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Mobile Banking: Innovation for the Poor

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Abstract

Access to, and the cost of, mainstream financial services act as a barrier to financial inclusion for many in the developing world. The convergence of banking services with mobile technologies means however that users are able to conduct banking services at any place and at any time through mobile banking thus overcoming the challenges to the distribution and use of banking services. This research examines the factors influencing the adoption of mobile banking by people at the Base of the Pyramid (BOP) in South Africa, with a special focus on trust, cost and risk

Data for this study was collected through paper questionnaires in townships around Gauteng. This research has found that customers in the BOP will consider adopting mobile banking as long as it is perceived to be useful and to be easy to use. But the most critical factor for the customer is cost; the service should be affordable. Furthermore, the mobile banking service providers, both the banks and mobile network providers, should be trusted. Trust was found to be significantly negatively correlated to perceived risk. Trust therefore plays a role in risk mitigation and in enhancing customer loyalty.

JEL Code : O31, O32, O33.

Key words: Mobile banking, Base of the pyramid, indicators

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1.0 Introduction

Millions of people in South Africa and across the developing world do not have access to banking services. Faced with barriers related to cost, geography and education, these individuals have no way of securely transferring funds, saving money or accessing credit (BASA 2003). One solution to this problem, which has drawn particular attention from stakeholders in Africa, is mobile banking.

Mobile banking offers a potential solution for the millions of people in emerging markets that have access to a cell phone, yet remain excluded from the financial mainstream. It can make basic financial services more accessible by minimising time and distance to the nearest retail bank branches (CGAP 2006) as well as reducing the bank's own overheads and transaction-related costs. According to the International Telecommunication Union (ITU), over 90% of South Africans use a mobile phone (ITU 2009), while only 40% have a bank account (African Executive 2008). Mobile banking presents an opportunity for financial institutions to extend banking services to new customers (Lee et al. 2007).

Despite the obvious potential benefits of mobile banking, questions remain about whether low-income customers will adopt the relatively new technology at a scale sufficient to make it worth offering. Understanding adoption behaviour allows for the providers of mobile financial services to engineer their offerings in order to optimise uptake by consumers. This research therefore examines the factors influencing the adoption of mobile banking by the Base of the Pyramid (BOP) in South Africa.

From an innovation perspective, the analysis examines the provision of new or significantly improved services to people at the base of the pyramid and, to a lesser extent, the impact of doing this of consumers on producers. The analysis suggests statistical indicators that could be used to describe changes in products being offered and in the way they are used by consumers.

Data was collected through the use of a paper questionnaire in townships around South Africa's main economic hub of Gauteng. While this introduced an acknowledged bias into the study, in that the population surveyed was urban and not rural and also in a more economically successful region rather than in a deprived region, the results were sufficiently robust to encourage further work on the use of mobile banking, the role of innovation, and the impact on the consumer. The research found that customers in the BOP would consider adopting mobile banking as long as it was perceived to be useful, easy to use and affordable. The study also found that trust played a key role in risk mitigation and in enhancing customer loyalty.

2.0 Background

The financial services sector in South Africa is sophisticated, world class and highly regulated. Historically however this sector had concentrated its services on middle to upper income consumers and corporate businesses, ignoring the large numbers of people excluded from the formal financial system. The Financial Sector Charter of 2005 applied regulatory pressure on banks to extend their banking services to the 18 million unbanked (Centre for Inclusive Banking in Africa 2011). The banking sector's response to this was the launch of the Mzansi account, described as "best- effort" attempt to bring entry- level customers into

the banking sector SA (Naidoo 2011). On paper the Mzansi account appeared successful, according to the Finscope (2010) survey, by December of 2010, there were 4.9m Mzansi account holders,. This represented about 15% of the 32m SA adult population, compared with 13% in 2009 and 11% in 2008. These numbers are however misleading as only about 60% of the 4.9m accounts which were opened are active. High levels of dormancy occur as the Mzansi product fails to meet customer needs. Customers are still required to travel to bank branches or ATM's to make transactions. Branches are expensive to set up, and are only open for limited trading hours (9am to 3pm). Banking executives described how it was counterintuitive to expect a consumer to spend 20 rand in taxi fare to come in to a branch to deposit 50 rand (Naidoo 2011).

Examining the bank's challenges, many banks have struggled to make traditional business models profitable in a BOP context, given lower profit margins and high costs. In a 2011 Financial Mail article, four of SA's largest banks have admitted to losses on conventional Mzansi accounts (Naidoo 2011). Traditional models therefore did not suit either the consumer or service provider and it required an innovative approach to create banking models more suitable to the low income context. For this reason many banks began experimenting with various mobile banking models. Mobile banking reduces the costs related to branch overhead, creating the potential for a viable business model at the BOP and therefore presenting an opportunity for banks to expand market penetration by reaching previously unbanked customers (Lee et al. 2007).

The convergence of telecommunication and financial services has created opportunities for the emergence of mobile banking solutions. Mobile banking services provide convenience and efficiency to customers, saving them time and money. For some customers in low-income communities, this can remove the barrier of an expensive and time-consuming visit to the nearest bank branch and in so doing encourages interaction with the formal economy (CGAP 2006).

These changes in the traditional banking model can be regarded as innovative using the definition of innovation as found in the Oslo Manual.

“An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.” (OECD/Eurostat 2005: paragraph 146)

In South Africa, the financial sector aims to reduce the number of unbanked people (BASA, 2003). Mobile banking and other forms of mobile money transfer have been cited as a secure means for the previously unbanked to access and transfer funds, to save money, and to access credit for low-income housing or financing agricultural development as well as insurance products and services (BASA 2003; GSMA 2009).

However, while research has been conducted into areas of mobile commerce and mobile banking, there has been little research into mobile banking in a BOP context. While mobile banking may offer opportunity for expanding financial inclusion in low-income markets, questions remain about customer adoption, and about the behaviour of customers at the BOP. Will low-income customers view banking through their mobile phones as reliable or risky? (CGAP 2006). How important is the cost factor versus the benefit of mobile banking, and how does this affect the decision of a low income individual to adopt a mobile banking service? Do customers at the BOP behave differently from middle and upper income people?

Do people at the BOP perceive risk and cost differently? Do they have sufficient knowledge about mobile banking service providers, services and products to trust them? These questions have been insufficiently tested in the literature around the adoption of technology in a low income market context.

Policymakers, as well as mobile banking service providers themselves, must understand the needs of the consumer, including factors influencing the intention to use or adopt mobile banking in the low-income economic segment, in order to stimulate demand and secure healthy returns on investment (CGAP 2006). A clear understanding of these factors will enable mobile banking service providers to develop suitable marketing strategies, business models, processes, awareness programmes and pilot projects (GSMA 2009). This understanding will also guide policymakers in crafting policy suitable to encouraging financial inclusion.

Various studies have been conducted in South Africa and other countries into mobile commerce and mobile banking, but with a focus on different factors and contexts. Wu and Wang (2005) looked at the impact of cost on the adoption of mobile banking in middle class populations. In South Africa, two studies examined factors influencing adoption of cell phone banking (Brown et al. 2003; Walker 2004), but both were urban-based and relied on email to contact some respondents, failing, therefore, to accommodate the majority of the population in the BOP segment which lacks access to the internet.

This case study contributes to existing research by assessing the relevance and effects of perceived usefulness, ease of use, cost, trust and risk in influencing the adoption of mobile banking services. From an innovation perspective, the knowledge gained from the analysis provides potential inputs to innovation both at the firm level and at the level of the policy maker. The study focused on the previously unbanked or under-banked consumer base in the BOP economic segment in South Africa (SA). As product and policy are engineered to encourage mobile banking adoption and adoption amongst the previously unbanked, from an innovation perspective, this forms an example of market development.

