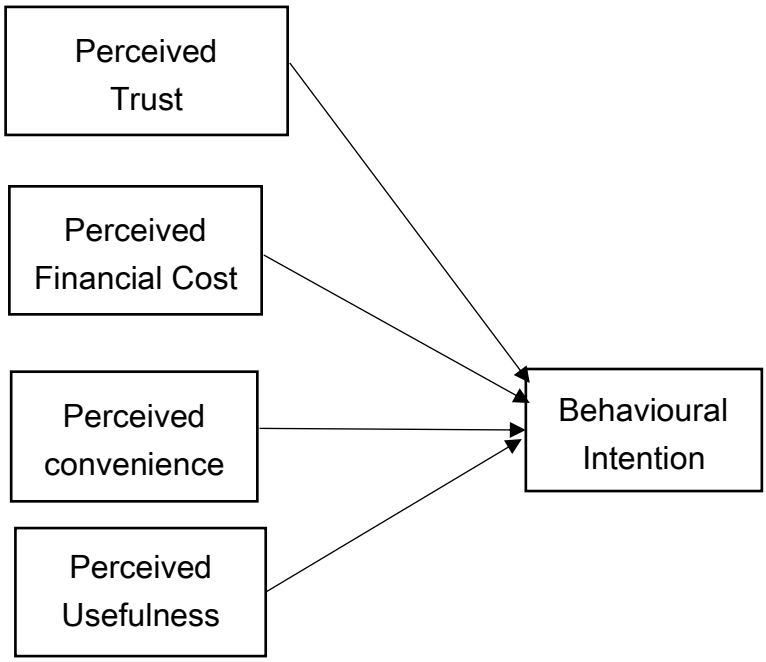

Figure 1 Research model

4.3 Perceived usefulness

Perceived usefulness has been a very significant construct in examining a person's intention to adopt various types of technology (Davis 1989; Venkatesh 2000; Tang & Chiang 2009). It was initially applied to the perception in which an individual believes accepting a technology would enhance his/her job performance with regards to work-related IT innovations. Perceived usefulness as used in this context refers to the extent to which a person believes that the use of mobile banking service would be beneficial in one capacity or the other such as savings and access to loans. Perceived usefulness as a construct in TAM has been shown to consistently influence an individual's intention to adopt mobile banking (Jeong & Yoon 2013; Olasina 2015; Faniran & Odumeru 2015; Crabbe et al. 2009; Wang et al. 2006). Perceived usefulness is a form of extrinsic motivation. An individual's motivation is considered extrinsic when he or she perceives that performing an activity would be instrumental in achieving valued outcomes that are separate from the activity itself. Tobbin (2012), studies suggest that the most important banking service that rural dwellers would like to have is savings and loans. Rural dwellers can therefore, have the motivation to have a behavioural intention to adopt mobile banking if they think it will facilitate easier access to getting loans from the banks. Other mobile banking services highlighted in the study is conducting typical bank transactions. Again, Tobin's study indicates that rural dwellers belief that mobile banking would be useful in making transactions such as money transfer. Transferring

money to a person or receiving money would become easy and a very useful element that could influence adoption of mobile banking. It is very common for well doing friends and families to send cash and kinds to support people in rural areas. This is a very useful element because it allows a people in rural areas to have easy access to finance. Bhatt (2016) study also indicates that customers perceive they would save time and effort in activities such as bill payment by using mobile banking services. These kinds of factors would positively influence their behavioural intention to adopt mobile banking. Based on the previous empirical evidence of the significance of perceived usefulness in mobile banking, the following hypothesis is presented:

H1: Perceived usefulness has positive influence on behavioural intention to adopt mobile banking.

4.4 Perceived convenience

The concept of convenience has been used in marketing to describe the time and effort consumers expend when buying a product or service rather than the attributes of the product (Tang & Chiang 2009). Convenience is adapted as a construct in relation to mobile banking as having two dimensions which are time and place. With respect to the space dimension, there is limited access to banking services in rural area (Oluwatayo 2013) and a high cost associated with travelling to bank locations or ATM services. With regards to the time dimension, mobile banking services can remarkably influence on reducing time and effort expended by the rural unbanked when using banking services. Certain banking services can be carried out at different times that is convenient to a user. Rural areas that are isolated from a lot of institutions but have access to mobile networks can easily use mobile banking services within their communities.

One study that examined the adoption of Islamic banking among Nigerian students in Malaysia, used convenience as a variable under the construct: technology quality (Dalhatu et al. 2014). Aside this study, the rest of the selected articles of mobile banking in Nigeria did not explicitly use the convenience construct. The findings of Dalhatu *et al*. showed that convenience had a significant relationship with perceived usefulness. However, another study of adoption of mobile banking in Nigeria did not find a significant relationship between a grouped construct of convenience&cost and behavioural intention to use. Convenience was found to indirectly influence the behavioural intentions of users to adopt mobile knowledge management through its influence on perceived ease of use (Tang & Chiang 2009). In another study that examined factors that influenced the intention to use mobile payments, convenience was found to be significantly essential (Kim et al. 2010). Late adopters of the technology perceived it much more useful compared to early adopters. Rural dwellers are generally

late in accepting technologies than their urban counterpart due to slower penetration of those technological infrastructures in rural areas. Therefore, this leads to the following hypothesis:

H2: Perceived convenience has positive influence on behavioural intention to adopt mobile banking services.

4.5 Perceived financial cost

Perceived financial cost has been integrated in TAM as a predicting factor for adoption. It is defined as the extent to which a person believes that using mobile banking services will cost money (Luarn and Lin, 2005; Wang et al., 2006). This view of perceived cost is integrated as construct to the research model to provide a perspective of an individual's economic motivations with regards to how it influences their behavioural intention to use mobile banking.

People in rural areas often need to travel to the bank to save or withdraw money. The amount they spend travelling is part of the barriers they face when considering opening a bank account. When it comes to mobile banking, a person might believe that there is associated cost to using the service which might serve as a barrier to having a behavioural intention. For example, the cost of owning a phone, buying mobile airtime. As observed by Tobbin (2012), a person in rural area would question if such service is affordable. Although Tobbin linked affordability as having an influence on perceived usefulness. A further study on consideration of affordability as a construct based on the explanation given in the study seemed to be more in line with perceived financial cost.

There is a variance in the significance of perceived financial cost as a factor that influences behavioural intention to adopt mobile banking. This could be as a result of differences in factors such as culture, infrastructural conditions, economic conditions that prevail in different regions that the studies have been conducted (Jeong & Yoon 2013). The findings of Luarn and Lin (2005) supported the notion that cost is a significant barrier to be considered when adopting mobile banking. Some of the people interviewed in Tarhini et al.'s (2015) study highlighed that cost was a factor that hindered their access to online banking. The cost of internet access if required by the mobile banking service would be a negative factor especially among low income people. The findings of Mustafa (2016) reveal that perceived financial cost is significantly positively correlated to the adoption of telecom-led branchless mobile banking services. However, the adaptation of the term perceived financial cost as used by Mustafa (2016) contradicts the author's reference to its adaptation from Luarn and Lin's (2005) study. Luarn and Lin (2005, 880) in their study define perceived financial cost as the extent to which an individual believes that the use of mobile banking will

cost money thereby negatively influencing behavioural intention. Whereas Mustapha (2016, 14) adapts perceived financial cost as helping an individual to save money in which is significantly positively correlated to usage of telecom-led branchless banking Telecom-com led branchless banking is a form of mobile banking as discussed in section 2.5. Majority of the people surveyed in the study conducted in Pakistan used mobile banking services and believed that they could save money and cut cost compared to conventional banking services Mustapha (2016). Despite the contradiction in the terminologies both findings of Luarn and in (2005) and Mustapha (2016) have implications that perceived financial cost can have significant influence on behavioural intention or usage. Nevertheless, other studies have shown that there is no significant relationship between perceived financial cost and behavioural intention (Ramlugun & Issuree 2014; Bankole et al. 2011; Jeong & Yoon 2013). Given the high level of poverty and low income among other inhibiting factors in Nigerian rural areas, the following hypothesis is proposed:

H3: Perceived financial cost has negative influence on behavioural intention to adopt mobile banking service

4.6 Perceived trust

Prior studies in online adoption of mobile banking have included trust and trust based constructs such as perceived risk and perceived credibility into TAM models (Gu et al. 2009; Faniran & Odumeru 2015; Luarn & Lin 2005). Although perceived trust, perceived risk and perceived credibility are said to be conceptually distinguishable (Luarn & Lin 2005). Trust is defined as a psychological expectation that a trusted party will not behave opportunistically. In the context of mobile banking service, trust represents the belief that various parties involved in providing the service are willing to behave based on a user's expectation and will not behave opportunistically (Kim et al. 2009; Gu et al. 2009). Kim et al. (2009) differentiates this kind of trust that influences behavioural intention as initial trust. Initial trust is a form of trust that assumes that the users do not have credible meaningful information because they have prior experience of using the service. Nevertheless, their propensity to trust might be influenced by prior experience or awareness of elements such as the technology being offered, the mobile network operators and the human agents that might be involved in providing the service. A human agent can be a bank employee or merchants that provide services to the users on behalf of the mobile banking institutions. For instance, a non-user of online banking in Nigeria expressed that "*I do not even use ATM cards let alone online banking. I go to the bank whenever I want to perform a transaction. I don't trust those things. I cannot afford to allow some young greedy computer literate steal all my*

money" (Tarhini et al. 2015, 5). This user does not trust online banking technology and believes that it is not a secure means. Trust in mobile network operators such as customers in Kenya trusting Safaricom (MNO) was transferred to M-PESA and it is one of the significant reasons mobile banking has been successful in Kenya (Morawczynski & Miscione 2008; Ndumba & Muturi 2014). Trust helps a user to believe that the providers of mobile banking service will not act in opportunistic behaviour and that the user will get a reliable service.

