

# **Modelling Financial Services Adoption through an Intermediary in South Africa: TAM and SEM Approach**

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## ABSTRACT

One of the most pressing needs society has in 2012 is addressing the plight of the 4 billion people, globally, who live at the bottom of the economic pyramid. Unless initiatives are undertaken to alleviate poverty and hardship in this portion of society, human potential will be wasted and the economic burden on the rest of society to support them will remain significant. In South Africa a significant portion of the population live at the bottom of the pyramid. One initiative to alleviate poverty and hardship is to enable bottom of the pyramid people who are excluded from formal financial services to access to them. By accessing formal financial services they would be able to safely save and borrow money. They would also be able to escape exploitative informal financial practices.

Technology has the potential to expand access to financial services and reduce the cost of service provision. To date, however, it has not delivered on its promise of expanding financial inclusion at the bottom of the pyramid. Intermediaries, too, have been used to increase access to financial services but have also not successfully expanded financial inclusion at the bottom of the pyramid. Understanding which factors would allow these approaches to realize their potential has the ability to meaningfully contribute to addressing the plight of people at the bottom of the pyramid.

This study brings together the potential of technology and the role of intermediaries to model expanding financial inclusion at the bottom of the pyramid in South Africa. The Technology Acceptance Model is used as a basis to propose an extended TAM model that explains adoption of technology enabled financial services through an intermediary at the bottom of the pyramid in South

Africa. The proposed model is validated using structural equation modelling with data collected in a national survey in South Africa. The extended TAM model successfully explains more than 90% of the behavioural intention of financially excluded people at the bottom of the pyramid to adopt financial services through an intermediary. Using the findings, a strategic approach to expanding financial inclusion at the bottom of the pyramid is proposed.

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## DEDICATION

This work is dedicated to my mother, Margaret Lillian Wentzel, who despite her poor and humble background, taught me the value of education and inspired me to advance beyond the circumstances of my birth through its power.

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## CHAPTER 1

### South African economic history and poverty

#### 1.1. Background

The Republic of South Africa is a country located at the southern tip of Africa. It covers a surface area of 1,221,037 km and is divided into nine provinces. South Africa is a multi-ethnic country with diverse cultures and languages. Eleven official languages are recognised in the Constitution of the Republic of South Africa and several distinct tribes reside in the country. Though English is commonly used in public and commercial life, it is only the fifth most-spoken home language. All ethnic and language groups have political representation in the country's constitutional democracy comprising a parliamentary republic. Approximately 79.5 percent of the South African population is of black African ancestry divided among a variety of ethnic groups speaking different Bantu languages, nine of which have official status. South Africa also contains the largest communities of European, Asian and ethnically mixed ancestry in Africa. The World Bank ranks South Africa as an upper-middle income economy. It has the largest economy in Africa and the 28th-largest in the world.

Prior to 1990 South Africa was largely a pariah state in the world due to the policy of racial segregation known as Apartheid. Apartheid was a system of minority rule in which the majority was denied political rights. Severe legal restrictions prevented the majority from enjoying the amenities and privileges available to the minority. Apartheid became increasingly controversial and some Western nations and institutions began to boycott doing business with South

Africa because of its racial policies and oppression of civil rights. International sanctions, divestment of holdings by investors accompanied growing unrest and oppression within South Africa. The government harshly oppressed resistance movements and violence became widespread. Anti-apartheid activists used a variety of peaceful and violent means to force the government to abolish Apartheid and implement majority rule. The African National Congress (ANC) was a major resistance movement. In 1990 the National Party government took the first step towards dismantling discrimination when it lifted the ban on the ANC and other political organisations. It released Nelson Mandela from prison after twenty-seven years' serving a sentence for sabotage. A negotiation process followed.

Apartheid in South Africa officially came to an end with the democratically held elections in 1994, leaving in its wake a population with vast inequalities across racial groups. At least 68 percent of the African in 1995 population were living in poverty, while poverty was virtually non-existent for whites. The Gini coefficient of expenditures was 0.56 (Ngwane et.al, 2001), making South Africa one of the most unequal countries in the world at that time. The country also inherited vast inequalities in education, healthcare and basic infrastructure such as access to running water (Ozler, 2007). Income disparities between blacks and whites were severe. In 1995 the black share of income was 38.7 percent, in spite of making up 75 percent of the population and the whites share was 49.9 percent despite making up less than 15 percent of the population (Ngwane et.al, 2001). Following the democratic elections in 1994 the new government was under significant pressure to address the high levels of poverty in South Africa and to reduce the income gap between whites and blacks.

## 1.2. The current South African economic context

The decade after 1994 saw an improved growth performance in South Africa, particularly when compared to the preceding ten years. The improvement, however, was modest both by international standards and the standard of South Africa's own history. The average real Gross Domestic Product (GDP) growth rate for the decade 1995 – 2004 was 3.0 percent and in per capita terms 1.0 percent (Du Plessis and Smit, 2005). The growth rate fell short of that anticipated for the economy after the political transition. The growth rate did not attain that required to advance employment and development for the entire South African population. Ultimately the peaceful transition in South Africa, while a great accomplishment for its people, was not accompanied by growth and a meaningful improvement in life for average South Africans (Motloug and Mears, 2002). Notwithstanding low growth rates the South African government did achieve noteworthy improvements in the plight of South Africans.

South Africa has achieved considerable success in terms of improvements to household access to most services. In excess of 15 million previously un-served people have been connected to a formal water supply since 1994. Progress has also been made with the provision of sanitation, with the proportion of households with adequate services improving from 50 percent in 1994 to 71 percent in 2006 (May, 2010). Survey data showed improvements in housing, access to water, access to electricity and toilets between 1993 and 2004. Access to electricity for lighting increasing from 52 percent of households to 80 percent while access to piped water increased from 59 percent to 68 percent of households. Poverty levels in South Africa have not shown the same level of improvement. Approximately 58 percent of South Africa's population was

categorised as being poor in 1995, a situation that had not changed by 2000, although there was a marginal decline on the poverty incidence of Africans, from 68 percent in 1995 to 67 percent (Ozler 2007).

Poverty alleviation has been one of the major policy objectives of the government. In order to alleviate the high levels of poverty, the government introduced and then greatly expanded a program of social welfare grants. Social welfare grants are paid to a range of beneficiaries such as pensioners, disabled people, war veterans and women with young children. Grants are paid to recipients who do not have another source of income. Social grants are now the most significant source of income for poor people (Finscope, 2011). In 2010 over 10 million citizens received a government social grant in one form or another. The National Treasury expects the number of grant recipients to increase to 16.5 million by the end of 2013. This expansion risks placing a severe drain on the treasury and informs the need to find alternative and complimentary approaches to poverty alleviation.

### **1.3. Definition of financial services**

Financial services are the economic services provided by the finance industry. Providers encompass a broad range of organisations that manage money and include credit unions, banks, credit card companies, insurance companies, consumer finance companies, stock brokerages, investment funds and some government sponsored enterprises. Within South Africa providers of financial services are split into two categories, banking financial services and non-banking financial services. Banking financial services are regulated by the registrar of banks and are occupied with the provision of banking services. Non-banking



financial services are regulated by the Financial Services Board (FSB) and cover other providers of financial services such as insurance and brokerage services. Banking financial services, the area of interest for this study, relates to the provision of financial services through a bank and involves the management of a banking account for customers to make deposits, save money, pay liabilities and obtain credit.

Historically banking has been provided through a banking branch infrastructure. This required customers to enter a branch to conduct transactional activities such as making a deposit, withdrawing money or applying for credit. Computer based technology has, over the past few decades, enabled customers to conduct banking increasingly without the need to enter a traditional branch. The introduction of automated teller machine's (ATMs) in the 1960's allowed customers to withdraw money from their accounts without entering a banking branch. Today, using an ATM, customers can make cash withdrawals, obtain debit card cash advances and check their account balances. ATMs often provide additional functionality such as the purchase of prepaid cell phone airtime. Similarly the introduction of Internet banking, cell phone banking and Point of Sale (POS) devices have allowed customers to conduct banking through the use of computer enabled technology without the need to enter a branch. The adoption of this type of technology by customers has allowed banks to increase both the availability and accessibility of banking.

#### **1.4. Financial exclusion**

The term financial exclusion was first used in 1993 by geographers who were concerned about limited physical access to banking services as a result of bank

branch closures in the United Kingdom (Leyshon and Thrift, 1995). The authors expressed concern that the closure of banking branches resulted in people and certain groups not being able to access financial services infrastructure. In the absence of alternative providers, these individuals and groups risked becoming excluded from the formal financial services system within the United Kingdom. Within the literature there are now various definitions for financial exclusion. Carbo et.al. (2005) defined financial exclusion as the inability of some societal groups to access the formal financial system. According to Conroy (2005) financial exclusion is a process that prevents poor and disadvantaged social groups from gaining access to the formal financial systems of their countries. Mohan (2006) holds that financial exclusion signifies the lack of access by certain segments of the society to appropriate, low-cost, fair and safe financial products and services from mainstream providers. The majority of the financially excluded people are low-income individuals (Centre for financial inclusion, 2009).