In the study, five questions were investigated.

1. What are the main factors influencing the adoption of mobile banking by the BOP?
2. How does the customer at the BOP perceive risk with regards to mobile banking?
3. What influences the customers at the BOP to trust mobile banking?
4. How do customers at the BOP perceive the cost of mobile banking?
5. How does perceived usefulness and perceived ease of use influence the adoption of mobile banking at the BOP?

2.1 Defining the BOP

Prahalad (2005) argued that the global poor constitute a “fortune at the Base of the Pyramid” and that the private sector should target these vast untapped rural markets in developing countries with low-cost services and appropriate business strategies. According to Prahalad (2005) there are more than four billion people at the BOP living on less than \$2 per day purchasing power parity (PPP), in both developing countries and least-developed countries. Several different definitions of the Base of the Pyramid have emerged since Prahalad coined the term. This study draws on various definitions, ranging from \$2 per day PPP (Prahalad 2005; Karnani 2007; Louw 2008) to an average household income of \$29.61 or R4,664 per

month (Chipp and Corder 2009; SAARF 2009). The presence of the extensive Social Grant system in South Africa has meant that the 'base' sits at a higher income level than in other developing markets.

For the purpose of the survey, people with incomes of less than R5, 000 per month were regarded as belonging to the BOP. Alternatively, if income was not provided, then the South African Living Standard Measure (LSM) was used to identify people classified as LSM 5 or below as recommended in the All Media Products Survey (AMPS) 2008B (SAARF 2009).

2.2 Distribution in the BOP

Distribution, the task of getting goods and services into low income markets, is often cited as being one of the biggest challenges in serving BOP markets and can be a major obstacle to overcome for many firms (Anderson and Billou 2007). The developing world unlike the developed world, is often characterised by fragmented or nonexistent distribution channels (Anderson and Billou 2007). This affects the flow of goods into and out of low income markets. Banking is no exception to this challenge as the distribution of banking services is dependent on a range of infrastructural necessities. This negatively impacts on the poor's ability to generate income and improve their quality of life (Vachani and Smith 2008).

Jenkins et al. (2010) see appropriate innovative technology and partnerships as enablers in expanding reach and distribution in low income markets. Mobile banking may be regarded as such a technology as it expands the reach of banking services to those marginalised from the formal financial system.

Anderson and Billou (2007) describe that companies which are successful and profitable in serving the poor have pursued strategies of experimentation in developing a unique combination of product and service offering. The above mentioned authors describe a 4A's model of availability, affordability, acceptability and awareness which provides a framework against which innovation in BOP products and services may be assessed. Mobile banking aims to offer availability, affordability and accessibility to its target consumers, this study will test how these attributes are perceived by the end consumer.

3.0 Description of the Innovation

Mobile Commerce (m-commerce) is defined as a business transaction conducted through mobile communication networks or the Internet (Siau and Shen 2003). M-commerce can offer value to consumers by providing convenience and flexibility through time and place independence (Kim et al. 2009, Venkatesh et al. 2003).

Mobile banking is an application of m-commerce which enables customers to access bank accounts through mobile devices to conduct and complete bank-related transactions such as balancing cheques, checking account statuses, transferring money and selling stocks (Kim *et al.*, 2009; Tiwari and Buse 2007). Luo, et al. (2010) defined mobile banking as an innovative method for accessing banking services through a channel whereby the customer interacts with a bank using a mobile device (e.g. mobile phone or personal digital assistant (PDA)). This is also consistent with the definition of innovation in the Oslo Manual (OECD/Eurostat 2005).

There are challenges associated with m-commerce, and specifically mobile banking. Mobile devices with a small screen size, limited screen resolution and an uncooperative keypad may make it difficult for the customer to use mobile banking (Kim *et al.* 2009). Mobile banking is also vulnerable to information and transaction eavesdropping risk, just like other e-commerce applications such as Internet banking (Siau *et al.* 2003).

3.1 Mobile Banking technology solutions

Currently, mobile banking is implemented through three different technology solutions: browser-based applications, messaging-based applications and client-based applications (Kim *et al.*, 2009; Tiwari and Buse 2007).

The browser-based application is essentially a Wireless Access Protocol (WAP)-based internet access (Kim *et al.* 2009). This requires a compatible mobile phone which is WAP-enabled. The mobile phone is used to access banking portals through the Internet.

On the messaging-based applications, the communication between the bank and the customer is carried out via text messages. For example, by using a registered mobile number, the customer sends a predefined command to the bank then uses text messages to conduct transactions with the bank. An example of messaging-based applications is the Unstructured Supplementary Service Data (USSD), which has compatibility with most mobile phones. Existing mobile banking applications based on USSD includes WIZZIT in South Africa (WIZZIT 2005), M-PESA in Kenya and Tanzania (Camner and Sjöblom 2009), M-PESA in South Africa (Nedbank 2010a) and FNB mobile banking (FNB 2010a).

On client-based applications, special software is installed in the mobile phone. An example of a client-based application is what is called the SIM Toolkit standard (STK) (Tiwari and Buse 2007). For instance M-PESA in Kenya uses the STK technical platform (Safaricom 2007; Camner and Sjöblom 2009).

3.2 Mobile banking in South Africa

According to the objectives of South Africa's Financial Sector Charter (BASA 2003), banks are expected to increase effective access to financial transaction services to the low-income segment of the population (LSM 1-5) (SAARF 2009).

In October 2004, the Banking Council of SA announced the launch of the Mzansi account as part of the requirements of the Financial Sector Charter, which regulates the financial services industry (BCSA 2005, BASA 2003). The Mzansi bank account was developed to provide an entry-level account to the poorest segment of the population, which falls into category LSM 1–5 (BASA 2010). By the end of 2005, 1.4 million Mzansi accounts had been opened. This figure increased at a rate of 21% year-on-year to approximately 3.9 million accounts by the end of 2009 (BASA 2010). This was a product innovation targeted to a particular market.

South African banking regulation requires that companies offering mobile banking service are in possession of a banking licence, which has prompted partnerships between mobile companies and financial services firms. The following section outlines the main mobile banking initiatives in South Africa:

3.2.1 M-PESA Money Transfer (Nedbank Cellphone Banking)

M-PESA is a money transfer service which was first introduced in Kenya in March 2007 by Safaricom in partnership with Vodafone (Safaricom 2007). The M-PESA service enables users to deposit, withdraw and transfer money using a mobile phone at M-PESA agents countrywide (Safaricom 2007). The M-PESA application is installed on the SIM card and works on all handset brands. M-PESA is widely used in Kenya and Tanzania (Camner and Sjöblom 2009), it is free to register and the user does not need to have a bank account (Safaricom 2007). This is a clear case of product innovation.

In August 2010, Nedbank and Vodacom officially launched M-PESA money transfer in South Africa (Nedbank 2010b). M-PESA is based on the Unstructured Supplementary Service Data (USSD) technology; it is currently available for Vodacom subscribers (Vodacom SIM card holders and ported SIM cards) (Nedbank 2010b). The registered M-PESA user does not need to have a bank account, there are no monthly fees and no minimum balance is required (Nedbank 2010b).

3.2.2 WIZZIT Cellphone Banking

Another example is the initiative by WIZZIT Bank, a division of the South African Bank of Athens. A WIZZIT cellphone banking system was launched in November 2004 in an attempt to provide solutions to the previously 'unbanked' society in SA (WIZZIT 2005). WIZZIT uses the 'pay-as-you-go' model, i.e. users pay per transaction (20c per 20 seconds on MTN and Vodacom) and there are no monthly fees (WIZZIT 2005).