Based on the findings of Kim et al., (2009), initial trust as a variable explained 32% of the variations of a user's intentions to use mobile banking in Korea. The findings of Kim et al. is in line with Zhou's (2011) empirical study whose result showed that initial trust and perceived usefulness are predicting factors of usage intentions of mobile banking in China. The research outcome of Gu et al. (2009) also indicates that trust, perceived usefulness and perceived ease of use were found to be a significant of a user's intention to adopt mobile banking. Six out of the nine selected literatures on online/internet banking in Nigeria that were reviewed revealed that trust is a significant factor that influences the adoption usage or usage intentions in Nigeria (see Appendix 1). It was noted in the selected literature that the two qualitative researches including a conceptual study on adoption of online banking in Nigeria noted trust as an element that influences on adoption. The other three literatures did not explore trust as a factor therefore, no report on the influence of trust in their study. The substantial evidence of trust in the adoption of online banking technology in Nigeria may indicate a general trust issue on technology adoption in the region. All the four elected core articles that discussed mobile banking adoption in Nigeria (see table 10 under appendix 1) noted that in prior studies, trust was found to have significant influence behavioural intention. Bankole et al. (2015) examined the influence of Trust and privacy among other factors. They stated in their study that it was surprising their research results did not find a significant influence of trust and privacy on behavioural intention. Faniran and Odumeru (2015) added perceived risk, a TAM based trust construct to their research model. Perceived risk was found to have a significantly low negative influence on adoption of mobile banking. Accordingly, this study proposes the following hypothesis:

H4: Perceived trust has positive influence on behavioural intention to adopt mobile banking services.

5 EMPIRICAL STUDY

5.1 Research design

The research design adopted in this thesis draws from the design as recommended by Cresswell (2003). According to Creswell, there are three key framework elements derived from three questions which form the research design of a research study:

- Philosophical assumptions: what knowledge claims are being made by the researcher?
- Research approach: What strategies of inquiry will inform the procedures?
- Data collection and analysis: What methods of data collection and analysis will be used?

The adaptation of the recommended research design as indicated by Creswell (2003) can be applied to identifying what research method approach to be used for inquiry. Research method approach can be quantitative, qualitative or a mixed method. The three key research framework elements can be applied as processes that constitute the outcome of the research design. The following subsections of this chapter is tailored according to the three research design elements adapted in this study. The outcome of this approach produces a framework to discuss the research philosophy, research approach as well as data collection analysis in the subsequent sections.

5.2 Research philosophy

The purpose of this section is to inform the reader on the philosophical assumptions undertaken in this thesis study. There are four school of thoughts about philosophical assumptions that are undertaken by researchers as discussed by Creswell (2013). They are postpositivism, constructivism, advocacy/participatory, and pragmatism. Postpositivism follows a set of philosophies that claims knowledge is deterministic, reductionist in its view, can be observed and measured and follows laws or theories that can be verified. Postpositivism is also referred to as quantitative research, positivist/postpositivism research, empirical science and postpositivism. Constructivism assumes that knowledge is subjective to the interpretation and experiences of the individual seeking understanding of the world around them. Advocacy/participatory knowledge researchers believe that research should have an agenda that may lead to change in people' lives and in the society and that enquiry into the subject should be a collaborative work with the participants in the research. The last school of thought

pragmatism claims that knowledge emerges from actions, situations and consequences instead of antecedent conditions as dealt with in postpositivism.

Given the philosophical positions adopted in different research, the research philosophy of this thesis is in line with the postpositivism view which is also referred to as a positivist view. This view is widely adopted in information systems science research (Orlikowski & Baroudi 1991, 8). Positivism follows a deterministic philosophy that outcomes are probably influenced by causes. Going back to the research question: *What factors influence the adoption of mobile banking service in rural Nigeria?* The research question presents a view point that the adoption of mobile banking services in rural areas is objectively influenced by certain factors. Therefore, the objective of this thesis is to seek to examine such factors which can then be presented in literature for other researchers interested in the topic and hopefully practitioners interested in the issue.

The research study is also reductionist in its view in that among several possible factors or variables that could influence the adoption of mobile services in rural areas, just four hypotheses have been developed for testing. The literature review methodology section – 3.1 present an overview of how knowledge and insight into the thesis topic was acquired. During the review process, several factors that could influence adoption of mobile banking were uncovered and reported. Careful consideration was given to the context, presentation and quality of the studies examined. It was through the review process that a decision to adapt a research model from a previous study by Tobbin (2012) was made. Tobbin's work on acceptance of mobile banking in rural areas in Ghana – a neighbouring country to Nigeria mirrors the perceived reality of the context of examination in this thesis study. The research model was also reduced to exploring few demographic elements and four antecedents to behavioural intention. Nevertheless, the antecedent constructs were carefully examined to determine the empirical evidence that they are valid applicable constructs to the context of this study. Instruments to measure the constructs derived by reductionism were then developed and survey approach was chosen to observe the empirical data. Conducting a survey to gather data is in line with the third philosophical view of positivism and is discussed further in next subsection 5.3.

Lastly, positivism follows a philosophy that there exist laws or theories which can be verified. To find answers to the research question, the thesis study adopts a research model that is based on technology acceptance model. The research model which is based on TAM theory is operationalized for data collection and applied for theory testing in the adoption of mobile banking in rural areas. Thus, one outcome of this study will be to confirm, reject or revise the applied research model as theoretical model to investigating adoption of mobile banking in rural areas.

5.3 Research approach

The second key element in a research design is the research approach which addresses the question of what strategies of inquiry will inform the research procedure (Creswell 2013). The research approach used in this study is a quantitative approach. A quantitative research approach is closely associated with the positivist philosophical position of this thesis study in its examination of factors that determine mobile banking.

Quantitative research is widely accepted to be suitable for quantifying a phenomenon, testing hypothesis and examining the statistically based relationship between different constructs. The use of a quantitative approach also affords this thesis study to examine same phenomenon that has been already been researched through a different lens. Therefore, the use of a quantitative method provides a possibility for this study to validate the adapted TAM model and constructs developed in Tobbin's (2012) qualitative research. As stated earlier in previous sections. Tobbin's study already examined similar research question using a qualitative approach to identify what factors influence adoption of mobile banking by the rural unbanked. This study provides the possibility to examine same phenomena in the rural context of Nigeria and to examine the demographic data and significance of the relationships between the constructs and behavioural intentions to adopt mobile banking services.

The TAM theory upon which the research is based originates from a quantitative survey study (Wu 2012) . It is not surprising that it has dominated TAM based research as evident in the presented literature reviewed (see appendix 1, table 8 - 11). A quantitative survey also enables the use of questionnaires for collecting the data with relative ease with the intent of generalizing from the sampled population. The study outcome from survey based studies have yielded rich set of findings with regards to different user groups and a variety of technologies.

The use of survey also comes with few criticism as identified by Wu (2012). First, collecting data by questionnaires is susceptible to well-known biases such as social desirability and non-response. Second, survey instruments or questionnaires are not flexible to ad-hoc changes during the research process. Third, there is a limitation arising from reducing the complex interactions between human and technology into deterministic relationship. Despite this criticism, quantity-survey methods appear to be very suitable to examine the factors that influence user adoption technology systems.