Financial exclusion may precipitate wider social exclusion as a lack of financial services may compromise access to jobs, housing, education and health care. The most basic form of formal financial inclusion is access to a bank account and consequently people who do not have a basic bank account are financially excluded. A bank account provides the key to accessing other financial products such as savings and credit. Being financially excluded means households and micro and small enterprises deal entirely in cash and are susceptible to irregular cash flows. Lack of financial planning and security in the absence of access to bank accounts limit their options for providing for themselves for their old age, increases the risk of loss through theft and leaves people at the mercy of predatory practices from unregulated credit providers (Mohan, 2006). Survey

evidence suggested that one of the main reasons poor people did not use bank accounts were that withdrawal fees were prohibitively expensive (Dupas et.al, 2012). Costs are negatively correlated with banking penetration and banking accessibility may prevent a large percentage of poor people from using banking services (Beck et.al, 2007).

### **1.5. Financial inclusion and poverty alleviation**

Evidence indicates that expanding access to financial services to the poor is an effective tool in poverty alleviation. A study in Ethiopia based on household surveys from 1994 to 2000 demonstrated that access to financial services caused a statistically significant reduction in five of seventeen determinants of poverty (Demi-Kunt, 2007). A similar multi-country study demonstrated how access to financial services encouraged social mobility across generations, thereby leading to poverty reduction in the long run (Beck et.al, 2007). In cross-country regressions Beck et.al (2004) investigated how financial development influenced the growth rate of the Gini coefficient of income inequality, the growth rate of the income of the poorest quintile of society and the fraction of the population living in poverty. The results indicate that access to formal financial services inclusion exerts a disproportionately large, positive impact on the poor and hence reduces income inequality.

Access to formal finance services by the poor is often hindered by a lack of relevant information and service infrastructure. Because of their economic situation typical financial transaction sizes may be small. Incomes for the poor may also be irregular and transaction flow through bank accounts may either be irregular or consist of numerous small value transactions. It may be expensive for

financial service providers to pay out and collect small amounts of cash from large numbers of poor people using a typical branch infrastructure. These types of transactions may furthermore not give poor people the kind of recorded financial history that providers can use to evaluate their credit worthiness. The absence of such physical and informational infrastructure makes it unattractive for financial service providers to offer products designed specifically for the needs of the poor, including appropriate transaction sizes and charging models.

Over the last five years, there has been a growing interest among policymakers, development organisations and practitioners in developing countries in solving the infrastructure gaps that hold back access to finance. Much of their attention has been focused on developing a general payments infrastructure that allows people and businesses to deposit and withdraw funds and make electronic payments in a manner that eliminates the need for bank branches (Dermish et.al, 2011). Expanding financial inclusion is thus defined as the delivery of banking services at an affordable cost to the sections of disadvantaged and low-income groups.

## **1.6. The South African banking sector**

For a developing country, South Africa has an exceptionally sophisticated banking sector. The electronic banking technology, smart cards and POS devices compete with the most advanced banking systems anywhere in the industrialized world. Effective banking supervision has resulted in a stable and competitive banking environment. In 2012 there were 31 registered banks in South Africa, 15 of which were local branches of foreign banks. The banking sector is, however, highly concentrated with the big four commercial banks (ABSA Bank, First

National Bank, Nedbank and Standard Bank) controlling over 80 percent of the retail banking market. This concentration compares poorly to the United Kingdom where the top three banks control 26.5 percent of the market and the United States where the top three banks control 10 percent of the market. At the end of 2010, South Africa had 2,740 bank branches, 21,000 ATMs and more than 109,000 POS devices (CGAP, 2010).

The number of retail bank accounts and customers for the big four commercial banks is estimated at 35 million. The very small retail client base of the other banks means that the 'big four' have cornered virtually all of the country's retail customers. South African banks also dominate the banking landscape in Africa. In Africa South African banks accounted for 40.4 percent of total banking assets, 34.6 percent of net earnings, 49.9 percent of bank credit and 42.4 percent of bank deposits. The banking sector has shown robust growth over the past decade. Total banking assets to GDP increased from 89.2 percent in 1999 to reach 138.6 percent in 2008, while private sector credit provided by the banking sector increased from 152 percent in 2000 to 198 percent in 2007 before falling to 172 percent in 2008, likely reflecting the impact of the global financial crisis (Mlambo, 2011).

This high level of concentration most likely reduces competition between banks and allows pricing power to move from the customer to the provider. Research on bank access in 2004 and 2005 for 58 developed and developing countries worldwide found that the fees to access and maintain certain banking services in South Africa were significantly higher than the median for the countries surveyed and more often than not, also higher than the average (Beck and de la

Torre, 2006). This view is also supported by a study that found service charges levied by the 'big four' banks in South Africa were higher than those of the top 100 banks in the world. The study further argued 'that despite the fact that these banks do not provide services to more than half of the adult population, they are more profitable than their counterparts in other developing countries' (Okeahalam, 2007). High levels of profitability may also reduce the incentive for banks to provide services to less profitable segments of the population, such as the poor.

In 2012 the South African financial sector remains relatively exclusive with regards to access and outreach. While access to financial services in South Africa remains a challenge, it is comparable to that of Brazil and India and superior to the rest of Africa. In terms of adults with access to loans and deposit accounts, nearly twice as many South Africans have access to finance compared to Botswana and Namibia. Also, more South Africans have access to ATMs than most of Africa. Notwithstanding this about half of the adult population in South Africa, especially the poor, has no access to formal financial services in South Africa (Mlambo, 2011). The most recent study into financial inclusion in South Africa found that 63 percent of the population were formally served while 27 percent were not served at all and 10 percent were informally served (Finscope, 2011).

The reason why access to financial services is a problem for many individuals throughout the world has received attention in academic research. Beck and De la Torre (2006) found that demand and supply factors limit access to deposit, payment and credit services for South Africa's poor. The supply constraints to

access were high costs involved in serving the poor, which included the operating cost per unit of transaction. This cost was high because the fixed costs needed to be recovered by a limited number of transactions small in size. In the case of loans, costs to lower the perceived high risk of loan default were high as the poor could often not provide banks with conventional forms of collateral (Schoombe, 2009). The demand determinants were those that affected the affordability of the service, the income level of the consumer and the cost of the service. The latter comprises of the direct costs, namely the price of the service and the indirect costs to access the service, namely transportation costs and the minimum balance required to open an account. Non-economic demand determinants such as financial illiteracy and ethnic or religious factors may also lead to self-exclusion by potential clients.

The supply of basic formal banking services to the poor is thus inhibited by the high costs involved for the suppliers, while the use of these services is limited by their affordability for the poor and their predisposition to self-exclusion (Schoombe, 2009). In South Africa, a low income has been found to be the most important disincentive to the use of financial services. Self-exclusion, often the result of financial illiteracy, has remained a serious constraint to the use of financial services locally. Overall, South African banks have not succeeded in lifting the supply constraints when serving the poor (Schoombe, 2009).

### **1.7. The role of technology in expanding financial inclusion**

The potential role that technology can play in enabling financial inclusion is significant. Concentrating low-value transactions at a limited number of branches is very costly for banks and their customers alike. Banks have to invest

large fixed costs in setting up and maintaining their branch network and customers often expend significant time and money to travel to distant branches, especially in rural areas. As a result, banks often stay away from poor or rural communities, which they find too costly to serve and poor people fall back on local, informal options to manage their finances (Mas and Almazan, 2011). Poor people may require as many, if not more, financial transactions than average bank customers since their income is less predictable. Poor people are often paid more frequently (daily or weekly) and their daily financial circumstances may be more easily overwhelmed by health or other shocks.

However active cash flow management may not translate into long-term financial accumulation, given the pressing consumption and investment needs poor people face. Serving the poor presents two major challenges for retail banks: devising a viable revenue model that is consistent with customers' cash flow needs and perceptions of value and minimising the infrastructure and operational burden of handling large numbers of small transactions. Formal financial institutions can provide a range of financial services to the poor and support the drive for financial inclusion through the use of technology-based solutions. The effective use of technology can reduce the cost of operations. Through technology, banks have the potential to reach out to poor and unbanked people through the ATMs and POS networks (Natu, 2008).

A cost comparison of technology based solutions and traditional banking highlights significant cost benefits to banks. ATM transaction costs are as much as five times less expensive than those of a bank teller. Other technologies, particularly mobile phones, are now widely used among poor people across



Africa. Inexpensive POS devices that read debit and credit cards can now be used without constant telecommunications and electricity connections (Ivatury, 2007). “Branchless banking” is a term coined by the Consultative Group to Assist the Poor (CGAP) to refer to distribution channels that allow financial institutions and other commercial actors to offer financial services outside traditional bank premises (Lyman et al., 2006). Branchless banking allows customers to conduct basic financial transactions such as deposits and withdrawals at a variety of outlets using technology in the form of cards, mobile phones, POS devices and ATMs to properly secure and authorise the transactions. Access to transaction facilities is a major enabler for achieving universal access to finance. Once the capability to easily pay and receive money to and from anyone exists, the range of financial possibilities expands.