3.2.3 Standard Bank Cellphone Banking

Standard Bank, in conjunction with MTN, implemented MTN Banking, a mobile money service which was based on wireless internet gateway (WIG) technology, which the client needed to install on a SIM card (Standard Bank 2005). The cellphone banking services are implemented using two options; the WAP-based option and a new cellphone banking option which works on any type of phone (Standard Bank 2010). To use Standard Bank's cellphone banking, the user needs to have an account with the bank.

3.2.4 ABSA Cellphone Banking

ABSA has implemented two cellphone banking options; WAP-based (Internet through a cellphone) and WIG-based technology, which is enabled through secure SMSes (ABSA 2010). With the WIG cellphone banking, the banking menu is downloaded to the SIM card, which allows for a convenient selection of transactions and the secure transmission of encrypted information between the cellphone and the bank (ABSA 2010). The ABSA WIG cellphone banking is currently available for Vodacom and MTN subscribers.

3.2.5 FNB Cellphone Banking

FNB has implemented cell phone banking based on the WAP and USSD technology available to all FNB account holders. In addition, FNB has introduced eWallet, which is a money transfer service (FNB, 2010a); as well as Pay Wallet which enables FNB Corporate, Commercial and Public Sector clients to electronically pay their unbanked recipients directly to their cellphones (FNB 2010b). This allows the recipients to have immediate access to their funds at any full service FNB ATM without the need of a bank card.

The examples above illustrate the various different mobile banking options in South Africa. The penetration of these products into the lower income segments is, however, limited. A

clearer understanding of the factors which would enhance adoption would be beneficial in order to build scale in the mobile financial services sector.

4.0 Triggers for the innovation

In South Africa, only 40% of people have a bank account (African Executive 2008), yet 90 percent of the population have access to a cell phone (ITU 2009). That ratio is mirrored across the developing world, presenting an obvious opportunity to use mobile technology for expanding financial inclusion.

As well as the strong demand-side ‘pull’ for innovation around mobile banking, there is also a supply-side incentive. Banks in South Africa have built their business models around the needs of a particular market, taking account of the behaviour of middle to high income customers. The branch model is rarely sustainable for a low-income market, given the high costs related to opening and operating a physical presence in often far-flung communities with low population density. Add to that the much lower levels of income at the BOP, and profit margins on a traditional branch model are virtually eroded altogether.

When the Financial Sector Charter was introduced, requiring that banks do more to provide financial services to the unbanked or under banked, (BCSA 2005; BASA 2003), financial institutions in South Africa began to examine different options for reaching the BOP. This was reinforced by a realisation that the mid to high income market in South Africa was largely saturated, whilst the vast lower-income market had yet to be tapped.

The incumbent banks introduced the Mzansi account, but this met with limited success. The main four banks have all explored options around mobile banking in recent years, due to the significantly lower cost-per-transaction, as well as the ability to reach many more customers whilst reducing overheads.

As discussed above, the main banks are each exploring different approaches to mobile banking, with varying degrees of success. They have yet to reach the unbanked or under banked markets at scale. Measures of the various activities begin to suggest indicators that could be used for monitoring the diffusion of new products and their use by the poor.

5.0 Frameworks and Analysis

This section critically reviews the literature pertaining to mobile banking in a South African BOP context. It discusses a technology acceptance framework for mobile banking and reviews the constructs within the framework, which include perceived usefulness, perceived ease of use, perceived risk, perceived cost and trust. The variables (risk, trust and cost) are added to the extended technology acceptance model (TAM2) (Venkatesh and Davis 2000) to develop a research model to investigate factors affecting adoption of mobile banking by the BOP in South Africa.

Since the late 1980s, technology adoption research has focused on exploring the determinants of users’ intentions to use new technologies. Many theories have been developed to study Information Technology (IT) adoption issues, including the theory of reasoned action (TRA) (Fishbein and Ajzen 1975), the technology acceptance model (TAM) (Davis 1989), the

extended technology acceptance model (TAM2) (Venkatesh and Davis 2000), the theory of planned behaviour (TPB) by Ajzen (1991), the innovation diffusion theory (Rogers 1995) and the unified technology acceptance user technology (UTAUT) (Venkatesh et al. 2003).

TAM suggests that perceived usefulness (PU) and perceived ease of use (PEOU) are the two most important factors in explaining individual users' adoption intentions and actual usage (Davis, 1989). Davis (1989) defines PU as the degree to which a person believes that using a particular system will enhance his or her job performance. In addition, PEOU refers to the degree to which the person believes that using the system will be free of effort (Davis 1989).

TAM has been extensively tested and validated and is a widely accepted model, which can be modified or extended using other theories or constructs (Taylor and Todd 1995; Venkatesh and Davis 2000; Wu and Wang 2005; Luarn and Lin 2005; Zhang et al. 2008; Yen et al. 2010).

Venkatesh and Davis (2000) introduced social and organisational factors such as subjective norms, impression, quality of output and work relevance into the TAM model, and proposed the so-called extended TAM model (TAM2).

In a study focused on investigating the drivers of mobile commerce, Wu and Wang (2005) combined TAM2 with Rogers' innovation diffusion theory (IDT) Rogers (1995). The PU and PEOU constructs from the TAM2 model were combined with the 'Perceived risk' and 'Cost' constructs. Wu and Wang (2005) also added the compatibility constructs from the IDT model.

Luarn and Lin (2005) conducted a study in Taiwan, where TAM and the theory of planned behaviour (TPB) by Ajzen (1991) were combined. The study investigated the possible factors affecting the behavioural intentions of mobile banking users. These factors include perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility, self-efficacy, and perceived financial cost (Luarn & Lin 2005).

In a study by Lee (2009) in Taiwan which investigated the factors influencing the adoption of internet banking, the TAM and TPB were integrated, and perceived risk and perceived benefit constructs were added to the research model. Lee discussed the following five antecedents of perceived risk: performance risk, social risk, financial risk, time risk and security risk.

For the purpose of this study, a research model was developed combining relevant constructs from across the literature, which is outlined in Figure 2.2. The model consists of the original determinants of TAM2, which are PU and PEOU as well as the dependent variables Adoption of mobile banking and Actual Usage (AU). It also adds additional determinants from the literature: Perceived Cost, Trust, and the five facets of Perceived Risk, which are each explained in further detail below.

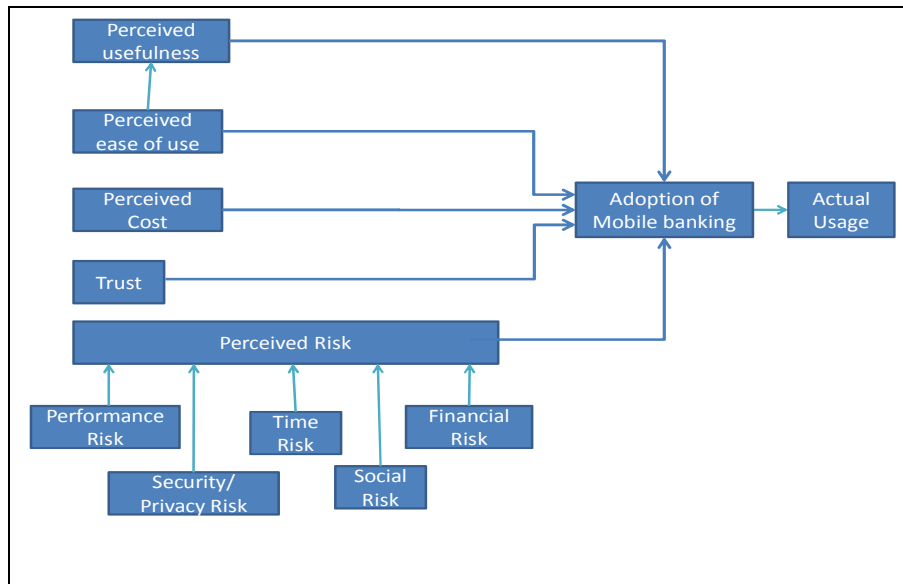


Figure 1: Research Model based on TAM2 with perceived risk, trust and perceived cost

The following section reviews the literature around the additional determinants of perceived risk, trust and perceived cost in more detail.