Measurement development

The survey instrument by design is divided into four questionnaire sections as presented in appendix 3. Altogether, there are 39 questions in the questionnaire. The questionnaire is subdivided into four sections in the form of tables 12 to 15 under appendix 3. The first three sections of the questionnaire, Section A, B, and C measures the respondents'

answers in nominal scales while section D as seen in table 15 is measured in ordinal scale using five-point Likert scales with anchors ranging from (1) – "strongly disagree" to 5 – "strongly agree". Section A (table 12) is used to gather demographic characteristics of each respondent which includes: gender age, education, occupation, income and mobile phone status. Depending on what mobile banking services the respondent has experience of, section B (table 13) and C (table 14) of the questionnaire collect information about the type of mobile banking services used, means of access, period of last usage of the service. Section B is specific to respondents who have used a conventional Bank's mobile banking service while section C gathers information specific to respondents that have used mobile money operators banking service. Section D (table 15) part of the questionnaire is built on the research model constructs which are: perceived convenience, perceived trust, perceived financial cost, perceived usefulness, and behavioural intention. To ensure content validity, items used in all the constructs were mainly adapted from prior studies that have operationalized the construct items. Some of the construct adapted from other technology acceptance were modified to fit the context of mobile banking services. In general, the items chosen were selected to reflect the context in which they were discussed in this study to ensure consistency around the concept of the constructs. Perceived usefulness consists of four items which were adapted from Lee et al. (2001), Tobbin (2012) and Wang et al. (2006). Perceived ease of use consists of three items which were developed based on Lee (2009) and Lee et al. (2001). Four items of convenience construct that have been applied in Kim et al. (2010) study were also adapted to measure convenience. Perceived financial cost construct consists of two items in which the statements were developed and applied by Luarn and Lin (2005) to measure the perceived cost and financial barriers of mobile banking adoption. The six items included in perceived trust were adapted and modified from instruments applied in the studies of Kim et al. (2009), Zhou (2011) and Tobbin (2012). Lastly, behavioural intentions consist of two constructs which were adapted from Liu et al. (2010) study. The final questionnaires were sent to the thesis supervisor, a senior researcher in the field of information systems science. The thesis supervisor of this study commented that the questionnaires were okay and thus, the study could proceed to conducting of the survey. The measurement indicators for the items and constructs are presented in table 16 under appendix 3.

5.4 Data collection

Four volunteer field workers participated in administering the questionnaires in Hausa language to respondents in the villages of Katsina state. The field workers consisted of two male research staffs from the renewable energy research centre, Umar Musa

Yaradua University, Katsina state and were also involved in translating the questionnaires. The two other field workers were female third year students from the faculty of education of same university. The balance in the gender of the volunteer field workers was in consideration of the culture in rural areas where there is high regard for customs and traditions. It is expected for a person with same gender to approach another person.

For two days, the thesis author organized several meetings with two of the field workers that were available. The objective of the meeting was to explain the aim of the research, key terminologies and each of the items in the questionnaire. Each meeting lasted between 15 minutes to three hours. During these period, the questionnaire was translated from English to Hausa by a volunteer translator from the department of linguistics. This translator was not part of the meetings or field work. One of the field workers that had not seen the questionnaire translated the Hausa version back to English. The translated Hausa-English version was then compared to the original English version. A series of interactive session then followed in which the author mediated discussions between two of the field workers while they reconciled the discrepancies between the newly translated English versions and original English version of the questionnaires. The concept of mobile money and differentiating it from a bank account holder that uses mobile phone to execute a transaction was very difficult to understand by the field workers let alone translate to Hausa. To address this issue when administering the questionnaires, a two-page poster presentation was designed by the author to simplify and explain mobile money and conventional bank accounts in Hausa language as seen in figure 3 and 4 under appendix 2. In addition, the researcher, created a mobile money account with Stanbic-IBTC bank (one of the banks in Nigeria) through self-registration on a mobile phone. Screen shots of this process was taken and shown to the field workers to demonstrate how the mobile money account works. Further investigation about mobile money accounts were made by visiting the bank's website and internet search, making calls to the bank's customer service and two visits to a bank branch in Lagos and Katsina state. The information gained through this means enabled the author to explain further to the field workers about the various mobile banking services available in Nigeria. The last stage of the translation from English to Hausa language involved the two field workers editing the already translated Hausa version. The editing process involved an interaction between the two field workers in which they agreed on an equivalent Hausa term for the English questionnaire terms. The terms used in the final Hausa version was based on a shared understanding with the researcher on the actual and contextual meaning of the terms and concepts used in the English version. As this stage was reached, it was easier to explain the English and Hausa terms in the questionnaire to the other field workers that joined later as they were briefed on how to administer the questionnaires.

A pre-test of administering the questionnaires was conducted on two village residents. before the main visit to the field. A village in Nigeria is often a rural area. Both respondents had low skilled jobs. One was uneducated while the other had a secondary school education. The respondents were asked to comment on their experience and understanding of the terms and concepts used in the questionnaire after completing the survey. The pre-test questionnaire administration showed that the poster document to introduce the research topic to respondents was effective in helping them understand the concepts in the questionnaire.

As this study is concerned with the adoption of mobile banking in rural areas, accordingly people living in the villages were our target group. The survey was conducted in five villages in Katsina for six consecutive days in the month of March 2017. One of the field workers was engaged with the neighbouring villages through a community development project. Therefore, some of the village residents working under him became familiar with the author and were very willing to take us to their villages. On arrival, the village resident leading us would introduce us to the village dwellers, community leader and in some cases village Imam. This influenced the trust for the villagers to be interested in what we came to do as they called on others to participate in the survey. The women field workers where directed from house to house to administer the questionnaires to the other women in the villages. The method of administering the questionnaires was same for all field workers. First, the poster presentation is used to introduce a respondent to the various ways of accessing a bank service using a mobile phone and description of mobile money account. Then the questionnaire is administered by the field workers in Hausa, while they fill the respondent's answers in a corresponding English version.

A total of 196 responses were gathered from four villages in Katsina state. Ten response cases were discarded due to missing data values that made them not usable resulting in 186 validated responses for data analysis. Subsection 5.6 on results reports on the findings of the data collection and how missing data values from certain part of the questionnaire were handled.

5.5 Data analysis

Responses from the questionnaire were inputted and coded into IBM SPSS statistics software version 24. Smart PLS (version 3.2.6) was used to conduct the data analysis for the research model using Structural Equation Model (SEM) (Ringle et al. 2005). Smart PLS as the name implies uses partial least square (PLS) model approach to examine theories of measurement models (Hulland 1999). It uses an SEM technique referred to as the partial least square which is a second-generation statistical tool (Gefen

et al. 2000). PLS techniques enables an IS researcher to test the extent to which a research model meets the quality of highly acknowledged statistical analysis.

The capability of PLS to simultaneously analyse the relationship model among multiple dependent and independent constructs has been demonstrated in its application to the TAM model (Gefen et al. 2000). The result of the demonstration showed that PLS is often a better methodological assessment tool and provides robust information with regards to how the data supports the research model. The SEM has been confirmed through a literature review of reputable IS journals to be widely used in IS research. The author's prior experience of using Smart PLS in a research methodology course offered in the University of Turku had influence on the choice of the statistical software.

5.5.1 Handling missing data values

Some of the questionnaires had missing values due to human errors in which a field worker asking a question forgets to mark the participant's answer to the questionnaire or mistakenly skipped the questions. Section D (see table 15) of the questionnaire which contains the questions for measuring constructs in the research model was well filled. Section B and C (see tables 12 and 13) of the questionnaire to capture detail of mobile banking services used by a respondent was largely unfilled. Most participants that took part in the survey were not aware of mobile banking and never used it. Hence, sections B and C are dropped from being reported including question 10 from Section A (see table 11) since they were mostly unanswered. There are few missing response data in Section A – the demographic section of the questionnaire. SPSS was used to analyse the pattern of missing data. Table 17 of appendix 4 shows the result when SPSS was used to analyse the missing data pattern. A high percentage of missing responses on what type of phone a participant had, resulted in the response to the question dropped from the demographic section. Responses to question 5 of the questionnaire on income level had 20 missing values while question 8 to determine if a participant has a bank account had 29 missing values. It was determined that the missing values of question 5 and 8 were not randomly missing but a result of the one field worker not writing the income value and another field worker mistakenly skipping to ask question 8 about bank account. Deleting or not including the response cases with missing values in question 5 and 8 would lead to an exclusion of substantial portion of the original sample. To handle the missing data values specifically for question 5 and 8, multiple imputation was used in SPSS because the missing data was not considered random. The author followed video instructions from an SPSS expert available on YouTube to perform multiple data imputation (TheRMUoHP Biostatistics Resource Channel 2013). Multiple imputation is

a form of statistical method that replaces missing values with multiple imputed values drawn from a distribution. The results of the several inputted data values are combined accordingly so that the values inherently contain some variability (Sterne et al. 2009; Soley-Bori 2013). SPSS could not input data values into response cases that had both values missing in both question 5 and 8 therefore, such cases were deleted. Further, response cases with missing values from the construct variables in the research model were also deleted. In total 10 response cases were deleted from the 196 responses resulting in a sample size of 186 usable responses for the demographic report and data analysis. After imputing missing data values with multiple imputation in SPSS, a new variable to categorize income was then created. Table 18 and 19 present an evidence of the frequency statistics reported in table 17 after missing data has been inputted. Few questionnaires which had missing values or unanswered responses about occupation, years of using mobile phone, and awareness of mobile banking are included in the data analysis and descriptive statistics as well.