Branchless banking allows customers to access financial services beyond bank branches and thereby holds the promise of addressing two major hurdles to financial inclusion, the lack of accessibility and high costs. It builds on the sustained development of mobile telecommunications that makes it possible for the banking sector to embrace indirect distribution and for new financial services to reach otherwise unbanked customers. Banking beyond branches means having better access to electronic transactions and the access to formal financial services becomes more convenient (Alexandre, 2011). Using data from surveys with more than 16,000 users, McKay and Pickens (2010) reviewed the experience of 18 branchless banking deployments that were mostly but not exclusively mobile based, focusing on the number of customers served, service pricing and customer needs. They found that each service averaged 1.37 million active, previously unbanked users and that the majority had more active customers than the

largest comparable microfinance institution. Branchless banking was also cheaper than traditional banking channels with low-volume transactions priced 38 percent lower than those of comparable providers (McKay and Pickens, 2010)

### **1.8. The role of intermediaries in expanding financial inclusion**

In a growing number of countries, banks and other commercial financial service providers are partnering with intermediaries to deliver financial services to unbanked people. Rather than using bank branches and their own field officers, they offer banking and payment services through postal and retail outlets. Grocery stores, pharmacies and petrol stations are examples of retail outlets through which financial services can be provided. For poor people, “branchless banking” through intermediaries such as retail outlets may be far more convenient and efficient than going to a bank branch. For many poor customers, it may be the first time they have access to any formal financial services (Lyman et.al, 2006). Two models of branchless banking through intermediaries are emerging. Banks lead the first model; nonbank commercial players lead the other. Both use information and communication technologies such as cell phones, debit and prepaid cards and card readers to transmit transaction details from the retail agent or customer to the bank.

Finding ways for these outlets to offer financial services has three main economic advantages for banks: (i) it permits an increased physical presence in the area for banks or other providers at drastically reduced set-up costs for banks; (ii) it turns customer service costs into variable costs, insofar as outlets are remunerated per transaction; and (iii) it offers the opportunity to create a familiar service environment for poor, less educated people who may feel intimidated by the

service style at traditional bank branches (Mas, 2008). Technology can enable banks and their customers to interact remotely in a trusted way through existing intermediaries. Customers can be issued bank cards with appropriate personal identification number (PIN) based or biometric security features and the local intermediary - the “banking agent” - can be equipped with a POS device controlled by and connected to the bank using a phone line or wireless or satellite technology. Infrastructure requirements can be further reduced by using mobile phones both to hold “virtual cards” for customers and as a POS device at the store (Mas and Hannah, 2008).

Retail stores are not the only viable intermediaries. Historically post offices have played a role in the provision of remittances and basic financial services to low-income populations. This function is being revived in an increasing number of developing and emerging countries. India Post, with its 155,000 post offices (139,000 of which are located in rural areas), has adopted a multi-agent banking approach (Kugemann, 2009). It distributes financial services on behalf of several partner institutions, thus acting as an agent for each of them, in addition to the development of its own savings accounts. Either directly or through various partnerships, 220 million savings accounts had been opened with India Post by the end of 2009 (Kugemann, 2009). Many postal services are leveraging their physical networks to further develop their financial services business, which generally consists of basic savings, payment and remittance services. The South African Post Office has over 2,400 outlets and due to its universal mandate many of these are located in poor or rural areas.

### **1.9. The research gap**

The combination of technology plus intermediary seems to offer potential to expand financial inclusion in South Africa. The challenge is to develop services that engage poor customers and deploy a workable business model that enables intermediaries to offer such a service. It is important to separate the access component from the services component, at least conceptually, because they have different take-up drivers. The access component is driven by customer comfort with the use of the technology platform (whether card or mobile phone based) and related aspects, such as ease of use, reliability and convenience. The services component provided by the intermediary is driven by the relevance and pricing of each service. However, in practice one cannot disentangle the two components if the focus is on targeting previously unbanked customers (Mas, 2008).

McKay and Pickens (2010) concluded that branchless banking has great potential to reach vast numbers of low income, unbanked people at affordable prices with a wide range of products to meet their complex financial needs. Yet early experience suggests that although the potential is indeed strong, it is by no means guaranteed that branchless banking will deeply penetrate low-income, unbanked segments with appropriately designed products. Indeed, in most countries, the challenge is still getting branchless banking started at all (McKay and Pickens, 2010). A study into several branchless banking ventures around the world found that less than 10 percent of all branchless banking customers are poor and new to banking and are using these channels for financial services or activities other than paying bills, purchasing airtime, or withdrawing government cash benefits (Ivatury and Mas, 2008).

In South Africa, of about one million mobile banking customers, CGAP estimates that fewer than 100,000 fall below South Africa's poverty line, did not have a bank account earlier and now use mobile banking for more than payments or transfers. In Colombia, typical cash transactions through an intermediary are in the range of US\$100–200, which suggests that they are not being used by the poorest. In a study in Pernambuco (a particularly poor state in Brazil), CGAP found that only about 5 percent used a banking agent at least once a month for anything more than paying bills or receiving government payments, were previously unbanked and were considered poor by Brazil's standards (Ivatury and Mas, 2008).

Branchless banking has yet to demonstrate pro-poor, pro-growth impacts for households, communities and national economies (Ivatury and Mas, 2008). Whilst there has been little study into the use of technology and intermediaries, other studies into the use of technology to expand financial inclusion have produced similar findings. Cell phone usage has grown phenomenally in Africa and particularly in South Africa where initial growth forecasts have been greatly exceeded. This technology therefore provides opportunities for services such as banking to reach critical mass. All major retail banks in South Africa provide cell phone banking, but very few customers actually use it (Brown et.al, 2003). This highlights the gap between the potential of the technology to expand financial inclusion and the actual adoption of it.

### **1.10. The research problem**

Technology and branchless banking through an intermediary appears not to have delivered on their promise yet. Scholarly research on the adoption and socio-

economic impacts of mobile banking systems in the developing world is scarce. Even less attention has been paid to the social, economic and cultural contexts surrounding the use of these systems (Donner and Tellez, 2008). This study investigates the role of technology and intermediaries and seeks to better understand what factors are crucial for the adoption of technology enabled financial services through an intermediary. The study confines itself to looking at the bottom of the pyramid because this is the area where the approach could have the greatest impact. The study thus seeks to identify those critical factors that determine how the unbanked bottom of the pyramid people in South Africa would adopt financial services offered through an intermediary and to develop a model that could determine the intention of a person at the bottom of the pyramid to adopt financial services through an intermediary.

The research brings together for the first time in a South African context, the study of adoption of financial services using traditional technology adoption theory and the study of intermediaries. In South Africa there is no body of research that has looked at the adoption of financial services through an intermediary, especially for customers at the bottom of the pyramid. To address the goals of this research, a combined research methodology of literature research and fieldwork was chosen. There have been numerous studies into financial inclusion, but to date there has been no study into the adoption of financial services at the bottom of the pyramid in South Africa. In addition to identifying and modelling the adoption of technology enabled financial services through an intermediary, the study will further seek to determine if there are specific group factors that affect adoption. These group factors include gender, age and urban versus rural location. The study approaches the problem from a

technology adoption perspective and will seek to apply technology adoption theory to better understand the factors that determine the adoption of technology enabled financial services through an intermediary.

### **1.11. The need for the study**

The expansion of financial inclusion in South Africa would contribute to a reduction in the poverty level. Poverty alleviation may reduce the burden on the government to provide social welfare grants. Such a reduction would have positive outcomes for the treasury allowing funds to be diverted to other pressing national needs. Lifting people out of poverty would further reduce the pressure on government to provide services to support poor people. The role that expanding financial inclusion can play has been highlighted, however, it is important to understand how financial inclusion can be expanded. The greatest need for expanding financial inclusion is among the poor. In recent times the phrase “bottom of the pyramid” has been used to describe that section of the population who is most deprived. The term “bottom of the pyramid” was first proposed in an article published in 2002 (Prahalad and Hart, 2002). The authors divided the global population into four tiers comprising a pyramid. At the bottom of this pyramid were 4 billion people whose annual per capita income based on purchasing power parity was less than \$1,500, the minimum considered necessary to sustain a decent life.

Work by Mendoza (2011) showed that a relatively higher cost is shouldered by the bottom of the pyramid when compared to the non-bottom of the pyramid, in their participation in certain markets. Investing in the bottom of the pyramid would mean potentially lifting billions of people out of poverty and desperation.

Lifting people out of dire economic conditions would contribute to avoiding social decay, political chaos, terrorism and environmental meltdown that could arise if the gap between the rich and poor continued to widen (Prahalad and Hart, 2002). Since the original work by Prahalad, there have been numerous studies to understand how to better serve this market and through such service to alleviate poverty (Martinez and Carbonell, 2007; Vachani and Craig-Smith, 2008; Pitta et.al, 2008; Anderson et.al, 2010; Anderson and Billou, 2007). In South Africa comparatively little work has been undertaken to understand how to alleviate poverty at the bottom of the pyramid. No significant work has been undertaken to understand how to expand financial inclusion at the bottom of the pyramid and through such expansion contribute to the alleviation of poverty.

### **1.12. Structure of the thesis**

This chapter has provided an overview of the background of South Africa, key aspects of its current economic condition in relation to levels of poverty and described the link between financial inclusion and poverty alleviation. It provided an overview of the South African banking environment, discussed the research gap and motivated the need for the study. The remainder of the work is presented in six additional chapters. In chapter 2 the Technology Acceptance Model (TAM) and its extensions are described. A proposed extended model to predict adoption of technology enabled financial services through an intermediary is proposed through the use of grounded theory. The thesis used a national survey to collect data and in chapter 3 the instrument design and data acquisition are described. The chapter covers the sampling methodology, determination of the appropriate sample size and research instrument development. Factors associated being at the bottom of the pyramid in South



Africa are presented, as is the adoption propensity between alternative channels for the provision of financial; services.