5.1 Perceived risk of mobile banking

Various studies on consumer perceptions of risks have been conducted in the context of online banking (Tan and Teo 2000; Im et al. 2008; Wu and Wang 2005), but the perceived risk variable has only been modelled as a single construct, which fails to reflect the characteristics of the perceived risk (Lee 2009).

Lee (2009) conducted a study on perceived risk in the context of Internet (online) banking adoption, where risk was divided into five facets (performance risk, social risk, financial risk, time risk and security risk) (Lee 2009). Given the similarities between mobile banking and Internet banking (Brown et al. 2003), these five risk facets were also used for the purpose of this study. As defined by Lee (2009), these five risks can be described for mobile banking as follows.

- Performance risk: refers to losses incurred by deficiencies or malfunctions of mobile banking servers (Lee 2009). According to Littler & Melanthiou (2006), a malfunction of a banking server would reduce customers' willingness to use Internet banking services, and the same applies for mobile banking.
- Security/privacy risk: defined as a potential loss due to fraud or a hacker compromising the security of a mobile banking user. In a similar study, Luarn and Lin (2005) used the construct 'perceived credibility', which is defined as the extent to which a person believes that using mobile banking will have no security or privacy threats. For this study, security/privacy risk will be considered to be similar to a lack of credibility.
- Time/convenience risk: this refers to a loss of time and any inconvenience incurred due to delayed payments or difficult navigation (Lee 2009).
- Social risk: refers to the possibility that using mobile banking may result in disapproval by one's friends/family/work group (Lee 2009).
- Financial risk: defined as the potential for monetary loss due to transaction errors or bank account misuse (Lee 2009).

Lee (2009) and Lee et al. (2007) found that all five risks: security, financial, time, social and performance risks, emerged as negative factors in the intention to adopt online banking. However, social risk was found to have an insignificant effect on the intention to adopt online banking (Lee 2009).

A study by Im et al. (2008) found that when deploying a technology perceived by users to be high risk, managers need to emphasis 'ease of use'. When deploying a technology perceived to be low risk, managers need to focus on communicating the 'usefulness' of the technology (Im et al. 2008).

A study by Tan and Teo (2000) on the adoption of Internet banking revealed that perceived risk is a significant determinant. Brown et al. (2003) applied Tan and Teo's Internet banking adoption framework to the mobile banking context. Brown et al. (2003) found perceived risks to be significant factors affecting mobile banking adoption. However, in their studies, perceived risk was modelled as a single construct (Tan and Teo 2000; Brown et al. 2003).

For this study, all five risk facets will be adapted as antecedents of perceived risk in the research model (as outlined in Figure 2.1). As per the literature review, it is hypothesised that security, financial, time, social and performance risks are more likely to have a negative effect on the adoption of mobile banking.

5.2 Perceived cost

Perceived cost is defined as the extent to which a person believes that using mobile banking will cost money (Luarn and Lin 2005). The cost may include the transactional cost in the form of bank charges, mobile network charges for sending communication traffic (including SMS or data) and mobile device cost.

A study by Wu and Wang (2005) on mobile commerce acceptance showed that perceived cost had minimal significance when compared to other variables such as perceived risk, compatibility and perceived usefulness. A further qualitative investigation on the same study was conducted, which revealed that perceived cost is normally a major concern when a technology is first introduced (Wu and Wang 2005). However, when there is an emergency or sudden need, the utility benefits outweigh the cost issues. The study by Wu and Wang (2005) was conducted on respondents with an average income level of US\$650 per month (equivalent to approximately R5000). This income level was regarded as being appropriate, implying that the users could afford mobile commerce (Wu and Wang 2005).

This study however focuses on the BOP context, a population with low disposable income. According to Karnani (2009), people at the BOP have very low purchasing power and are price sensitive. According to Guesalaga and Marshall (2008), the consumption pattern of the BOP in developing countries concentrates mainly on basic needs such as food, housing and household goods; with less spending on information and communication technology (ICT). Therefore, perceived costs should be considered with regards to the adoption of mobile banking in a BOP context.

For this study, perceived cost is included in the research model as having a direct effect on the adoption of mobile banking (as outlined in Figure 2.1). Hence, it is anticipated that the perceived cost of mobile banking services is likely to negatively influence the adoption of mobile banking.

5.3 Trust in mobile banking

Customer trust is recognised as critical for the success of mobile banking. With the surge of both electronic commerce (e-commerce) and mobile commerce (m-commerce), studies have been conducted on the conceptual structure of trust, the formation of the mechanisms of trust and the effects of trust (Bhattacharjee 2002; Kim et al 2009; Kim et al. 2010; Shin 2010).

In a study by Kim et al. (2009) which examined the effect of initial trust in mobile banking user adoption, trust was defined as a psychological expectation that a trusted party will not behave opportunistically. In Kim et al. (2010), trust was defined as a feeling of security and willingness to depend on someone or something.

Kim et al. (2009) further makes a distinction between initial trust and experience or knowledge-based trust. This study will focus on initial trust, as users are less likely to have experience with service providers with regard to the use of mobile banking.

A study by Siau and Shen (2003) classified trust into two categories: trust of technology and trust of mobile banking service providers. This is supported by Lee et al. (2007) in a study that focused on three trust dimensions: trust in bank, trust in mobile network provider and trust in wireless infrastructure.

A study by Bhattacharjee (2002) provided a definition and measurement of the consumer's trust of an e-commerce service provider, based on the three dimensions or typology of trust: ability, integrity and benevolence. Bhattacharjee (2002) defined these as follows:

- Ability refers to the perception of the consumer about the competency and salient knowledge of the mobile banking service provider to deliver the expected service;
- Integrity refers to users' perceptions that the service provider will be fair, honest and adhere to reasonable conditions of transactions;
- Benevolence refers to the extent to which a service provider will demonstrate receptivity and empathy towards the user. The service provider will make a good faith effort to resolve users' concerns and intends to do good to the users beyond profit motives.

For the purpose of this study the three dimensions of trust: ability, integrity and benevolence (Bhattacharjee 2002), will be used, together with trust from the three perspectives of bank, mobile network provider and wireless infrastructure (Siau and Shen 2003; Lee et al. 2007).

To better understand how customer trust influences the adoption of mobile banking, the concept of brand loyalty and customer loyalty is also introduced in this study.

In a study by Lin and Wang (2006), brand loyalty is simply defined as the repetitive purchase of preferred brand products or services. It further defines customer loyalty as a customer's favourable attitude toward the mobile vendor that results in repeat buying behaviour (Lin and Wang 2006). For the purpose of this study customer loyalty will be used. According to Reichheld and Schefer (2000), earning customer loyalty in an online business is dependent on first earning customer trust. A study by Harris and Goode (2004) found that trust is positively and directly associated with customer loyalty for online services. Given that mobile banking is considered an extension of Internet banking (Brown et al. 2003), it is therefore proposed that a customer's trust in a mobile banking service provider is likely to positively influence the adoption of mobile banking.

In conclusion, the literature highlighted various factors affecting the adoption of technology, several of which are regarded as significant for the context of this study. These factors were used to construct a research model. This model was used to investigate the effects of the original determinants of the TAM2 model (PU, PEOU) on the adoption of mobile banking by the Base of the Pyramid (BOP) economic segment in South Africa, as well as the effects of additional determinants: perceived risk, trust and perceived cost.