5.5.2 Demographic information of respondents

The demographic information of the respondents is shown in table 3. 56% of the respondents are female and 44% male. The age group of 30-39 years was the highest percentage of respondents accounting for 37% of the sample. 27% of the respondents fall within the age group of 20-29 and 20% are in the age brackets of 40-49. It can be deduced that 84% of the respondents fall between ages 20 and 49. 53% of the population have not completed primary school or have not been educated in formal primary school. About 33% of the respondents have only primary school education while 13% have secondary education. This suggests a high level of illiteracy. Majority of the respondents are engaged in occupation as retailers (52%) or farmers (20%). With respect to monthly income, 53% of the respondents reported an income less than or equal to 5 thousand naira and 29% earn a monthly income between 5 thousand naira and 15 thousand naira. The unit of currency in Nigeria is Naira and official abbreviation of the currency is NGN. Exchange rate was 1 USD = 317 NGN at the time of conducting this study. It can also be noted that six out of ten (59%) of the sampled population own a mobile.

Table 3 Demographic information of respondents

Measure	**Item**	**Frequency**	**Percentage (%)**
Gender	Male	82	44.0
	Female	104	56.0

Age	20 – 29	51	27.4
	30 - 39	68	36.6
	40 - 49	37	19.9
	50 - 59	20	10.8
	60 and above	10	5.4
Education	Not completed primary school	98	52.7
	Primary	62	33.3
	Secondary	24	12.9
	Degree	2	1.1
Occupation	Unemployed	12	6.5
	Student	7	3.8
	Retailer / wholesaler	97	52.2
	Tradesman	11	5.9
	Farmers/animal rearers	38	20.4
	Low skilled jobs	15	8.1
	Others	2	1.1
	No answer	4	2.1
Income	5000 and below	99	53.2
	5001 to 15000	53	28.5
	15001 to 25000	20	10.8
	25001 to 35000	10	5.4
	35001 and above	4	2.2
Own mobile phone	No	76	41.0
	Yes	110	59.0
Years of using mobile phone	< 1 year	17	9.1
	1- 2 years	25	13.4
	2 - 3 years	22	11.8
	Above 3 years	49	26.3
	Not applicable (do not own mobile phone)	68	36.6
	No answer	5	2.7

Have bank account	No	148	79.6
	Yes	38	20.4
Awareness of mobile banking	Never heard about it	159	85.5
	Heard about it but never used it	17	9.1
	I know what m-banking is and used it before	3	1.6

27% of the total respondents have used a mobile phone for more than 3 years which is the highest in the category among those that have a mobile phone. 26% own a bank account while 86% have never heard of mobile banking and 9% are aware of mobile banking but have never used it.

5.5.3 Analysis of measurement model

The data analysis follows after a two-step approach proposed by Anderson and Gerbing (1988). The first step is to examine the measurement model and test for reliability and validity. The second step is to examine the structural model of the research model. In examining the structural model, the research hypothesis is tested by considering the significance of the strength and direction of the relationships among the research model constructs.

The results of the empirical study in subsection 5.6 examines the second step of the data analysis which is analysing the research model. Reliability and validity of the measurement model is assessed by using the following criteria indicated by Fornell and Larcker (1981):

1. Item reliability: Item reliability is assessed by examining the factor loadings of each construct items. The factor loadings of all construct items should be significant and a value of 0.7 is more acceptable among researchers.
   All construct item's factor loadings exceeded 0.7 except for one item from perceived trust which approximates to 0.7 as seen in table 4. Based on the criteria, four construct items from perceived trust construct and one item from perceived usefulness construct were deleted.
2. Convergent validity: This measures the extent to which items in a construct demonstrate internal consistencies within the construct. A construct is said to have good internal consistency when the construct items on a scale which are theoretically related are also statistically well related. A benchmark for modest value of composite reliability (CR) is 0.7 (Hulland 1999, 199;

Henseler et al. 2016, 10). A CR above 0.8 seem to be more acceptable in as high quality validity criteria among researchers.

Table 4 shows that the composite reliability of all the constructs is above 0.8 excluding perceived trust which is still above 0,7.

3. Discriminant validity: This measures the extent to which a given construct differs from other constructs that make up a measurement model. The average variance extracted value (AVE) is used to measure discriminant validity. AVE of each construct must exceed 0.5. To meet the criteria for discriminant validity, the square root of AVE of each construct should be greater than the correlation between a given construct and other constructs in the model (Fornell & Larcker 1981).

   The average variance extracted scores of all the measurement constructs are greater than 0.5 as seen in Table 4. Table 5 shows the square roots of the AVE for each item is greater than the correlation value with other constructs in the measurement model. This shows that the discriminant validity criteria are met.

In summary, table 4 below presents the factor loadings, CR and AVEs of all the constructs that were assessed in testing the reliability and validity of the measurement model. The table shows that all the constructs meet the recommended criteria set by Fornell and Larcker (1981).

Table 4 Construct reliability and convergent validity

Construct	Item	Factor loading	Composite reliability	Average Variance Extracted
Behavioural intention	BI1	0.912	0.878	0.782
	BI2	0.856		
Perceived convenience	CON1	0.727	0.810	0.516
	CON2	0.707		
	CON3	0.707		
	CON4	0.733		
Perceived financial cost	PFC1	0.856	0.852	0.743
	PFC2	0.868		
Perceived trust	PT2	0.694	0.766	0.624
	PT6	0.875		

Perceived usefulness	PU2	0.770	0.811	0.589
	PU3	0.754		
	PU4	0.778		

Table 5 Discriminant validity of constructs

	Behavioural Intention	**Perceived convenience**	**Perceived financial cost**	**Perceived trust**	**Perceived usefulness**
Behavioural Intention	**0.884**				
Perceived Convenience	0.459	**0.719**			
Perceived financial cost	0.295	0.528	**0.862**		
Perceived Trust	0.434	0.470	0.399	**0.790**	
Perceived Usefulness	0.240	0.453	0.378	0.431	**0.767**

The discriminant validity is further verified by evaluating the cross loadings of the construct items as presented in table 6. The loadings of items in relation to their assigned latent variable is greater than the loadings of other items. This confirms that the discriminant validity at the construct item level meets the criteria recommended by Fornell and Larcker (1981)

Table 6 Cross loadings of construct items

Item	**Behavioural Intention**	**Perceived convenience**	**Perceived financial cost**	**Perceived trust**	**Perceived usefulness**
BI1	**0.912**	0.429	0.298	0.443	0.220
BI2	**0.856**	0.381	0.215	0.311	0.204
CON1	0.364	**0.727**	0.297	0.287	0.353
CON2	0.339	**0.707**	0.375	0.418	0.230
CON3	0.297	**0.707**	0.454	0.298	0.375
CON4	0.313	**0.733**	0.410	0.347	0.349
PFC1	0.249	0.517	**0.856**	0.363	0.318
PFC2	0.259	0.396	**0.868**	0.325	0.333

PT2	0.269	0.349	0.295	**0.694**	0.298
PT6	0.401	0.395	0.337	**0.875**	0.379
PU2	0.185	0.341	0.266	0.353	**0.770**
PU3	0.180	0.323	0.249	0.353	**0.754**
PU4	0.187	0.377	0.354	0.288	**0.778**

5.6 Results

This section presents the result of the second step approach of data analysis as recommended by Anderson and Gerbing (1988). The structural model is examined based on three criteria. The three criteria set for the research model are assessed by examining the 1) path coefficients (ß); 2) path significant (p-value < 0.05 and t-value > 1.96) and 3) R^2 coefficient of determination of the endogenous variable. The endogenous variable in the research model is behavioural intention. Examining these criteria also offer results of testing the stated hypotheses of this study. Table 7 presents the results of the path coefficients, path significant values of the latent variable relationships and associated hypothesis in the research model.

Table 7 Hypothesis / path coefficients of the model

Hypothesis	Path	Coefficient (ß)	t-value	p-value
H1	Perceived usefulness → Behavioural Intention	0.008	0.624	0.533
H2	Perceived convenience → Behavioural Intention	0.366***	4.058	0.000
H3	Perceived financial cost → Behavioural Intention	0.017	0.321	0.748
H4	Perceived trust → Behavioural Intention	0.286**	3.286	0.001
Notes: *p < 0.05 **p < 0.01 *** p < 0.001 and t-value greater than 1.96				

As mentioned earlier, PLS statistical techniques were applied in analysing the research model. Figure 2 shows the result of the structural model with non-significant paths represented as dotted lines, path coefficients are indicated in between the constructs and R^2 coefficient of determination are presented. The results show that hypotheses H2, and H4 were supported while hypothesis H1 and H3 is not supported. Behavioural intention to use mobile banking was predicted by perceived convenience and perceived trust. Perceived usefulness and perceived financial cost do not have significant relationship to behavioural intention to use mobile banking. All together 27.3% of the variance in behavioural intention was accounted by the contribution from perceived convenience (ß = 0.37) and by perceived trust (ß = 0.29).