In chapter 4 Structural Equation Modelling (SEM) is discussed in detail. The chapter provides an overview of the SEM technique and described the use of the technique to validate the proposed extended model of TAM to explain adoption of financial services at the bottom of the pyramid. Chapter 5 contains the results of the analysis including the testing of the hypothesis of the proposed model. A multi-group analysis to test the model for invariance is also presented. Using the validated extended TAM model as a basis, chapter 6 proposes strategic architecture for expanding financial inclusion at the bottom of the pyramid. This chapter utilises the results of the work to propose an approach for expanding financial inclusion through the use of technology and intermediaries at the bottom of the pyramid. In chapter 7 the conclusions, limitations of the study and a future scope of work are presented.

## CHAPTER 2

### **Extended Technology Acceptance model development**

In this chapter a model is proposed to explain the adoption of technology enabled financial services at the bottom of the pyramid. The basis for the proposed model is the Technology Acceptance Model (TAM) (Davis, 1986; 1989). The chapter begins with an overview of the TAM in the context of financial services in section 3.1. Since the development of the TAM it has been expanded to understand adoption beyond its initial field. The most significant additions to the TAM are discussed in section 3.2. Using a grounded theory approach, constructs for the acceptance of technology enabled financial services are derived from the literature in section 3.3 and the proposed extended TAM model is presented in section 3.4. The proposed model implies a number of hypothesis and these are detailed in section 3.5. The conclusion to the chapter is presented in section 3.6.

#### **2.1. The Technology Acceptance Model**

Notwithstanding significant work on technology adoption studies, there has been limited research on the interventions that can potentially lead to greater acceptance and use of information-based technology (Venkatesh, 1999). The most widely employed model of adoption and use is the TAM that has been shown to be highly predictive of information technology adoption and use (Davis et.al, 1989; Adams et.al, 1992; Venkatesh and Davis, 2000; Venkatesh and Morris, 2000). Most of the current approaches to understanding and modelling the adoption of technology can be traced back to work done by Davis (1986, 1989)

who defined the TAM to understand the adoption of information systems in the workplace.

The basis of the TAM is the Theory of Reasoned Action (TRA). The TRA (Fishbein and Ajzen, 1975) is a model based in social psychology that explains an individual's behaviour and has been widely used by researchers to explain information technology adoption (McKnight et.al, 2002; Venkatesh et. al, 2003). According to the TRA, behaviour is predicted by intention. Intentions are jointly determined by two factors: (1) the person's attitude toward this behaviour, which is a function of beliefs about consequences of this behaviour and (2) subjective norm defined as an individual's perception of whether people important to the individual think the behaviour should be performed. Attitude toward the behaviour is defined as the individual's positive or negative feelings about performing the behaviour. Based on TRA, Davis (1989) proposed the TAM for predicting information technology usage. The TAM is shown in figure 2.1.

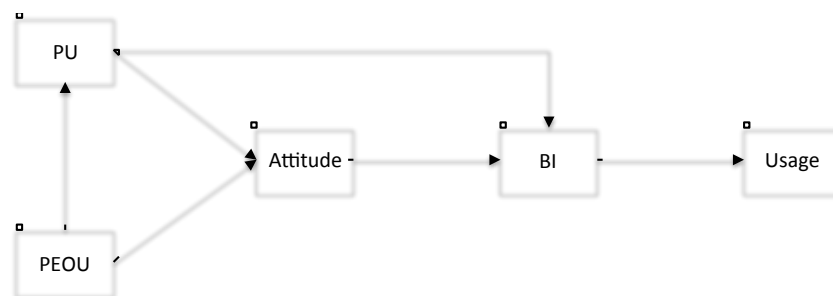


Figure 2.1: The Technology Acceptance Model (Davis, 1989)

While the TRA was designed to explain virtually any human behaviour, the goal of the TAM was to provide an explanation of the determinants of computer acceptance across a broad range of end-user computing technologies and user populations (Davis et. al, 1989). According to the TAM, actual system usage is

directly determined by behavioural intention (BI) to use. BI is in turn influenced by the user's attitude toward using the system and perceived usefulness. Attitude is jointly determined by perceived usefulness (PU) and perceived ease of use (PEOU) of the system. Both PU and PEOU are affected by external variables, such as individual differences, situational constraints, organisational characteristics and system characteristics. Over the last two decades, there has been substantial empirical support in favour of TAM (e.g., Adams et al., 1992; Agarwal and Karahanna, 2000; Karahanna et.al, 2006; Venkatesh et al., 2003, 2007).

## **2.2. The Technology Acceptance Model in financial services**

In section 2.1 the TAM was introduced. Whilst the TAM was originally used to study adoption intention of computer systems in a workplace setting, it has been used to study adoption in a broader range of settings, including financial services. Yaghoubi (2010) investigated which factors led to the adoption of online banking in Isfahan province of Iran. The results confirmed the TAM's robustness in predicting customers' intention to adopt of online banking. Jaruwachirathanakul and Fink (2005) successfully used the TAM to study the adoption of Internet banking services in Thailand. Pikkarainen et.al (2004) used the TAM to study online banking in Finland whilst Riquelme and Rios (2010) used the TAM to test the factors that influenced adoption of mobile banking among users in Singapore. Amin (2010) used the TAM to determine whether customers in Eastern Malaysia would use ATM banking. McKenchie et.al (2006) used the TAM to study the use of an online channel to distribute financial services whilst Gu et.al (2009) investigated determinants of users intentions to

adopt mobile banking using the TAM. The TAM has been successfully used to study adoption intention in financial services across a number of studies.

### **2.3. Extension of the Technology Acceptance Model**

As the TAM moved beyond its original setting, researchers have identified shortcomings in the model that needed addressing. The results of this were modifications to TAM. Modifications involved the introduction of new variables and constructs. Attempts to extend TAM have generally taken one of three approaches. The first approach has been the introduction of factors from related models. The second approach has involved introducing additional or alternative factors and the third approach examined antecedents and moderators of PU and PEOU (Wixom and Todd, 2005). The first significant extension to the TAM was developed by Venkatesh and Davis (2000). This extension examined antecedents and moderators of PU and PEOU. The new model, called TAM2, explained PU in terms of “cognitive instrumental processes” including job relevance, output quality and result demonstrability. PEOU was explained in terms of “social influence processes” including subjective norm, voluntariness and image. The model of TAM2 is shown in figure 2.2.

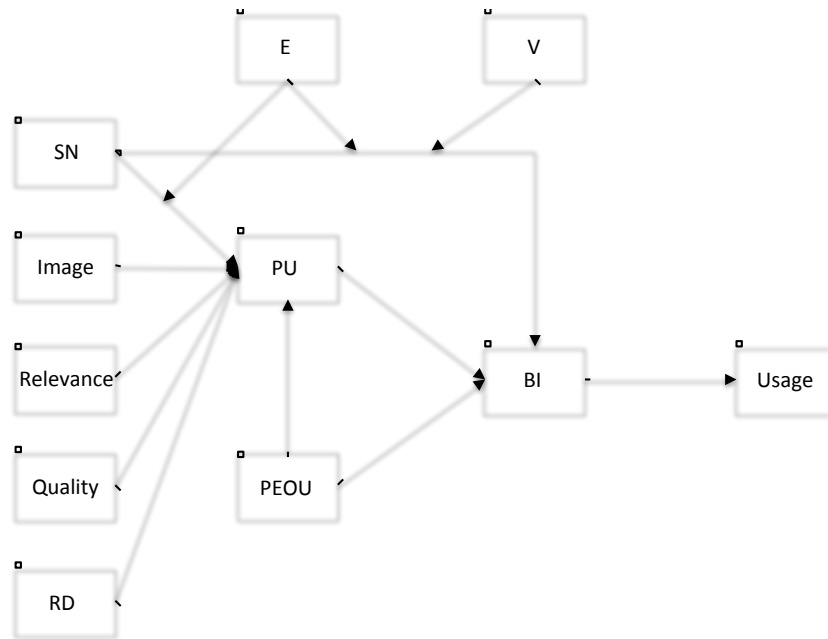


Figure 2.2: The TAM2 (Venkatesh and Davis, 2000)

The primary extensions to the TAM that were introduced by TAM2 were the inclusion of social influence processes (subjective norm, voluntariness and image) and cognitive instrument process (job relevance, output quality and results demonstrability) (Venkatesh et al., 2003). The additional constructs were proposed to be determinants of PU, whilst subjective norm also directly affected BI. Subjective norm has been defined as “the perceived social pressure to perform or not to perform the behaviour” in question (Ajzen, 1991). Subjective norm has also been defined as an individual’s perception or “opinion about what important others believe the individual should do” (Finlay et.al, 1999). Image was defined as the degree to which the use of an innovation is perceived to enhance one’s status in one’s social system. Voluntariness related to the freedom potential adopters felt toward the adoption decision.