For this study, the following hypotheses are proposed, assuming a BOP context:

Hypotheses based on TAM2

- H1:** Perceived usefulness (PU) influences the adoption of mobile banking.
- H2:** Perceived ease of use (PEOU) influences the adoption of mobile banking.
- H3:** Perceived ease of use (PEOU) influences perceived usefulness (PU).

Perceived Cost Hypothesis

- H4:** The perceived cost influences the adoption of mobile banking.

Perceived Trust Hypothesis

- H5:** Customers’ trust in mobile banking service providers is likely to influence the adoption of mobile banking.

Perceived Risk Hypothesis

- H6:** The level of perceived risk is likely to influence the adoption of mobile banking.
- The hypotheses are integrated to the research model as outlined in Figure 3.1.

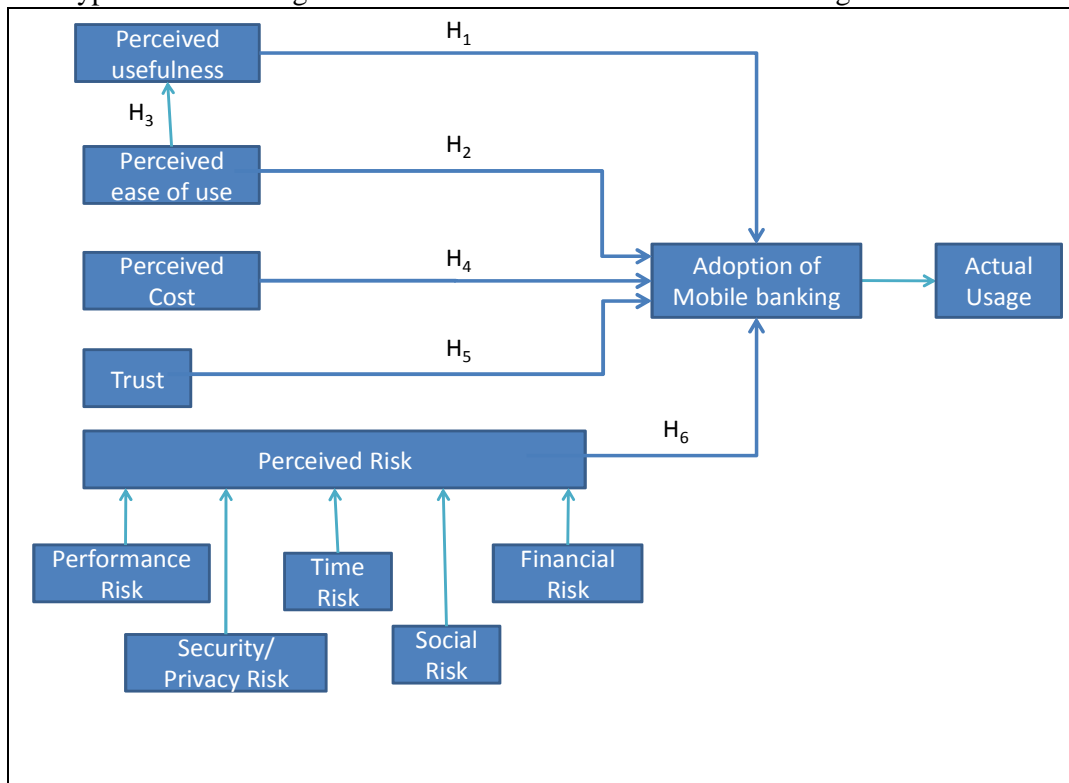


Figure 2: The research model with hypotheses based on TAM2 with the addition of perceived risk, trust and perceived cost

6.0 Methodology

The research followed a quantitative research methodology. Survey questionnaires were used for standardisation purposes to allow for aggregation of results.

The investigation aimed to identify whether the independent variables are statistically significant factors in the adoption of mobile banking. The research established the effect of independent variables, which included perceived risk, trust, perceived cost, perceived usefulness, and perceived ease of use on dependent variables, i.e. the adoption of mobile banking.

6.1 Population

The population was defined as individuals with a mobile phone and a bank account in South Africa, with an income of less than R5,000 per month, or a person in a category not higher than LSM 5, based on AMPS 2008b (as in Appendix A) (SAARF 2009; Chipp and Corder 2009).

According to ITU (2009), over 90% of the South African population has a mobile phone. Mobile banking solutions are compatible and can work on all types of mobile phones (Kim et al. 2009; Tiwari and Buse 2007).

More than 15 million people (over 16 years old) are estimated to be in the BOP economic segment in South Africa (Louw 2008; Chipp and Corder 2009). According to a report by the Banking Council of South Africa, over 3.9 million Mzansi accounts were opened by the end of 2009 (BASA 2010). A total population of mobile phone owners with bank accounts, who fall in the BOP economic segment, is assumed to be more than 500,000.

6.2 Unit of Analysis

The unit of analysis was defined as a mobile phone owner with a bank account in South Africa, with an income of less than R5,000 per month or a person in a category not higher than LSM 5, based on AMPS 2008b (SAARF 2009; Chipp and Corder 2009). To better understand the perception of people at the BOP, the research also included the population within the BOP who do NOT have bank accounts or cell phones. This allowed for comparison of adopters, potential adopters and non-adopters of mobile banking.

6.3 Sampling and size of sample

The sampling method was non-probability judgement sampling focused on informal settlements, rural areas or townships, which qualify as the BOP segment described under unit of analysis. Approximately 450 questionnaires were prepared and circulated. A total of 316 responses were received. Of these, seven (7) responses had to be discarded due to invalid or incomplete data entries. Thus, the sample comprising of a total of 309 respondents was used for analysis.

6.4 Data Collection

A paper based survey questionnaire was prepared and distributed to the intended BOP population, in townships or informal settlements in Gauteng Province, South Africa.

About 99% of the respondents were based in Soweto Township in order to reduce the costs of distributing hard-copy surveys. The remaining 1% of the respondents were based in Tembisa and Midrand.

The operational definition or measurement instrument for perceived usefulness, perceived ease of use and the five facets of perceived risk constructs were adapted from Lee (2009). The measurement instrument for the perceived cost construct was adapted from Wu and Wang (2005). The measurement instrument for the three dimensions of trust: ability, integrity and benevolence, was adapted from Bhattacharjee (2002), and the instrument from the perspective of trust from the bank, network operator and wireless network was adapted from Gu et al. (2009).

A five-point Likert scale was used for the survey.

6.5 Pre-test

A pre-testing (pilot study) was conducted to validate the instrument. It was sent to four respondents in two batches, who were selected on a convenience basis and were asked to comment on length, format, general understanding and wording of the scales.

6.6 Questionnaire

The first section of the questionnaire focused on the respondent's demographic information, including gender, age, level of education, work status, income level, and whether the respondent had a bank account and mobile phone (Appendix A). The respondents were also requested to indicate whether they currently use mobile banking and the time it took for them to access the nearest bank branch. To verify the respondents' BOP economic category, respondents were requested to indicate household items they possess in order to categorise them according to LSM (as indicated in Appendix A).

The second section asked respondents about their perceptions of mobile banking, based on the variables in the research model using the 5-point Likert scale from 1 ("strongly disagree") to 5 ("strongly agree").

The questionnaire aimed at identifying whether the independent variables were statistically significant factors influencing the adoption of mobile banking.

6.7 Data Analysis

Descriptive statistic (such as mean and frequencies) analysis was conducted on the demographics data. Statistical analysis was conducted on the data collected from the returned questionnaires.