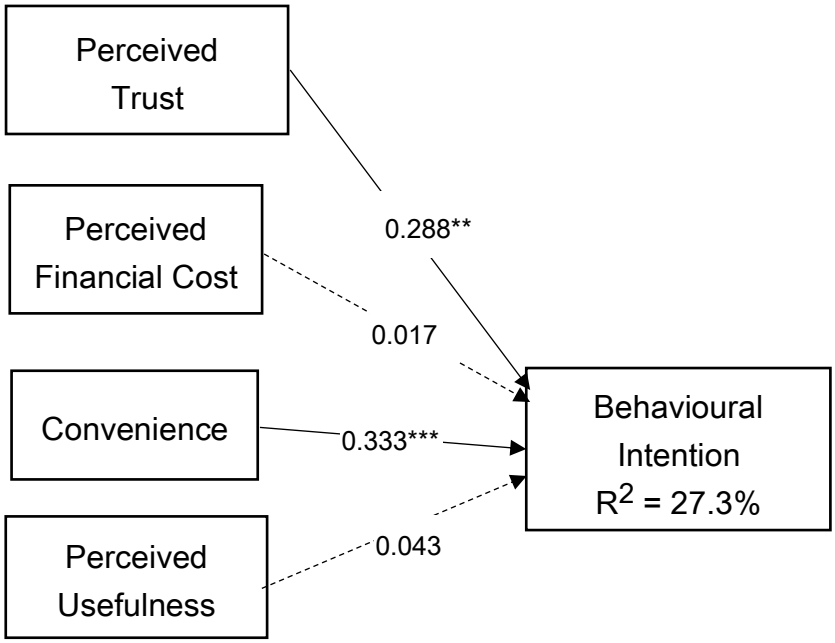

Figure 2 Result of research model analysis

6 DISCUSSION AND CONCLUSION

6.1 Discussion

This study examines the factors that influence on the adoption of mobile banking service in rural Nigeria. The demographic information of the participants surveyed is in line with the information provided about rural areas in the background chapter of this study. There is high level of poverty/low income, illiteracy and few people with bank accounts. Nevertheless, about six out of ten people surveyed have a mobile phone. At an exchange rate of 1USD = 317 NGN when this study was conducted, majority of the people (81%) surveyed earn below 50 USD (15,850 NGN) per month. The monthly income reported by participants is an estimated figure of their regular income. Most of the households in the villages are into subsistence farming. It implies they mainly grow part of the food they eat for self-consumption and not on a commercial scale. They might get bulk money when they sell their harvest or reared animal. For instance, one of the participant interviewed had a matured cow ready to be auctioned at 200,000 NGN (630 USD). In this case, the money realized could be used for a project such as buying a motorcycle, land, house renovations, more seeds for farming, more animals or even marrying another wife. These social and economic findings highlight the reasons why rural areas are not attractive target environment for banking institutions interested in making good profit margin.

Furthermore, there is a high level of unawareness of mobile banking in rural areas. Interestingly there is also a high level of unawareness of mobile money among mobile airtime retailers despite the sign that reads "MTN mobile money available here"[1] close to their booth. Banks, mobile money operators and their mobile network partners should build a more integrated advert message on the mobile banking related services they provide. It is not enough to have the information on their websites and billboards. It is important to devise a campaign strategy that results in an average rural resident to become aware of the various products and services they provide. One way to achieve this is to create posters and catalogues that provide details of the what and how to use mobile money in a simplified format. For instance, a poster presentation was designed by the author to explain the concept of mobile banking to people that never heard of it. This approach proved to be very useful as most of the respondents could understand the concept in a short time and use it as a basis to ask more details. Investments is needed to

[1] The author randomly visited seven airtime retailers in Katsina state to ask about the mobile money advertised on their signboard. None of them knew how to make mobile money transaction. One of them replied that MTN (a mobile network operator) agents had placed it at his shop while he was away.

train the airtime retailers who can be agents in conducting mobile bank transactions. A trained airtime retailer becomes well informed to further inform his or her customers on how the service works thereby creating more awareness.

The study adapts a TAM model to predict an individual's use or acceptance of an information systems. However, the results from this study suggests that adoption of mobile banking in rural context differs from the traditional application of TAM in IS. Perceived usefulness, a primary TAM exogenous variables does not explain the intention to use mobile banking in rural areas of a developing country. Perceived ease of use another primary TAM exogenous variable was not included in the model. There was lack of empirical evidence in literature to justify including the construct in the model when the characteristics of rural areas where considered. However, the convenience that mobile banking provides and the trust that rural residents have on the service providers and technology is strongly related to their expectation on future use.

Based on the model used in this study, perceived convenience is found to have the most significant influence in predicting behavioural intention to adopt mobile banking. Prior studies have shown that convenience has indirect influence through perceived usefulness or ease of use on mobile based information systems (Tang & Chiang 2009; Kim et al. 2010). Perceived convenience in this study has a direct influence on behavioural intention. Although it did have a significant influence on perceived usefulness when tested in the model. However, hypothesis H1 - perceived usefulness has positive influence on behavioural intention to adopt mobile banking was not supported in this study. This finding underscores that people living in rural areas would perceive mobile banking to reduce the barrier in time and effort to access banking services. The villages in which the survey was conducted are about 5 to 10 kilometres or more to main town where banks are located. It is very common that the people walked or hitchhiked to town when they go to work or market. Most people in Nigeria and other developing countries use prepaid phones. Although many people have phones in these rural areas, none of the villages in which the survey was conducted had a retailer selling mobile airtime. An individual having a bank account or mobile money account with a registered phone number could easily buy recharge mobile airtime credit by dialling certain codes on the cellphone.

The ability to use mobile phones to conduct transactions such as buying of mobile airtime, sending money, receiving alert of payment into one's account at convenience regardless of space and time is economically empowering to a rural resident. A lot of people in rural areas are less aware of mobile banking as evident in this study. Many of the participants in the survey and other less privileged people encountered during this study in Nigeria were amazed at the ease of opening a mobile money account or a bank account. Communicating the ease of opening a bank account and creating an awareness with a message that highlights the convenience that mobile banking affords especially

to people in rural areas can be an effective campaign to decrease the unbanked population.

Perceived trust in this study is supported as expected in hypothesis H4 to have a positive relationship with the behavioural intentions. The result support other prior studies that trust positively influences behavioural intentions to adopt mobile or online banking (Zhou 2011; Gu et al. 2009; Kim et al. 2009). The two trust construct items that survived the reliability and validity test are: 1) PT2 – "I believe mobile banking service providers keep their promises and commitments" and 2) PT6 – "I believe the technology behind mobile banking service can be trusted". An individual's propensity to trust the service providers and the technology behind mobile banking services is vital. It presents an opportunity for banks and telecom operators to innovate more services tailored to the meet the needs in rural areas. The finding on trust also indicates a potential for rural areas of Nigeria to achieve similar success in adoption of mobile banking as compared to Kenya (Morawczynski & Miscione 2008; Llewellyn-Jones 2016). However, the findings is in contrast with previous mobile banking adoption study by Bankole et al. (2011) who found trust to negatively influence on intention to adopt mobile banking in Nigeria.

Perceived usefulness in this study was not found to have positive influence on adoption of mobile banking. This is in contrast to previous studies in mobile banking in which perceived usefulness significantly influences adoption of mobile banking (Jeong & Yoon 2013; Olasina 2015; Faniran & Odumeru 2015; Crabbe et al. 2009; Wang et al. 2006). This suggest that people in rural areas do not intend to use mobile banking services based on its usefulness. This statistical result supports the narrative revealed in the discussion with some of the locals. Some of them expressed they prefer to save money by keeping them in some safe or well-hidden spot. They claimed there was no point to keep money in the bank when they could have physical access to their money whenever they want. However, it was admitted that there were times the money kept in a safe went bad due to long term exposure to moisture. Nevertheless, some of the locals the author spoke with reasoned that it could be worth saving in the bank to avoid money going bad or the risk of theft if it was more convenient for them to do so.