The introduction of organisation constructs reflected the degree to which a new technology could improve a person ability to do their job. These constructs were

premised within a workplace setting. Job relevance was defined as an individual perception regarding the degree to which a new technology is applicable to their job. Quality was defined as the degree to which the task matched the job goals of the potential adoptee while the inclusion of results demonstrability was taken from work of Moore and Benbasat (1991). Moore and Benbasat (1991) had defined results demonstrability as the “tangibility of the results of using an innovation”. The inclusion of specific task and outcome variables in TAM recognized that a key factor in adoption was the ability of the technology to enable the adoptee to achieve their goals. TAM2 further proposed the introduction of moderators. It was proposed that personal experience and voluntariness would moderate the strength of the relationship between subjective norm and BI. The extended model was able to account for 34-52 percent of the variance in usage intentions in four organisations that were studied.

The second major addition to the body of work related to the TAM was the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al, 2003). The UTAUT was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain usage behaviour. The UTAUT was formulated, with four core determinants of intention and usage and up to four moderators of key relationships. The theory proposed that four key constructs play a significant role as direct determinants of user acceptance and usage behaviour: performance expectancy, effort expectancy, social influence and facilitating conditions. Gender, age, experience and voluntariness were posited to mediate the impact of the four key constructs on usage intention and behaviour. The UTAUT model is shown in figure 2.3.

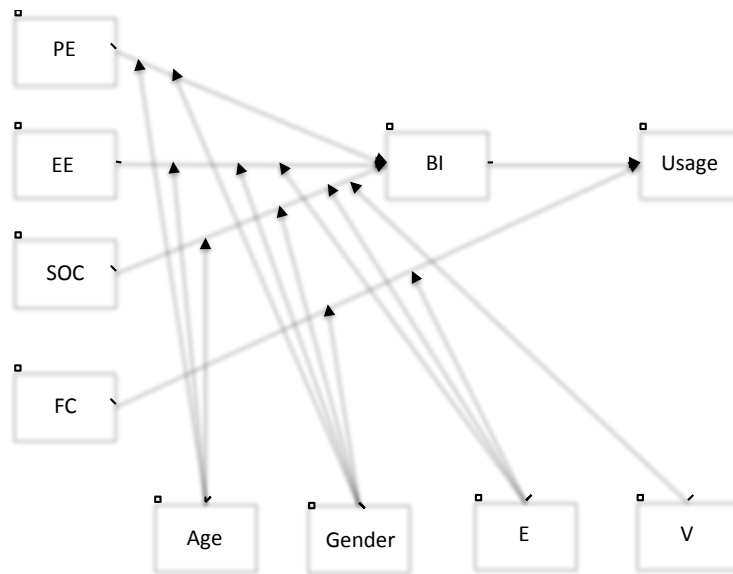


Figure 2.3: The Unified Theory of Acceptance and Use of Technology (UTAUT)  
(Venkatesh et.al, 2003)

The model defines facilitating conditions as the degree to which an individual believes that organisational and technical infrastructure exists to support use of a system they are adopting. Performance Expectancy was the degree to which an individual believed that using a new system would help him/her to attain gains in job performance. If there was an expectation that performance would be enhanced, adoption increased. Effort Expectancy was the degree of ease associated with the use of system. This construct in the other models was similar to PEOU in the original model proposed by Davis (1989) and relates to ease of use of a new system. Social Influence was the degree to which an individual perceived that important others believe he/she should use the new system.

The UTAUT proposed that facilitating conditions would directly influence usage, while the remaining three constructs would influence BI. The UTAUT further expanded the constructs in the original TAM through the recognition of the role



of effort in discharging the new task and support systems play in adoption. The UTAUT also further expanded on the role of moderators that had first been explicitly included in TAM2. As in TAM2, experience and voluntariness were defined in the same manner and proposed to moderate the strength of the relationships within the model with the exception of performance expectancy. The model also explicitly introduced age and gender as moderators. Subsequent validation of UTAUT in a longitudinal study found it accounted for 70 percent of the variance in usage intention.

Venkatesh and Bala (2008) argued that while prior research had provided valuable insights into how and why employees make a decision about the adoption and use of information technology in the workplace. From an organisational point of view, however, the more important issue they held was how managers made informed decisions about interventions that could lead to greater acceptance and effective utilization of information technology. The authors analysed prior research on TAM and developed a theoretical framework that represented the cumulative body of knowledge accumulated over the years from TAM research. They called their model TAM3. TAM3 presented a complete network of the determinants of individuals' IT adoption and use. The authors suggested three theoretical extensions beyond TAM2 and the model of the determinants of PEOU.

Building on the anchoring and adjustment framing of human decision making, Venkatesh (2000) had proposed a model of the determinants of PEOU. Venkatesh (2000) argued that individuals form early perceptions of PEOU of a system based on several anchors related to individuals' general beliefs regarding computers

and computer use. This is an attitudinal construct. The anchors suggested by Venkatesh (2000) were computer self-efficacy, computer anxiety and computer playfulness and perceptions of external control. This was the recognition of the role of attitude in adoption as well as the influence of personal locus of control. The TAM3 model is shown in figure 2.4

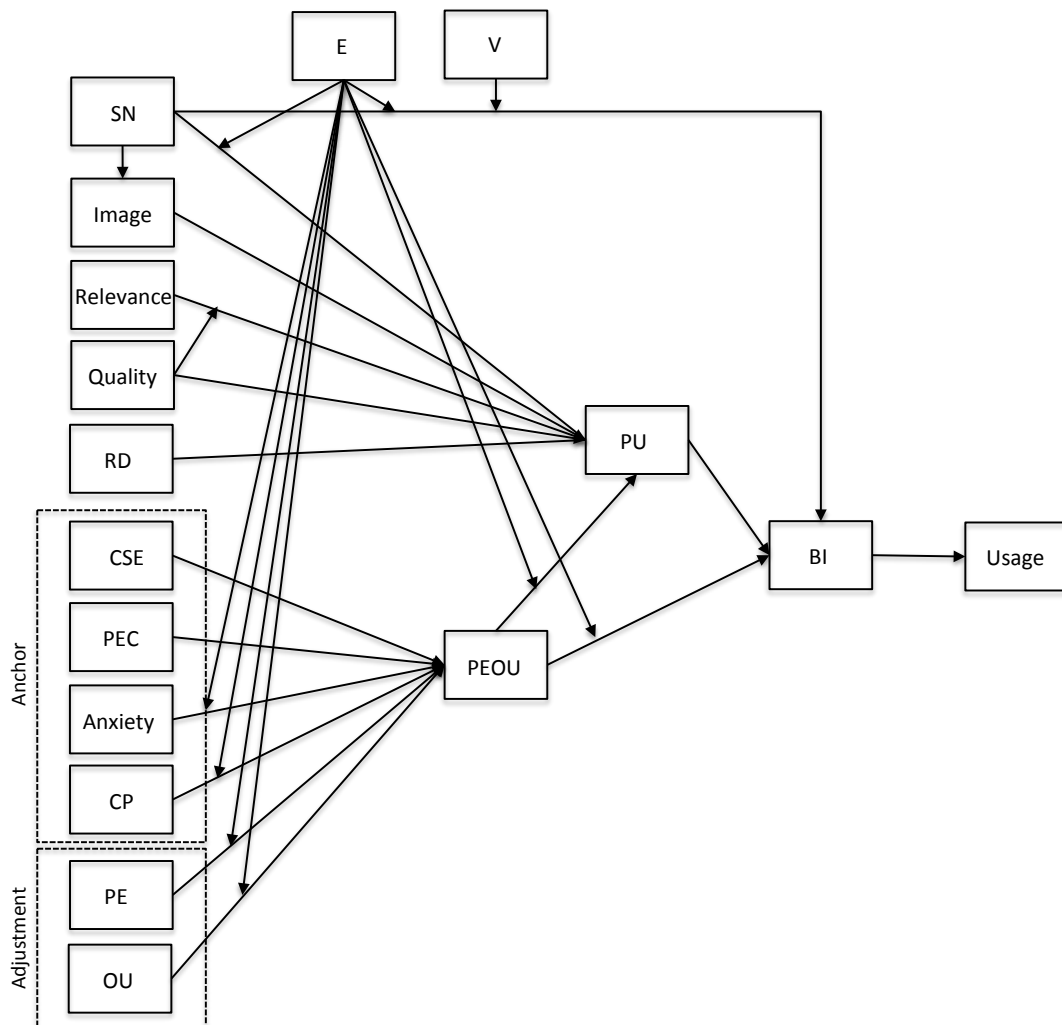


Figure 2.4: The TAM3 (Venkatesh et.al, 2008)

The first three of these anchors represent individual differences or general beliefs associated with computers and computer use. Computer self-efficacy refers to individuals' control beliefs regarding his or her personal ability to use a system.

Perceptions of external control are related to individuals' control beliefs regarding the availability of organisational resources and support structure to facilitate the use of a system. Computer playfulness represents the intrinsic motivation associated with using any new system. Venkatesh (2000) suggested that while anchors drive initial judgments of PEOU individuals would modify these judgments after they gain direct hands-on experience with the new system. Two system characteristics-related adjustments perceived enjoyment and objective usability were suggested by Venkatesh (2000) to play a role in determining PEOU after individuals gain experience with the new system. Longitudinal field studies were conducted to test TAM3. Data were collected from four different organisations and overall, TAM3 was able to explain 53 percent of the variance in BI.