In this study, dependent variables were categorised into three groups; adopters, potential adopters and non-adopters. ANOVA was used to compare the means of the three groups to test for statistical significance at 0.05 level.

Discriminant Analysis was used to determine which independent variables were the best predictors of the dependent variable's outcome. Of these, the possible outcomes were current usage of mobile banking, interest to use mobile banking in the future or no interest to use mobile banking in the future. A various combination of independent variables, which included perceived usefulness, perceived ease of use, perceived risk, trust, and perceived cost was tested to establish the best combination of predictors.

The Pearson Correlation Coefficient (T-Test) was used to establish the correlation between the selected construct; perceived usefulness (PU) and perceived ease of use (PEOU), and between trust and perceived risk. This test was conducted to establish any possible indirect effect of certain independent variables on the adoption of mobile banking.

6.8 Scale Results

The composite reliability was estimated to evaluate the internal consistency of the measurement model. All the main constructs had Cronbach's alpha above 60; greater than the recommended benchmark of 0.60 (Wu and Wang 2005).

6.9 Limitations

The survey was mainly conducted in historically black-dominated townships and shopping centres close to such townships, limiting variety in terms of race. The survey questionnaire was in English, which may have led to misinterpretation and misunderstanding. The townships in Gauteng Province were urban and more affluent than townships in other parts of South Africa.

7.0 Research Results

7.1 Demographics

The sample largely reflected the age distribution of the South African adult population, and was roughly evenly split between male and female.

The majority of the respondents (71%) had either matriculated or had some high school education. A high percentage of the respondents (37.9%) were unemployed.

A total of 308 respondents (99.7% of the total respondents) had an income level of less than R5, 000, therefore representing the Base of the Pyramid (BOP) economic segment.

Approximately 84% of the respondents had a mobile phone, while approximately 72% of the respondents had a bank account

The majority (66%) of respondents take less than 20 minutes to access the nearest bank branch.

It is clear that these figures are a result of conducting the survey in townships in Gauteng Province which are urban and served by branch banks. The ITU figures quoted in the Introduction showed that 90% of South Africans used a mobile phone, but only 40% had a bank account (ITU 2009). The survey showed that, even with almost all of the respondents having an income of less than R5, 000, and 37.9% being unemployed, they were well educated, 84% had a mobile phone and 72% had a bank account. However the hypotheses posed in Section 5 remain relevant.

Descriptive Analysis Results:

7.2 Current use or intention to use mobile banking services

The results shows that approximately 30% of the respondents used mobile banking services (Group A), with 58% currently not using the mobile banking service, but interested (Group

B). The remaining 12% of the respondents indicated no interest in using mobile banking services (Group C).

About 96% of the respondents who currently use mobile banking have bank accounts. It is interesting to note that about 4% of the respondents who currently use mobile banking do not have bank accounts; they currently use mobile banking for money transfers.

| | | | |
|----------------------------------|-----|-----|-----|
| Do you have or use a cell phone? | Yes | 261 | 84% |
| | No | 47 | 16% |
| Do you have a bank account? | Yes | 224 | 72% |
| | No | 85 | 28% |

Table 1: Cell phone and bank account ownership

Approximately 63% (114) and 77% (138) of the respondents, who **indicated an interest** in using mobile banking in the future, were in possession of bank account and mobile phone respectively. The remaining 37% (66) and 23% (42) of respondents did not have a bank account and mobile phone respectively; this is a potential opportunity for both the banks and mobile network providers to provide access to bank account and mobile phone services in order to encourage adoption. Of the respondents who indicated **no interest** in the use of mobile banking in the future, 39% (15) and 16% (6) of respondents did not have a bank account and mobile phone respectively. This may be a contributing factor to the lack of interest.

| Use of Mobile Banking | No. of Responses | % | Possession of Bank Account | No. of Responses | % | Possession of mobile phone | No. of Responses | % |
|-----------------------|------------------|-------|----------------------------|------------------|-----|----------------------------|------------------|------|
| Yes | 91 | 29.4% | yes | 87 | 96% | yes | 91 | 100% |
| | | | no | 4 | 4% | no | 0 | 0% |
| No, but interested | 180 | 58.3% | yes | 114 | 63% | yes | 138 | 77% |
| | | | no | 66 | 37% | no | 42 | 23% |
| No, not interested | 38 | 12.3% | yes | 23 | 61% | yes | 32 | 84% |
| | | | no | 15 | 39% | no | 6 | 16% |
| Total | 309 | | yes | 224 | 72% | yes | 261 | 84% |
| | | | no | 85 | 28% | no | 48 | 16% |

Table 2: Summary and comparison of bank account possession, mobile phone possession and mobile banking usage

7.3 Results and Analysis

The statistical tests showed that all except one of the hypotheses tested were supported by the data. The hypotheses also probe factors affecting the success of innovation.

The analysis of variance (ANOVA) results supported the hypotheses that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are both likely to influence the adoption of mobile banking, while correlation results indicated that perceived ease of use is likely to influence perceived usefulness (Appendix C).

ANOVA tests also supported the hypotheses that perceived cost and customer trust in mobile banking providers is likely to influence adoption of mobile banking (Appendix C&D).

Statistical tests on the data did not support the hypothesis that the level of perceived risk is likely to influence adoption. However the data did show a significant negative correlation between trust and perceived risk.

Discriminant analysis indicated that perceived usefulness and perceived cost were significant predictors of mobile banking.

Perceived usefulness had the highest Mean, and perceived risk had the lowest Mean, as factors affecting the adoption of mobile banking.

| No | Hypotheses | Results | Reason |
|----|---|---------------|---|
| H1 | Perceived usefulness (PU) is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 31.15, Pr<0.0001, Alpha=0.05 |
| H2 | Perceived ease of use (PEOU) is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 11.83, Pr<0.0001, Alpha=0.05 |
| H3 | Perceived ease of use (PEOU) is likely to influence Perceived usefulness (PU). | Supported | Correlation results, Rho=0.59808, Pr<0.0001, Alpha=0.05 |
| H4 | The perceived cost is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 11.76, Pr<0.0001, Alpha=0.05 |
| H5 | Customer's trust in mobile banking service providers is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 5.29, Pr=0.0055, Alpha=0.05 |
| H6 | The level of perceived risk is likely to influence the adoption of mobile banking. | Not Supported | ANOVA results, F value = 0.60, Pr=0.5495, Alpha=0.05 |

Table 3: Results Summary of Hypotheses

8.0 Discussion of Results

Five of the six hypotheses were supported by the data, consistent with previous literature in most cases (Appendix E).

In the cases of perceived usefulness and perceived ease of use, the research findings supported the literature by showing that both these factors are likely to influence the adoption of mobile banking by individuals at the BOP. The data was also consistent with previous research by indicating that perceived ease of use is likely to influence perceived usefulness – i.e. if mobile banking is perceived by BOP customers to be easy to use, it is viewed as more useful.

The research findings also supported previous literature by suggesting that perceived cost was likely to influence mobile banking adoption at the BOP. Likewise with customer trust: the respondents demonstrated high levels of trust across all three perspectives -- the banks, mobile network providers and wireless infrastructure. This was consistent with the literature, which suggests that customer trust influences mobile banking adoption at the BOP.

The hypothesis around perceived risk was the only case where the data departed from previous literature. The results showed that perceived risk had no significant effect on the adoption of mobile banking by the BOP, and that respondents remained neutral on how they felt about the perceived risk of a mobile banking service. None of the five facets of perceived risk (security, financial, time, social and performance risks) were shown to influence adoption, in contrast to previous studies.

However, the results also showed a significant negative correlation between trust and perceived risk. This implies that when respondents perceived mobile banking service providers as trustworthy, the respondents' perception of risk likely to be lower. Considering that the respondents perceived the mobile banking service provider to be trustworthy (Figure 5.7), this might explain why respondents did not express risk concerns.