The results also show that there is no significant relationship between perceived financial cost and behavioural intentions to use mobile banking. This finding is supported by previous studies such as Bankole, et al., (2011); Jeong and Yoon (2013), and Ramlugun and Issuree (2014). It shows that the respondents do not view financial cost as a barrier to their expectation to use of mobile banking. It could be that people in rural areas consider that the benefits of saving time and effort by using mobile banking outweighs the associated cost. On the other hand, the cost of using mobile banking through dialing short codes for services such as purchasing mobile airtime, checking account, receiving payment alerts and transferring money is very affordable. Some

banks do not charge to use services such as buying airtime or checking account. Also, the transactional charges for transferring money from one account to another by dialing specific codes can be as low as 20 NGN (0.06USD). The financial cost affordability by simply dialing short codes or text in mobile banking is of significance to rural areas where most people own cellphones. The result on perceived financial cost is in contrast with previous studies that found perceived financial cost to be a barrier to behavioural intention to use mobile banking (Luarn and Lin, 2005; Wang, et al., 2006)

6.2 Conclusion

More progress is needed to decrease the number of people without bank accounts in developing countries. One of the dilemma that banks and other financial institutions face is to concentrate and consolidate the growth of their businesses in urban areas. This leaves a blind spot in the opportunities that abound in reaching out to the rural areas. The proliferation of mobile phones including rural areas presents a context that can be leveraged in providing financial services to the rural population. This study examined the factors that influence the adoption of mobile banking in rural areas in the context of Nigeria as a developing country. The results of the study provide a view point of adoption of mobile banking on an adapted TAM model. So far, most of the research on mobile banking has been predominately sampled from urban regions. More research on mobile banking in rural context is needed to concretize a theoretical model for research in the topic area.

The findings from this research show that perceived convenience and trust are important factors for the adoption of mobile banking. It also shows that rural residents do not consider the financial cost as a barrier to using it. However, most people in rural areas are not aware of mobile banking services. This thesis concludes by providing practical and theoretical implications as well as limitations of the study in the following sections of this chapter.

6.2.1 Practical implications

The proliferation of mobile phones in Nigeria including rural areas presents a convenience channel through which people in rural areas can be included in digital financial services. The management of financial institutions and mobile network operators should pay attention to the context in rural areas. This study has found that convenience influences on the intention for rural residents to adopt mobile banking service. The limitation in the number of people without bank accounts can be overcome

by creating an awareness of the ease of opening a bank account, the convenience that mobile banking provides and the affordable cost in using it.

Another observation made while conducting this study is the issue of language. It was observed that bank customers are often served in their local language if it is a more comfortable option. Most banks also provide an option to receive customer services in one of the major local languages via telephone. However, these options are not deployed in ATMs or SMS based bank account or mobile money account. For instance, Hausa is the main language of communication in Northern Nigeria and several people that do not have formal education can read in Hausa. Banks and financial institutions can deploy mobile service channels with local language options. While this may be challenging to deploy on a wider scale because there over two hundred languages in Nigeria and few of them is standardized or in written form. Introducing a language option in mobile service channels can begin with the three major languages in Nigeria namely, Igbo, Hausa and Yoruba. To begin with, the ATMs closest to rural communities can be deployed to have the language options of the main language in the region.

6.2.2 Theoretical implications

This study presents contributions to existing literature in IS and other fields that study the acceptance of mobile innovations. First, the results make contribution to existing literature on mobile banking by providing insight on the adoption mobile banking from Nigeria's rural perspective. Perceived convenience and trust were found to significantly influence intention to use. The results also show that perceived financial cost does not negatively influence intention to use.

Second, taking previous studies on adoption of mobile innovations in IS into account, convenience and trust should be considered as important theoretical constructs that predict adoption of mobile systems. Perceived convenience should explain the view point in saving time and effort which mobile systems affords a user when linked directly to behavioural intentions. In addition, when examining a context that perceived usefulness is an important predicting factor, perceived convenience can also be used as a predictor of perceived usefulness.

Thirdly, the results of this study highlight the limitation of the primary TAM model (Davis 1989) in investigating adoption of mobile banking in a largely unbanked population. Perceived usefulness, a primary TAM exogenous construct did not have a significant path with intention to use. Perceived ease of use, the other primary TAM exogenous construct was excluded from the model used in this study. The exclusion of perceived ease of use in the model was justified due to lack of theoretical evidence in

literature when characteristics of rural areas where considered. One key characteristics of the rural context in this study is that the population is largely unbanked indicating most of the people are non-users of mobile banking.

6.2.3 Limitations

There are several limitations to consider in this study. First, a total of five construct items were deleted from the model. One perceived usefulness item and four out of the six trust construct items and were deleted because they did not meet the factor loading criteria of 0.7. Low loadings add very little explanatory power to a model (Hulland 1999). One reason for the low factor loadings may be due to the translation of the items into Hausa language or rephrasing the items in English (Hulland 1999). Hence, updating and revalidating the items of the constructs would be necessary when used for future research.

Second, the influence of demographic characteristics such as gender, education and bank account ownership on the intention to use mobile banking was not included in the model. The model adapted in this study was only used to examine the structural relationship between constructs and behavioural intention derived from theory.

Third, the research model adapted in investigating adoption of mobile banking has low explanatory power. It explains just about 27% of the variance in behavioural intention to adopt mobile banking. Additional variables emerging from a qualitative study conducted in rural contexts and linked to theory would be needed to further develop a model for conducting quantitative research on rural adoption of mobile banking.

Fourth, the results from this study is based on a single survey study. The antecedents to behavioural intention may change over time as awareness and usage of mobile banking in these rural areas increases. Future research may employ longitudinal studies in providing insights into changes in the antecedents to intention to adopt mobile banking over time.

Fifth, caution should be taken to consider the rural context of this study when generalizing the adoption of mobile banking. The social, cultural, economic, technological and political factors in one context differs from another context. Therefore, there is a limitation to generalize the results of this study outside of rural areas in developing countries. More research is needed in rural areas to explore the adoption of mobile banking given its contribution to help improve the unbanked population in the world.

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APPENDIX

Appendix 1: Extensive list of selected reviewed literatures

Note: + indicates significant positive relationship and – indicates significant negative relationship of the construct

Table 8 Extensive list of selected literatures on mobile banking from Nigerian context

Articles	**Significant adoption factors that influence mobile banking**	**Region**	**Sampled population of the studies**	**Primary data collection methods**	**Theories**
Oluwatayo 2013	educational level, age, gender, membership of cooperative, privacy, perceived usefulness	Rural	360 farming household	Quantitative	socio-economic characteristics
Olasina 2015	(+)perceived usefulness , (+)perceived ease of use, (+)social influence, (+)computer self-efficacy/ICT skills, (+)customer service , (-)bank type, (+)user expectation, gender behavioural intention	University	500 respondents from university.350 students and 150 academic staffs	Quantitative/ survey	UTAUT based
Bankole et al.2011	(+)Utility expectancy, (+)effort expectancy, (-)trust and privacy,	Not Specified	231 respondents with mobile banking experience	Quantitative/survey	Concceptual based on UTAUT

	(+)social factors, (-),indivualism, (+)uncertainty avoidance, gender, power distance, user satisfaction, (+)behavioural intention, user behaviour				
Faniran & Odumeru 2015	(+)perceived usefulness , (+)perceived ease of use, (+)perceived risk, (+)facilitating conditions, (+)edcational level, (+)income level/poverty, age, attitude	Urban	295 usable response from bank customers	Quantitative/survey	Conceptual based on TAM

Table 9 Extensive list of other mobile banking literatures outside Nigerian context

Articles	**Adoption factors that influence mobile banking**	**Region**	**Sampled population of the studies**	**Primary data collection methods**	**Theories/ research model**
Wang et al. 2006	(+)Perceived usefulness, (+)perceived ease of use, (+)perceived credibility, (+)perceived self-efficacy, (-)perceived financial cost, behavioural intention	Taiwan	180 respondents	Quantitative /survey	TAM based
Gu et al. 2009	(+)Perceived Usefulness, (+)perceived ease of	Korea	900 respondents	Quantitative /survey	TAM based

	use, (+)trust, (-)social influence, (+)system quality, (+)self-efficacy, (+)facilitating conditions, (+)situatuinal normality, (+)structural assurances, (+)calculative-based trust				
Crabbe et al. 2009	(+)Perceived usefulness, (+)perceived credibility, (-)perceived elitisation, (+)sustained usefulness, attitude, age, gender, education	Ghana	271 respondents	Quantitative /survey	TAM based
Tobbin 2012	(+)Perceived usefulness, (+)perceived ease of use, (-)perceived economic factors, (+)perceived trust, (+)convenience, (+)affordability, age, gender, behavioural intention	Rural, Ghana	97 participants in 8 focus group discussions	Qualitative/ focus group discussion	TAM based discussion theme
Jeong & Yoon 2013	(+)Perceived usefulness, (+)perceived ease of use, (+)perceived credibility, (+)self efficacy, adoption	Singapore	165 respondents	Quantitative / survey	TAM based
Ramlugun &	(+)Perceived usefulness,	Mauritius	347 respondents	Quantitative / survey	TAM based

Issuree 2014	(+)perceived ease of use, (+)perceived credibility, (+)self efficacy, behavioural intention				
Shankar 2016	(+)Awareness, (+)usefulness, (+)ease of use, (+)self-efficacy, (+)compatibility, (+)social influence, (-)security and privacy, (-) financial cost, adoption	India	248 respondents	Quantitative / survey	Based on significant factors found in prior literature
Mustafa 2016	(+)Unbanked, (+)Perceived convenience, (+)perceived security, (+)perceived financial cost, (+)age, (-)education, usage	City, Pakistan	850 respondents	Quantitative / survey	Conceptual model

Table 10 Extensive list of selected literatures on internet/electronic banking from Nigerian context

Articles	**Significant adoption factors that influence internet/electronic banking**	**Region**	**Sampled population of the studies**	**Primary data collection methods**	**Theory /research model**
Agwu 2012	Security and privacy, accesibility (electric/telecommunication infrastructures), income level/poverty , occupation , trust, educational level, cost/price	Not explicitly specified	20 interviwees	Qualitative	N.A.
Tahrini et al.	security, privacy, accesibility, perceived	Urban	30 interviewee	Qualitative	N.A.