TAM has proven over time to be the most influential technology adoption model (Adams et.al, 1992; Venkatesh and Morris, 2000; Venkatesh, et al., 2003). Although many models had been proposed to explain and predict the use of technology, the TAM has been the model that has captured the most attention of the information systems community (Chuttur, 2009). Legris et.al, (2003) conducted an analysis of empirical research using TAM and suggested that there may be a need to include additional factors beyond that defined in the original model. McCoy et.al, (2007) studied the cultural transferability of the TAM and found that that TAM does not hold for certain cultural orientations. Bagozzi (2007) referring to the role of culture argued that the TAM neglected group, social and cultural aspects of decision-making on technology adoption. Van de Wijngaert and Bouman (2009a; 2009b) highlighted that, in addition to personal

characteristics, context characteristics played an important role in technology adoption.

#### **2.4. Use of grounded theory to derive proposed model constructs**

In order to model the adoption of financial services through an intermediary at the bottom of the pyramid, the original TAM and its modifications were studied. The addition of constructs that related to social, effort expectancy, enjoyment and self efficacy, among others, provided a framework to propose a model to explain adoption at the bottom of the pyramid. To identify other constructs modifications to the TAM reported in empirical studies, a literature search was carried out. The use of TAM to study adoption of technology enabled financial services was evaluated by searching various databases for related studies. Three large databases (ABI / Inform, Business Source complete and Social Sciences Citation Index) were searched. A total of 19 studies in which TAM was used to explain adoption of financial services were identified. Many studies described additional constructs to enhance the ability of TAM to predict adoption, but the authors used different naming conventions for these constructs. In order to classify the additions in a systematic way a grounded theory approach was used (Glaser and Strauss, 1967; Strauss and Corbin, 1990; Corbin and Strauss, 1990). Grounded theory offers a way to compare and categorise similar qualitative concepts across different studies in a methodological way, through the use of a coding schema (Strauss and Corbin, 1990).

Grounded theory is best regarded as a general theory of scientific method concerned with the detection and explanation of social phenomena (Martin and Turner, 1986). To this end, grounded theory is a problem-oriented endeavour in

which theories are generated from patterns, elaborated through the construction of plausible models and justified in terms of their explanatory coherence. The basic idea of the grounded theory approach is to read the work and label variables (called categories, concepts and properties) and their interrelationships. While the use of the grounded theory method in the discipline of information systems is relatively recent and quite rare, is a useful method for generating concepts about technology (Bryant and Charmaz, 2007). The grounded theory approach has previously been used in studying information systems (Baskerville and Pries-Heje, 1999; White and Weatherall, 2000; Winkelman et.al., 2005; Arcs and Razali, 2009).

In conducting the analysis of the 19 papers, the structured methodology for coding proposed by Dey (1999) and Strauss and Corbin (1990) was used. The process of reviewing the papers began with an open coding exercise of each paper in which concepts from the text were found and categorised. For each paper from the results, discussions and conclusions of the authors the relevant sentences in which findings related to the constructs were described was identified. For each section the relevant text was recorded and assigned a code. It was attempted to assign the descriptive used by the author, but where there was no descriptive a code based on the reading of the relevant text was assigned. Once the open coding had been completed, axial coding was undertaken. Axial coding is the appreciation of concepts in terms of their dynamic interrelationships and this forms the basis for the construction of the classification (Strauss and Corbin, 1990). Once a concept has been identified through open coding, its attributes are explored in greater depth and its characteristics determined. Similar open codes

were then subsumed into a core category. A core category pulls together all the strands in order to offer a descriptive of the behaviour under study.

As PU, PEOU and Attitude are already established as part of the TAM model, these were retained for those variables that fitted into this category of constructs, to ensure consistency with the established theory. In addition to the original constructs of PU, PEOU and Attitude the researcher has identified five additional constructs that he believes are important in understanding the adoption of technology enabled financial services. These additional constructs were grouped after reviewing the literature into the usage of the TAM and its extensions in modelling the adoption of financial services through technology. Each of the groupings is discussed in turn.

#### **2.4.1. Social**

Several of the previous adaptations cited above highlight the need to take cognizance of social factors in understanding the adoption of technology. Social constructs were highlighted as modification in TAM2, UTAUT and TAM3. Social constructs relate to how an individual perceives himself or herself within their broader social context and in particular how they perceive that others would view their decisions. A number of studies that utilized the TAM or its enhancement to study adoption of technology enabled financial services included constructs consistent with this classification. Often these constructs had differing names but were defined very similarly. Amin (2009) studied factors influencing online banking acceptance in Borneo, Malaysia and defined Social Norm as the person's perception that most people who are important to them would think they should or should not adopt online banking.

Hwang (2010) investigated the intention to adopt an e-commerce system also defined Social Norm while Riquelme and Rios (2010) tested the factors that can influence adoption of mobile banking among users of Internet banking in Singapore and included Social Norm. A construct similar to social norm was defined by Bhatti (2007) whilst studying mobile commerce adoption in the United Arab Emirates. Bhatti (2007) defined the construct, Subjective Norm, as the perception that salient social referents think the respondent should or should not perform a particular behaviour. Subjective Norm was also defined by other authors such as Yaghoubi (2010) when investigating which factors affect the adoption of online banking in Isfahan province of Iran. The role of social constructs has been highlighted as playing a significant role in adoption theories. The opinion of social peers or social structures in providing support to BI has been found to be a significant determinant in understanding adoption.

#### **2.4.2. Task**

This category of constructs is associated with aspects of executing the task associated with the intended behaviour. It relates to the information, effort, expected performance and resource expectancy a person has in executing the tasks associated with the intended behaviour. Bandyopadhyay (2007) considered the role of culture in the user adoption of technology and found that social influence, along with performance expectancy and effort expectancy were significant factors influencing consumers' intention to use prepaid metering systems. Wang and Shih (2009) investigated the determinants of use behaviour regarding information kiosks and validated the extension of TAM developed by Venkatesh and Davis (2000) by including the addition of task constructs. In

investigating factors that influence the acceptance of online banking services in Australia. Yeow, et al. (2008), defined facilitating conditions as the degree to which an individual believes that infrastructure exists to support or facilitate the use of online banking as a construct.

Researchers have studied the determinants of mobile payment services adoption in China (Yang et.al., 2012) and defined Perceived Fee that relates to monetary expenses that the consumer will incur, as a predicative construct. In investigating the adoption of mobile banking (Zhou et.al., 2010) facilitating conditions and task technology fit were found to affected adoption. Task-technology fit is the degree to which a technology assists an individual in carrying out his or her tasks and facilitating conditions are those environmental factors that enhance the individual's ability to carry out the task. The literature has highlighted factors that are associated with executing the tasks associated with the intended behaviour as additional constructs that are needed to fully understand BI.

#### **2.4.3. Self-Efficacy**

Self-efficacy is defined as the belief that one is capable of performing in a certain manner to attain certain goals. It is a belief that one has the capabilities to execute the courses of actions required to manage prospective situations. Self-efficacy has been identified by a number of researchers as an additional construct for the TAM. Luarn and Lin (2005) extended the applicability of the TAM to a mobile banking context by adding one trust-based construct (“perceived credibility”) and two resource-based constructs (“perceived self-efficacy” and “perceived financial cost”) to the model. The results strongly supported the



extended TAM in predicting users' intentions to adopt mobile banking. Yaghoubi (2010) investigated which factors affect the adoption of online banking in the Isfahan province of Iran. The authors developed a theoretical model based on the TAM along with the theory of planned behaviour (TPB). The results indicated that the intention to use online banking was positively affected mainly by perceived behavioural control and PU.

Perceived behavioural control reflects a person's perception of the ease or difficulty of implementing the behaviour in question. It concerns beliefs about the presence of control factors that may facilitate or hinder their performing the behaviour and relates to the self-confidence a person has. Yeow et.al (2008) investigated both positive and negative factors influencing user acceptance of online banking services in Australia using the UTAUT model. The authors validated the model but also added anxiety. Anxiety was defined as the degree to which an individual becomes anxious when it came to using the service. Anxiety was defined as a lack of self-confidence in using the technology. Enhancement to the TAM through the addition of self-efficacy related constructs has been found to improve the TAM ability to explain adoption of technology enabled services.

#### **2.4.4. Attitude**

Taylor and Todd (1995) were among the first researchers to incorporate attitudinal related constructs into an extension of TAM. Attitude is defined as holding a positive or negative opinion toward an event, situation, person or product. Attitudes can play a role in decision-making and the TRA, which formed the basis for the TAM, suggests that a person's behavioural intention in part depends on a person's attitude about the behaviour. Attitude had originally been

a construct in the TAM; acting as a mediator, but in subsequent enhancements such as TAM2 and TAM3 the mediator was removed. In studying the adoption of Internet banking in Taiwan (Lee, 2009) the researchers combined the theory of planned behaviour (TPB) with the TAM model and proposed a theoretical model to explain customers' intention to use online banking. This work highlighted that attitudinal related constructs were key in understanding adoption intention. Kulviwat et al (2007) noted that there had been little integration of affect, or subjective experienced emotion, into applications of TAM. The researchers found substantial improvement in the prediction of technology adoption by consumers following the integration of attitudinal constructs of affect and cognition into the TAM. Yaghoubi and Bahmani (2010) showed that the intention to use online banking is primarily affected by perceived behavioural control and attitude as predictors of BI. The literature has shown that attitudinal constructs directly influence and indirectly affect BI.