To conclude the results section, this research showed that people at the BOP will adopt mobile banking services, which are new or significantly improved services to them, when the value and benefit of mobile banking is evident. People at the BOP will also adopt mobile banking when it is perceived to be easy to use. The easier it is to use mobile banking, the more it will be perceived as useful. Perceived cost and customer trust in mobile banking providers were also shown to be significant factors influencing the adoption of mobile banking in the BOP, meaning that people at the BOP will adopt mobile banking when it is perceived to be affordable and when providers (both the banks and mobile network provider) are perceived to be trustworthy. Customer trust in mobile banking service providers had a direct effect on the customer's loyalty. Trust had a negative significant correlation with perceived risk, and trust can play a role in mitigation of risk. The results show perceived risk had no effect on the adoption of mobile banking services by the BOP.

9.0 Implications for policy and business

This study yielded findings with important implications for both business and policymakers.

The first finding is around the opportunity for banks and mobile providers to reach under-banked or unbanked customers using mobile banking through the offering of new or significantly improved products and providing the market conditions needed to make the innovation work. . The results showed that while only 30% of the respondents are currently

using mobile banking, 58% of the respondents are not using mobile banking but have an interest in using it in the future, indicating significant demand for the service.

The research also provides insight for banks and mobile providers into the behaviour patterns of customers in low income markets, revealing that usefulness, ease of use, cost and customer's trust in the service provider, are all critical when introducing services and products to customers to the BOP.

More specifically, this means that mobile banking service providers need to continuously strive to simplify the mobile banking application used for transactions. Their marketing campaigns should focus on demonstrating the simplicity, usefulness and cost benefit of using mobile banking. Furthermore, mobile banking service providers need to build trust with customers, providing secure services and delivering on promises made in marketing initiatives. Crucially, mobile banking service providers need to drive down the costs of mobile banking.

The increased use of mobile banking services will be beneficial to both the mobile banking service provider and the users. The mobile banking service provider will be able to reduce expenditure by limiting dependence on physical bank branches, while users will benefit from reduced travel costs and more free productive time.

The research suggests that policymakers looking to expand financial inclusion and reduce the number of unbanked individuals should consider the benefits of mobile banking, especially given the latent demand among customers at the BOP. A policy response could include the offering of public services through mobile platforms, both to introduce people to a culture of paperless transactions and to educate them for this purpose. Mobile public services would benefit those already engaged in mobile banking and they would provide an entry point for those who were not.

10.0 Conclusion

In conclusion, various studies and real-world case studies point to the power of mobile banking for reaching unbanked or under-banked individuals at the BOP. However questions remain about the behaviour patterns of potential users in low-income communities, and around the factors that might influence the adoption of this relatively new technology.

This research drew on previous literature to construct a research model for testing which factors influence adoption of mobile banking services at the BOP. It found that perceived usefulness, perceived ease-of-use, perceived cost and the level of customer trust in the mobile banking provider were all important factors influencing the take-up of this new technology. The research indicated the latent demand for mobile banking services, and provided key insights for mobile banking providers and policymakers looking to encourage the spread of mobile banking in order to expand financial inclusion in low-income communities.

The propensity to use mobile phones and then to use them for mobile banking provide some basic indicators which could be produced as part of community profiles to which service providers could respond. Other variables measured in this study, such as trust in and the influence of cost of mobile banking services could be considered for more comprehensive surveys, leading to indicators of use to industry and in support of public policy debate.

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APPENDICES

Appendix A: Survey Questionnaire: Factors affecting adoption of mobile banking

Section A: Demographic details

Please complete the section by marking with a cross (X) the options applicable to your statement.

| | User Demographics | Categories | Mark applicable with cross (X) |
|-----------|--|--|--------------------------------|
| Q1 | Where do you stay? (Provide area & province) | Area:..... Province:..... | |
| Q2 | Gender | Male | |
| | | Female | |
| Q3 | Race | Black | |
| | | White | |
| | | Indian | |
| | | Coloured | |
| Q4 | What is your age? |years | |
| Q5 | Work Status | Employed / Working | |
| | | Housewife | |
| | | Student | |
| | | Self- Employed | |
| | | Unemployed | |
| | | Pensioner/Retired | |
| Q6 | Income Level | No income | |
| | | Between: R1 – R999 | |
| | | Between: R 1000 – R 1999 | |
| | | Between: R 2000 – R 2999 | |
| | | Between: R 3000 – R 4999 | |
| | | Between R 5000 – R6 999 | |
| | | R 7000 and higher | |
| Q7 | Education Level | No Formal or Some primary school | |
| | | Primary school completed | |
| | | Some high school or Matriculated | |

| | | | |
|------------|---|---|--|
| | | Technical/apprentice ship | |
| | | College / University/ Post matric | |
| Q8 | Do you have or use a cell phone? | Yes | |
| | | No | |
| Q9 | Do you have a bank account? | Yes | |
| | | No | |
| Q10 | Time to get the nearest bank (branch) | Less than 20 Minutes | |
| | | Less than 45 Minutes | |
| | | More than 1 hour | |
| Q11 | Do you use mobile banking? | Yes | |
| | | No, but I will use if affordable, trustworthy, other reasons. | |
| | | No, not interested | |
| Q12 | If yes on Q11, What do you use mobile banking for? (Mark with X all applicable) | Buy airtime | |
| | | Check account balance | |
| | | Transfer money | |
| | | Pay store accounts (Pay City Council accounts) | |
| | | Pay electricity | |
| | | Cash withdrawal | |
| | | Others | |
| | | Not Applicable | |
| Q13 | Do you have any of the following at home? (Mark with X whatever is applicable) | Hot running water at home | |
| | | Washing Machine | |
| | | Motor vehicle in the household | |
| | | DSTV | |
| | | Home telephone | |
| | | Vacuum cleaner | |
| | | PC Desktop/ Laptop | |

Section B: Five-point Likert Scale Questionnaire

Please complete the following questionnaire on a scale of 1 to 5. 1-strongly disagree, 2-disagree, 3- neutral, 4-agree and 5- strongly agree.