2015	ease of use, awareness, trust, educational level, cost/price , culture		s		
Salimona et al. 2016	perceived usefulness , perceived ease of use , perceved security trust, satisfaction	N.A	N.A	Conceptual studies	Based on literature review
Adesina & Ayo 2010	(+)Perceived usefulness, (+)perceived ease of use , (+)perceived credibility, (+)computer self-efficacy/ICT skills , (+)customer attitude, behavioural intention	Urban	292 bank customers	Quantitative /survey	TAM based
Okeke & Okpala 2014	income level/poverty , occupation , educational level, age, gender , marital status, marital ethnicity, intention to use	Urban	400 retail banking customers	Quantitative	Demographic analysis
Dalhatu et al. 2014)	(+)Perceived usefulness, (+)perceived ease of use , (+)Security and privacy, (+)awareness, (+)trust, (+)attitude, (+)convenience, (+)attitude, (+)behavioural intention, usage	Urban	61 Islamic bank customers who are Nigerian students and workers in Malaysia	Quantitative /survey	TAM based
Oyeleye et al. 2015	(+)perceived usefulness , (+)perceived ease of use, (+)educational level	Urban	479 used responses from bank customers	Quantitative /survey	TAM based
Omotayo & Adebayo 2015	(+)perceived usefulness , (+)perceived ease of use , (+)trust, , (+)perceived behavioural control, (+)subjective	Urban	522 post graduate university students	Quantitative /survey	TAM + TPB

	norm(social influence), (+)attitude, age, (+)intention, usage				
Okeke et al. 2015	(+)security, , (+)assurance (+)responsiveness, (+)perceived risk (+)cost/price, saisfaction of online banking services	Urban	258 bank customers	Quantitative /survey	Service quality dimension

Table 11 Extensive list of other internet/electronic banking literatures outside Nigerian context

Articles	**Significant adoption factors that influence internet/electronic banking**	**Region**	**Sampled population of the studies**	**Data collection Methods**	**Theories/ research model**
Tan et al. 2010	(+)Perceived Usefulness, (+)perceived ease of use, (+)trust, (+)social influence, intention to use	Malaysia	231 online banking service users	Quantitative/ survey	TAM based
Ozdemir & Trott 2009	(+)Perceived Usefulness, (+)perceived ease of use, (+)internet experience (+)mobile internet experience (+)long working hours (+)higher income, internet banking (IB) adopters	Turkey	175 internet users	Qualitative/ 155 Structured interviews and 20 semi structured interviews	TAM based themes
Sundarraj & Manochehri 2011	(+)Perceived Usefulness, (+)perceived ease of use, (+)trust, (+)compatibility, (+)attitude	Gulf-region university	127 used responses	Quantitative/ survey	Extended TAM
Riffai et al. 2012	(+)performance expectancy, (+)effort expectancy, (+)trust, (+)awareness, output	Oman	329 reponses from university students	Quantitative/ survey	UTAUT based

	quality, perceived playfulness, website design, (+)education level, (+)occupation				
Wu et al. 2014	(+)Perceived usefulness, (+)perceives ease of use, (+)perceived value, (+)attitude, age, gender, income, internet experience, adoption intention	Urban, China	614 usable responses (276 non internet bank –IB users, 296 current users, 46 discontinued users)	Quantitative /survey	Conceptual TAM based model
Lin et al. 2014	(+)Perceived Usefulness, (+)perceived ease of use, (+)compatibility, (+) perceived credibility, (+)perceived behavioural control, subjective norm (+)attitude, intention to use	Vitenam	100 respondents	Quantitative/ survey	TAM based+ TPB
Angenu et al. 2015	(+) Awareness, (+)accesibility, (+)trust, (+)loyalty, adoption	Ghana	300 university students	Quantitative/ survey	TAM based
Nasri 2011	(+)convenience, (+)security perception, (+)perceived risk (+)prior internet knowledge, education level, occupation, intention	Tunisia	253 usable respondent data	Quantitative/ survey	Conceptual model derived from literature
Al-ajam & Nor 2013	(+)Relative advantage, (+)perceived ease of use, (+)trust, (+)attiitude, intention to use	Yemen	1286 usable responses from non IB service bank customers	Quantitative/ survey	TAM based

Appendix 2: Poster presentation to introduce mobile banking to respondents

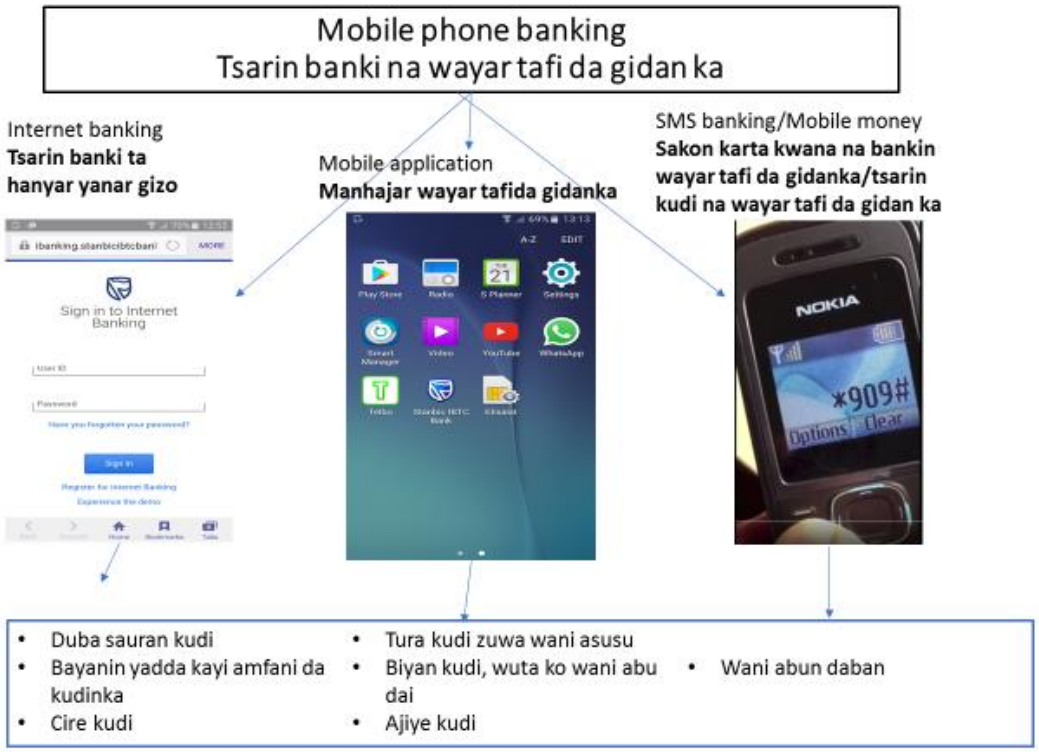

Figure 3 First page of the survey poster presentation

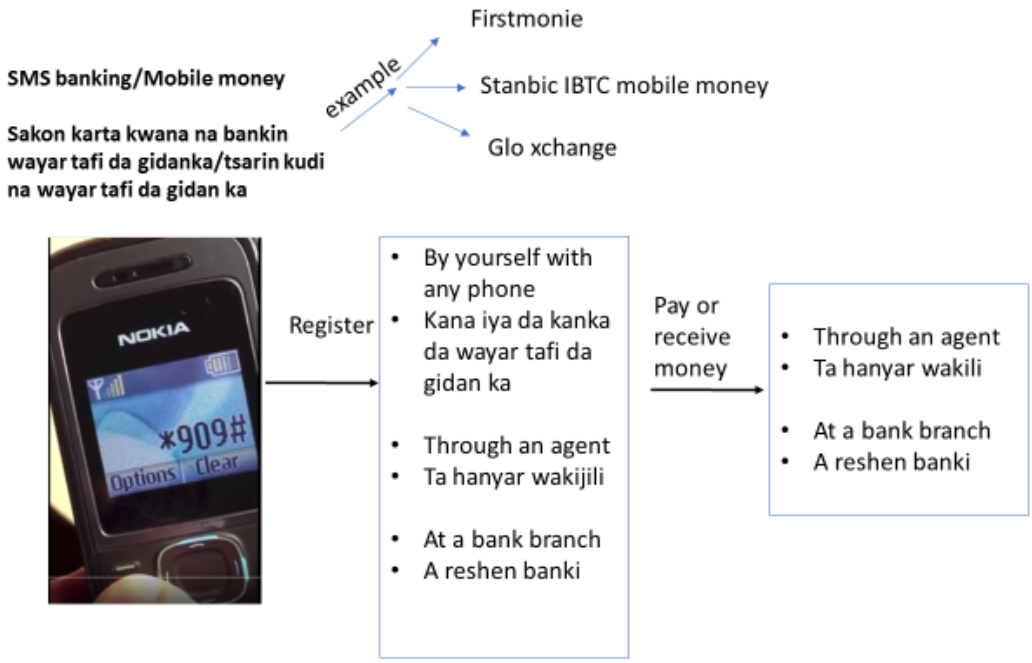

Figure 4 Second page of the survey poster presentation

Appendix 3: Questionnaire

Demographic details

Table 12 Section A: Gender age, education, occupation, income and mobile phone status