#### **2.4.5. Hedonistic**

From the literature analysis it was found that it was possible to group constructs that related to fun, enjoyment and pleasure into a construct. As the TAM has moved beyond its original field of information system adoption into consumer service adoption, the concept of fun and enjoyment has recently become an area for the addition of new constructs to explain adoption. Fun, pleasure and enjoyment related factors have been labelled hedonistic by the researcher. Hsiao and Yang (2010) recently conducted a co-citation analysis and determined that the first emerging trend of TAM is task- related or utilitarian information systems, including job-related systems, e-learning and management information systems. The second trend in TAM research is e-commerce and finally, the third

and recent trend of TAM–hedonic systems, emerged. In this trend, intrinsic motivational factors such as perceived playfulness or ease of use have a more powerful effect than PU on building positive attitude toward adoption. The definition has been adopted from van der Heijden (2004).

Hedonistic constructs aim to describe adoption in terms of self-fulfilling rather than instrumental value to the user. Shang et.al (2005) examined whether such intrinsic motivations can be used to explain consumers' acceptance of on-line shopping. Results showed that fashion and cognitive absorption experiences on the web were more important than their extrinsic factors in explaining on-line consuming behaviour. The role of enjoyment is seen to play a greater role in the adoption of technology-enabled services as these migrate out of the workplace and into customer focussed activities. Where customers have a choice of alternative providers or channels, an important factor that determines BI is found to be enjoyment, fun or fulfilment. Hedonistic factors may thus play an important role in adoption of consumer focussed technology enabled financial services.

## **2.5. The proposed extended Technology Acceptance Model**

In deriving a proposed model to account for technology adoption through an intermediary it is proposed that a similar set of factors will be applicable as those used for the TAM and its extensions. The adoption of a technology-enabled service through an intermediary is expected to primarily be about the underlying service and technology whilst those factors that specifically relate to the intermediary can be accommodated by existing constructs in TAM supported by

additional constructs drawn from the literature. The proposed model is illustrated in figure 2.5.

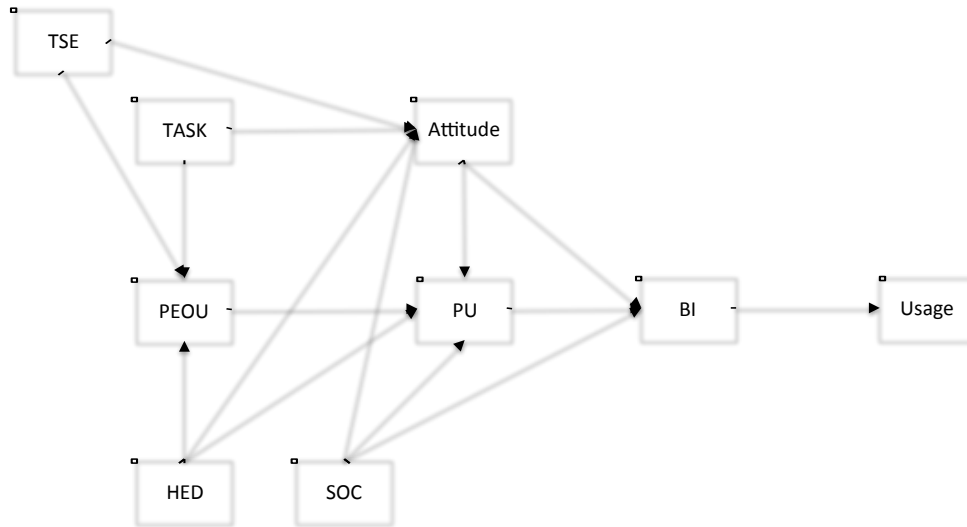


Figure 2.5: The proposed extended TAM

The basis for the proposed extension of TAM to understanding the adoption of financial services through an intermediary is the original work of Davis (1989). The extensions to the TAM contained in TAM2, UTAUT and TAM3 have also been analysed. As in the original model BI is proposed to determine actual usage, whilst PU directly affects BI. It is proposed that two additional factors will have a direct BI, social factors (SOC) and attitude. The original model of the TAM proposed that PEOU would have an indirect effect on BI through PU and attitude. The relationship between PEOU and PU is retained, however based on the literature review, it is proposed that the effect of hedonistic factors (HED); task related factors (TASK) and technology self-efficacy (TSE) would also have an effect on BI. HED and TASK are proposed to indirectly affect BI through PU and attitude respectively. Since the model proposed to model the adoption of a technology enabled service, the role of self-confidence and belief in the use of

technology is expected to be significant. TSE is thus proposed to be a determinant of PEOU as well as attitude.

## **2.6. Hypothesis of the proposed model**

From the proposed extended TAM model a number of hypothesis were derived. Each of the implied hypotheses contained in the model are presented in discussions related to the respective constructs.

SOC was defined as a person's belief that others they regard as important socially, their social referents, would approve of or expect them to behaviour in a particular manner. Social factors may thus contribute what a person feels is acceptable or unacceptable actions. People who place a high value on social referents would be more likely undertake an activity if through undertaking it their standing relative to their social referents would be raised. In the context of using financial services through an intermediary, social factor may manifest in social referents approving or through use encouraging others to utilise the service. SOC is thus likely to directly affect BI. Attitude is defined as a person's set of beliefs about a particular situation – either positive or negative. The opinions that social referents hold about a service may affect a person's own opinion about the service if they place a high value on social referents. If the opinion of social referents relates to how useful a service is it may also affect how useful a person perceives the service to be. In communities where there is strong social cohesion or in communities where traditional forms of leadership still apply, social constructs may have a greater influence than in other communities. Three social construct hypotheses arise from the proposed model.

*HYPOTHESIS 1:* SOC will directly affect BI

*HYPOTHESIS 2:* SOC will have an indirect effect on BI through PU.

*HYPOTHESIS 3:* SOC will have an indirect effect on BI through attitude.

In the original TAM, PU was defined as the extent to which a person believes that using an IT will enhance his or her job performance. PU has consistently been found to be one of the most important predictors of BI. In the context of the use of financial services, PU is similarly defined as the belief that using financial services through an intermediary would enhance a person's ability to manage their money better. The more useful the service is seen to be from a potential bottom of the pyramid customer perspective, the more likely it will be that the customer will form an intention to use the service. A single hypothesis related to PU arises from the proposed model.

*HYPOTHESIS 4:* PU will directly affect BI

Attitude is an opinion – either positive or negative – to a person, place, event or situation. In the original TAM proposed by Davis (1989) attitude was a mediation variable between PEOU and PU. Whilst the original TAM contained the constructs attitude, subsequent enhancements have removed it as a construct that affects BI. In the context of the provision of financial services through an intermediary, attitude is defined as the opinion that a person has toward the concept. Because an attitude can have an on beliefs and as original proposed in the TRA, attitude may have an effect on intention. If people have a strong positive or negative attitude toward the provision of financial services through an intermediary it will directly affect BI. Because of the strong influence that beliefs

may have on intention, it may also affect how a person sees the usefulness of financial services offered through an intermediary. If someone has a negative attitude toward the concept, it may be likely that they will consequently also feel that the concept is not useful in their lives. Consequently two hypotheses related to attitude arise from the model.

*HYPOTHESIS 5:* Attitude will directly affect BI

*HYPOTHESIS 6:* Attitude will have an indirect effect on BI through PU.

In the original definition of the TAM, PEOU was defined as "the degree to which a person believes that using a particular system would be free from effort" (Davies, 1989). In the context of provision of financial services through an intermediary, PEOU is proposed to play a similar role. Factors associated with being a bottom of the pyramid person may render a concept hard to use. Being at the bottom of the pyramid is strongly associated with poverty and lower levels of education. Consequently bottom of the pyramid people may not be able to use electronic financial services if it is not presented in their home language. Such services may be designed in such a way that it requires require a level of education beyond what they have attained. PEOU in relation to the provision of financial services through an intermediary is defined as how easy people perceive the service will be to use. If people perceive that the concept will be easy to use, it is likely that they will find it useful. A single hypothesis related to PEOU arises from the proposed model.

*HYPOTHESIS 7:* PEOU will indirectly affect BI through PU.

In a consumer setting there is not mandated use and consumers often have alternative choices. The role of enjoyment, fun and fulfilment was previously highlighted in the literature as an important factor in determining BI. In some settings, such as online gaming where the purpose of the activity is enjoyment itself, having fun may directly affect BI. The hedonistic construct is defined as perceptions relating to comfort or enjoyment that a person expects to experience when using financial services provided through an intermediary. If people enjoy using a service, or are comfortable enough to try it, they may perceive that the service is easy to use. An enjoyable experience is also likely to result in a positive opinion of the service itself and thus affecting a person's attitude. Comfort in using a service may well enhance the perception that the service is useful. HED factors are thus likely to influence BI indirectly. Consequently three hypotheses related to hedonistic factors arise from the model.

*HYPOTHESIS 8:* HED will directly affect PEOU. HED factors will thus be a determinant of PEOU.

*HYPOTHESIS 9:* HED will have an indirect effect on BI through attitude.

*HYPOTHESIS 10:* HED will have an indirect effect on BI through perceived usefulness.