| Item | Construct | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|------|---|-------------------|----------|---------|-------|----------------|
| Q14 | I think that using mobile banking would enable me to accomplish my tasks more quickly. | 1 | 2 | 3 | 4 | 5 |
| Q15 | I think that using mobile banking would make it easier for me to carry out my tasks. | 1 | 2 | 3 | 4 | 5 |
| Q16 | I think that mobile banking is useful. | 1 | 2 | 3 | 4 | 5 |
| Q17 | Overall, I think that using mobile banking is advantageous. | 1 | 2 | 3 | 4 | 5 |
| Q18 | I think that learning to use mobile banking would be easy. | 1 | 2 | 3 | 4 | 5 |
| Q19 | I think that interaction with mobile banking does not require a lot of mental effort. | 1 | 2 | 3 | 4 | 5 |
| Q20 | I think that it is easy to use mobile banking to accomplish my banking tasks. | 1 | 2 | 3 | 4 | 5 |
| Q21 | Mobile banking services may not complete transaction because of network problems. | 1 | 2 | 3 | 4 | 5 |
| Q22 | Mobile banking services may not perform well and process payments incorrectly. | 1 | 2 | 3 | 4 | 5 |
| Q23 | When transferring money through mobile banking, I am afraid that I will lose money due to careless mistakes such as wrong input of account number and wrong input of the amount of money. | 1 | 2 | 3 | 4 | 5 |
| Q24 | When transaction errors occur, I worry that I cannot get compensation from banks. | 1 | 2 | 3 | 4 | 5 |
| Q25 | I'm sure that if I decided to use mobile banking and something went wrong with the transactions, my friends, family and colleagues would think less of me. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|------------|---|---|---|---|---|---|
| Q26 | When my bank account incurs fraud or hacking, I will have a potential loss of status in my social group. | 1 | 2 | 3 | 4 | 5 |
| Q27 | Using mobile banking services would lead to a loss of convenience for me because I would have to waste time fixing payments errors. | 1 | 2 | 3 | 4 | 5 |
| Q28 | It would take me lots of time to learn how to use mobile banking services. | 1 | 2 | 3 | 4 | 5 |
| Q29 | I would not feel totally safe providing personal privacy information over mobile banking. | 1 | 2 | 3 | 4 | 5 |
| Q30 | I'm worried about use mobile banking because other people may be able to access my account. | 1 | 2 | 3 | 4 | 5 |
| Q31 | I would not feel secure sending sensitive information across mobile banking. | 1 | 2 | 3 | 4 | 5 |
| Q32 | I think the mobile phone cost for mobile banking is expensive. | 1 | 2 | 3 | 4 | 5 |
| Q33 | I think the access (airtime) cost is expensive to use | 1 | 2 | 3 | 4 | 5 |
| Q34 | I think the transaction fee (bank charges) is expensive to use | 1 | 2 | 3 | 4 | 5 |
| Q35 | Mobile banking service providers have the skills and expertise to perform transactions in an expected manner. | 1 | 2 | 3 | 4 | 5 |
| Q36 | I think my bank have access to the information needed to handle transactions appropriately | 1 | 2 | 3 | 4 | 5 |
| Q37 | I think my bank is fair in conduct of customer transactions. | 1 | 2 | 3 | 4 | 5 |
| Q38 | I think my bank fair in customer service policies following a transaction. | 1 | 2 | 3 | 4 | 5 |
| Q39 | I think my bank is open and receptive to customer needs. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|------------|--|---|---|---|---|---|
| Q40 | I think my bank make good-faith efforts to address most customer concerns. | 1 | 2 | 3 | 4 | 5 |
| Q41 | I believe banks are trustworthy. | 1 | 2 | 3 | 4 | 5 |
| Q42 | I believe mobile network providers are trustworthy. | 1 | 2 | 3 | 4 | 5 |
| Q43 | I believe wireless infrastructure can be trusted. | 1 | 2 | 3 | 4 | 5 |

Appendix B: Results of the Demographic Characteristics

| Demographics | Categories | No of Responses | % |
|----------------------------------|-----------------------------------|-----------------|-------|
| Geographical location | Soweto Gauteng | 307 | 99% |
| Gender | Male | 142 | 46% |
| | Female | 167 | 54% |
| Race | Black | 309 | 100% |
| Age | 16 – 24 years | 70 | 23% |
| | 25 – 34 years | 114 | 37% |
| | 35 – 50 years | 110 | 35% |
| | Over 50 years | 15 | 5% |
| Work Status | Working | 97 | 31.4% |
| | Housewife | 13 | 4.2% |
| | Student | 29 | 9.4% |
| | Self- Employed | 38 | 12.3% |
| | Unemployed | 117 | 37.9% |
| | Pensioner/Retired | 15 | 4.9% |
| Income Level | No Income | 111 | 35.9% |
| | R1-R999 | 96 | 31.0% |
| | R1000 – R1999 | 34 | 11.0% |
| | R2000- R2999 | 24 | 7.8% |
| | R3000 – R4999 | 43 | 13.9% |
| | R5000 – R6999 | 1 | 0.3% |
| Education Level | No Formal or Some primary school | 7 | 2.3% |
| | Primary school completed | 34 | 11.1% |
| | Some high school or Matriculated | 211 | 71.2% |
| | Technical/apprenticeship | 15 | 4.9% |
| | College / University/ Post matric | 32 | 10.6% |
| Do you have or use a cell phone? | Yes | 261 | 84% |
| | No | 47 | 16% |
| Do you have a bank | Yes | 224 | 72% |

| | | | |
|---------------------------------------|---|-----|-----|
| account? | No | 85 | 28% |
| Time to get the nearest bank (branch) | Less than 20 Minutes | 204 | 66% |
| | Less than 45 Minutes | 88 | 29% |
| | More than 1 hour | 16 | 5% |
| Do you use mobile banking? | Yes | 91 | 30% |
| | No, but I will use if affordable, trustworthy, other reasons. | 180 | 58% |
| | No, not interested | 38 | 12% |

Appendix C: Summary of ANOVA Results

| Source (Independent Variable) | DF | DF2 | Mean | F Value | Pr>F (at 0.05) |
|-------------------------------------|----------|------------|-------------|--------------|-------------------|
| Perceived usefulness (PU) | 2 | 305 | 4.04 | 31.15 | <0.0001 |
| Perceived ease of use (PEOU) | 2 | 305 | 3.82 | 11.83 | <0.0001 |
| Perceived cost | 2 | 305 | 3.08 | 11.76 | <0.0001 |
| Trust | 2 | 305 | 3.61 | 5.29 | 0.0055 |
| Ability (facet of trust) | 2 | 305 | 3.51 | 8.11 | 0.0004 |
| Integrity (facet of trust) | 2 | 305 | 3.72 | 0.50 | 0.6095 |
| Benevolence (facet of trust) | 2 | 305 | 3.61 | 3.48 | 0.0320 |
| Perceived risk (PR) | 2 | 305 | 2.86 | 0.60 | 0.5495 |
| Performance risk (facet of PR) | 2 | 305 | 2.89 | 0.73 | 0.4851 |
| Financial risk (facet of PR) | 2 | 305 | 2.82 | 1.43 | 0.2401 |
| Social risk (facet of PR) | 2 | 305 | 2.94 | 1.00 | 0.3678 |
| Time risk (facet of PR) | 2 | 305 | 2.51 | 1.08 | 0.3416 |
| Security/privacy risk (facet of PR) | 2 | 305 | 3.06 | 2.09 | 0.1254 |

Appendix D: Overall Results

Perceived usefulness has the highest Mean, and perceived risk the lowest Mean, as factors affecting the adoption of mobile banking.

Variance between the factors

| Importance of Factors | Factors | Mean* | Standard Deviation |
|-----------------------|------------------------------|-------|--------------------|
| 1 | Perceived usefulness (PU) | 4.04 | 0.63 |
| 2 | Perceived ease of use (PEOU) | 3.82 | 0.64 |
| 3 | Trust | 3.61 | 0.51 |
| 4 | Cost | 3.09 | 0.78 |
| 5 | Perceived risk (PR) | 2.86 | 0.66 |

Mean: where 1 = disagree and 5 = agree, to be a factor affect the adoption of mobile banking.*

Appendix E: Results Summary of Hypotheses

| No | Hypotheses | Results | Reason |
|----|---|---------------|---|
| H1 | Perceived usefulness (PU) is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 31.15, Pr<0.0001, Alpha=0.05 |
| H2 | Perceived ease of use (PEOU) is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 11.83, Pr<0.0001, Alpha=0.05 |
| H3 | Perceived ease of use (PEOU) is likely to influence Perceived usefulness (PU). | Supported | Correlation results, Rho=0.59808, Pr<0.0001, Alpha=0.05 |
| H4 | The perceived cost is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 11.76, Pr<0.0001, Alpha=0.05 |
| H5 | Customer's trust in mobile banking service providers is likely to influence the adoption of mobile banking. | Supported | ANOVA results, F value = 5.29, Pr=0.0055, Alpha=0.05 |
| H6 | The level of perceived risk is likely to influence the adoption of mobile banking. | Not Supported | ANOVA results, F value = 0.60, Pr=0.5495, Alpha=0.05 |

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