	User Demographics	**Categories**	**Mark cross when applicable**
Q1	Gender	Male	
		Female	
Q2	Age group	20–29	
		30–39	
		40–49	
		50–59	
		60 and above	
Q3	Education level	Primary	
		Secondary	
		Undergraduate	
		Postgraduate	
Q4	Occupation	Unemployed	
		Student	
		Retailer or wholesaler	
		Office work	
		Tradesman (plumber, electricial …)	
		Others	
Q5	Income level (NGN)	No income	
		Can you give an estimate of your monthly income	
Q6	Do you have a mobile phone	No	
		Yes	
		CellPhone	
		Smartphone	

Q7	How long have you had your mobile phone	< 1 year	
		1-2 years	
		2-3 years	
		>3 years	
		Yes	
Q8	Do you own a bank account	No	
		Yes	
Q9	Are you aware of mobile banking services	I do not know what m-banking is and never used it before	
		I know what m-banking is, but never used it before	
		I know what m-banking is and used it before	
Q10	Which did you use?	Traditional bank's m-banking service (→ Section B)	
		Mobile money operators' m-banking service (→ Section C)	

Table 13 Section B: Only for those that have used a conventional Bank's m-banking service

Q11	What service(s) have you used your bank's mobile banking service for	Deposit alert	
		Balance enquiry	
		Check statement	
		Withdraw cash	
		Cash transfer	
		Pay bills	
		Save money	
		Others	
Q12	How do you access the mobile banking service (it can also include web/online bank)	Using your phone to visit the bank's web page	
		Using a downloaded application	
		Via SMS	
		Agent	

Q13	Have you used a mobile banking service at any point in time	Within last 6 months	
		6months – 1 year	
		Above 1 year	

Table 14 Section C: Only for those that have used mobile money operator's banking service

Q14	What service(s) did you the mobile money operator service for	Deposit alert	
		Balance enquiry	
		Check statement	
		Withdraw cash	
		Cash transfer	
		Pay bills	
		Save money	
		Others	
Q15	How do you access the mobile money operator's service	Using your phone to visit the bank's web page	
		Using a downloaded application	
		Via SMS	
		Agent	
Q16	Have you used a mobile money operator's service at any point in time	Within 6 months	
		6 months – 1 year	
		Above 1 year	

Section D: Five point likert scale questions

Please complete the following questions by answering from strongly disagree to strongly agree. 1 – strongly disagree and 5 – strongly agree (SD – Strongly disagree, D – Disagree, NS - Not sure, A - Agree, SA, Strongly Agree).

Table 15 Section D: Five point likert scale questions

Items	Construct	SD	D	NS	A	SA
		1	2	3	4	5
Q17	I think using mobile banking services would enable me to save money					
Q18	I think using mobile banking would make it easier for me to conduct transactions					
Q19	I would find mobile services useful in conducting my transactions					
Q20	Overall, I think that using the online banking is advantageous					
Q21	I think that learning to use mobile banking would be easy					
Q22	It would be easy for me to become skilful at using mobile banking					
Q23	I think that it is easy to use mobile banking to accomplish my banking tasks					
Q24	Mobile banking service is convenient because my mobile phone is usually with me					
Q25	Mobile banking service is convenient because I can use it anytime					
Q26	Mobile banking service is convenient because I can use it in any situation					
Q27	Mobile banking service is convenient because mobile banking service is not complex					
Q28	It would cost a lot to use mobile banking.					
Q29	There are financial barriers (e.g., having to pay for handset and communication time) to my using mobile banking					
Q30	I believe mobile banking service is trustworthy					
Q31	I believe mobile banking service providers keep their promises and commitments					
Q32	I believe mobile banking service providers keep customers interest in mind					

Q33	I believe banks are trust worthy					
Q34	I believe mobile network operators are trustworthy					
Q35	I believe the technology behind mobile banking service can be trusted					
Q36	I intend to use m-banking in the future					
Q37	I believe I will use m-banking in the future					

Table 16 Measurement indicators for the items and constructs

Construct	**Code**	**Item**	Source
Perceived Usefulness	PU1	I think using mobile banking services would enable me to save money	(Lee et al. 2001; Tobbin 2012)
	PU2	I think using mobile banking would make it easier for me to conduct transactions	(Wang et al. 2006; Tobbin 2012)
	PU3	I would find mobile services useful in conducting my transactions	(Wang et al. 2006)
	PU4	Overall, I think that using the online banking is advantageous	(Lee et al. 2001; Lee 2009)
Convenience	CON1	Mobile banking service is convenient because my mobile phone is usually with me	(Kim et al. 2010)
	CON2	Mobile banking service is convenient because I can use it anytime	
	CON3	Mobile banking service is convenient because I can use it in any situation	
	CON4	Mobile banking service is convenient because mobile banking service is not complex	
Perceived Financial Cost	PFC1	It would cost a lot to use mobile banking.	(Luarn & Lin 2005)
	PFC2	There are financial barriers (e.g., having to pay for handset and communication time) to my using mobile banking	
Perceived Trust	PT1	I believe mobile banking service is trustworthy	(Kim et al. 2009)

	PT2	I believe mobile banking service providers keep their promises and commitments	(Zhou 2011) (Tobbin 2012)
	PT3	I believe mobile banking service providers keep customers interest in mind	
	PT4	I believe banks are trust worthy	
	PT5	I believe mobile network operators are trustworthy	
	PT6	I believe the technology behind mobile banking service can be trusted	
Behavioural Intentions	BI1	I intend to use mobile banking in the future	(Liu et al. 2010)
	BI2	I believe I will use mobile banking in the future	

Appendix 4: Statistical imputation of data values

Missing variable summary

Table 17 Statistical summary of missing data values

Variable Summary[a,b]

	Missing		Valid N	Mean	Std. Deviation
	N	Percent			
smart phone?	76	38.8%	120		
cell phone?	74	37.8%	122		
Do you have a bank account	29	14.8%	167		
Income level	20	10.2%	176	8892.0398	9356.72856
It would cost a lot to use mobile banking.	2	1.0%	194		
Mobile banking service is convenient because mobile banking service is not complex	2	1.0%	194		

I have used my phone to access my conventional bank account	1	0.5%	195		

Table 18 Frequency statistics after imputing missing data values

Statistics

Imputation Number			Gender	Age group	Educational level	Occupation	Income range	Do you have mobile phone
Original data	N	Valid	186	186	186	186	173	186
		Missing	0	0	0	0	13	0
1	N	Valid	186	186	186	186	186	186
		Missing	0	0	0	0	0	0
2	N	Valid	186	186	186	186	186	186
		Missing	0	0	0	0	0	0
3	N	Valid	186	186	186	186	186	186
		Missing	0	0	0	0	0	0
4	N	Valid	186	186	186	186	186	186
		Missing	0	0	0	0	0	0
5	N	Valid	186	186	186	186	186	186
		Missing	0	0	0	0	0	0
Pooled	N	Valid	186	186	186	186	186	186
		Missing	0	0	0	0	0	0

Table 19 Frequency statistics after imputing missing data values (continued)

Imputation Number			How long have you had a mobile phone	Do you have a bank account	Awareness of mobile banking
Original data	N	Valid	186	163	186
		Missing	0	23	0
1	N	Valid	186	186	186

		Missing	0	0	0
2	N	Valid	186	186	186
		Missing	0	0	0
3	N	Valid	186	186	186
		Missing	0	0	0
4	N	Valid	186	186	186
		Missing	0	0	0
5	N	Valid	186	186	186
		Missing	0	0	0
Pooled	N	Valid	186	186	186
		Missing	0	0	0