When the TAM was developed it included the concept of determinant. Determinants were defined as variables that influence early perceptions about the ease of use of a new system. Determinants thus played a role as a variable that can influence a latent factor. Task related factors are defined as factors that relate to executing the task that a person has chosen to undertake. In a work context it is related to how well a new system enables a person to carry out their



job. In a consumer context, where mandated use does not apply, task related factors play a similar role. In the context of financial service adoption through an intermediary, task is defined from a utility perspective. In order for a bottom of the pyramid person to effectively carry out the task of managing their money effectively, a number of task related issues might arise. Bottom of the pyramid may be treated badly because of discrimination based on their economic standing. They may not be able to afford to use the service because of cost. Services that are provided in a language different to their home language may prevent them from being able to use the service. Task in the context of the model is defined as those factors that enable the bottom of the pyramid person to effectively execute a decision to make use of financial services offered through an intermediary. If bottom of the pyramid people are able to carry out the financial services through an intermediary it is likely that they will find the service easy to use. If a person is able to execute the task they are likely to form a positive opinion of using the service. Consequently two hypotheses related to the desired task arise from the model.

*HYPOTHESIS 11:* TASK factors will directly affect the PEOU of a service. TASK factors will thus be a determinant of PEOU.

*HYPOTHESIS 12:* TASK factors will have an indirect effect on BI through attitude.

As the provision of financial services has migrated from over the counter to technology enabled, confidence in using technology has become more important. Earlier the expansion of technology-enabled service to reduce cost and improve access was highlighted. If people do not have the confidence or belief to use

technology it is likely that they will not be able to take advantage of easier access and reduced cost. In the context of using financial services through an intermediary, technology self-efficacy is defined as the self-belief, or confidence, to use technology. The types of technology that such self-belief would relate to include ATM, POS, Internet banking and mobile banking. As with the task construct, if people are confident in the use of technology it is likely that they will find it easier to use. This may likely effect their perception on how easy such a service would be to use as well as enhance their opinion of the service itself. Consequently two hypotheses related to technology self-efficacy arise from the model.

*HYPOTHESIS 13:* TSE will directly affect PEOU. TASK will thus be a determinant of PEOU.

*HYPOTHESIS 14:* TSE will have an indirect effect on BI through attitude.

## **2.7. Conclusion**

This chapter has presented and discussed the literature on technology acceptance theories and models and highlighted the TAM and its extensions. The original TAM was developed to explain the adoption of technology in a workplace environment and has become the most widely used technology adoption model. As the usage of the TAM expanded into different work settings and outside of mandated use, extensions to the model were developed to deal with its original shortcomings. The introduction of TAM2 saw the incorporation of social related constructs and constructs related to executing a task. Further expansion of the TAM through the introduction of the UTAUT model and TAM3 expanded these factors further and also introduced the concept of moderators such as gender, age

and educational levels. In considering the application of TAM to financial services a review of the literature has indicated that researchers have added additional constructs to enable the TAM to better predict adoption in an environment where use is not mandated.

From the literature a number of additional constructs have been identified that need to be taken into consideration if a complete picture of adoption of financial services through an intermediary is to be fully understood. Social constructs, task related constructs, self-efficacy, attitude and constructs related to enjoyment have been identified as being important extensions to the TAM as proposed by Davis (1989). Utilising the additional constructs and taking the TAM and its extension (TAM2, UTAUT and TAM3) the researcher proposes an extension that can explain the adoption of financial services through an intermediary at the bottom of the pyramid. The extended model produces a total of fourteen hypotheses that can be explicitly tested.

Advances in technology have allowed the delivery of financial services outside of the traditional branch infrastructure that banks have historically used. These advances have not only enabled more convenient banking in general, but allowed banks to address the challenge of serving the poor in a cost effective manner. The growth of mobile phone and communication technology allows for the expansion of financial inclusion to the bottom of the pyramid where it may have been prohibitively expensive in the past. These developments have allowed for the emergence of a model that may successfully expand financial inclusion. The emergence of an intermediary, that uses the advance in technology to offer

financial services, has led to meaningful expansion of financial services in countries like Brazil.

This approach has potential in South Africa where supermarkets and the post office can play the role of intermediary. Whilst the combination of technology and intermediary has potential to expand financial inclusion, research to date shows that the model has not realised its full potential. Very little, if any, work on this subject has been undertaken in South Africa. There is a further need to understand what the factors are that determine adoption at the bottom of the pyramid if it is to realise its potential to expand financial inclusion. The research problem is one of understanding what factors in a South African context determine the adoption of technology enabled financial services at the bottom of the pyramid. Understanding the role of technology adoption is key and the most successful technology adoption theory, the TAM, provides a basis for undertaking such a study.

## CHAPTER 3

### **Instrument design and data acquisition**

In this chapter the research design and data acquisition are described. In section 3.1 the determination of the bottom of the pyramid in South Africa is detailed. The sampling methodology is discussed in 3.2 with validation of the sample size covered in section 3.3. In section 3.4 the research instrument development is discussed in detail including issues of question development, question bias, scales and the overall structure of the questionnaire. The construct development to test the proposed model is described in section 3.5 including tests of construct reliability and validity. In section 3.6 descriptive statistics of the sample are described. Factors associated with being unbanked at the bottom of the pyramid in South Africa are also reported. In section 3.7 a comparison between the adoption propensities of bottom of the pyramid people to make use of intermediaries compared to traditional banks is discussed. The chapter is closed with the conclusion in section 3.8.

#### **3.1. Determination of the bottom of the pyramid in South Africa**

The study focused on understanding financial service adoption through an intermediary at the bottom of the pyramid. It was thus necessary to determine the bottom of the pyramid in South Africa. The term “Bottom Of the Pyramid” was first proposed in an article published in 2002 (Prahalad and Hart, 2002). The authors divided the global population into four tiers in the shape of a pyramid. At the bottom of this pyramid were 4 billion people whose per capita income based

on purchasing power parity was less than \$1,500, the minimum considered necessary to sustain a decent life. Whilst this presented an untapped market for corporations, investing in the bottom of the pyramid would potentially mean lifting billions of people out of poverty.

Lifting people out of dire economic conditions would avoid social decay, political chaos, terrorism and environmental meltdown that could arise if the gap between the rich and poor continued to widen (Prahalad and Hart, 2002). The per capita income translated into surviving on less than \$4.11 per day. In a subsequent paper on the same topic (Prahalad and Hammond, 2002) it was argued that consumers at the bottom of the pyramid pay higher prices for goods and services when compared to middle-class consumers. A book was subsequently published (Prahalad, 2006) in which the author argued that serving bottom of the pyramid customers was not only a profitable opportunity for corporations, but also a social imperative. By addressing the bottom of the pyramid corporations could curtail poverty and improve the living conditions of the world's poorest (Prahalad, 2006).

To conduct the research it was necessary to identify the bottom of the pyramid in South Africa. The Living Standards Measure (LSM) was used to segment the population and identify the sample that met the criteria for bottom of the pyramid. The South African Advertising Research Foundation (SAARF) developed the LSM methodology in the 1980's for market segmentation. The LSM methodology categorises the entire South African population into 10 categories labelled LSM 1 to LSM 10. The LSM is a household level multi-attribute segmentation tool based on access to services, durables goods and geographic indicators as determinants of the standard of living of a household.

For the LSM segmentation, respondents are scored on the presence or absence of each of 29 variables in their household. The score, either 1 for present or 0 for absent, is multiplied by a weighting factor and summed. The 29 variables and the weighting associated with each variable are included in appendix 8.1.

The LSM category is determined from the final summated score and compared to the LSM classification table. The classification table for LSM groupings is included in the appendix 8.2. The SAARF updates the LSM measures regularly and the most recent list of variables and weightings for the index was released in February 2012. The field research was conducted in 2011 and the classification table, variables and weightings were those in use for the 2008 – 2012 period. The new and older measures are compatible and respondents will have been placed in the correct LSM with either measure. The LSM methodology has been widely used for market segmentation and understanding living conditions in South Africa (Møller, 1997; De Jager, 2004; Martins, 2004). The LSM was designed to avoid the use of unreliable self-reported income as a basis for segmenting a population. The LSM segmentation tool has been used as the primary basis for segmentation in research on financial inclusion (Finscope 2010, 2011).

While LSM measures do not explicitly take income into account, work has been carried out linking average household income to LSM (SAARF, 2011). This linking of LSM to household income allows the determination of the bottom of the pyramid in South Africa based on income. In table 3.1 below the LSM is shown along with the average monthly household income, average household size and daily \$ equivalent income per person. During 2011, the time period when the fieldwork was conducted, the average exchange rate was \$1 = R7.264. The

average household size for LSM 1-6 was obtained from the research data, whilst the average household size for LSM 7-10 was obtained from the Finscope study into financial inclusion (Finscope, 2011). From the income comparison relative to the definition of Prahalad (2002) it was concluded that LSM 1-4 covers the bottom of the pyramid in South Africa.

Table 3.1: Daily per capita income as a function of LSM

LSM	Income	Household size	Daily income R	Daily income \$
1	R1 363	3.0	R14.94	\$2.06
2	R1 929	3.8	R16.74	\$2.30
3	R2 258	3.8	R19.34	\$2.66
4	R3 138	4.1	R25.48	\$3.51
5	R4 165	4.2	R33.00	\$4.54
6	R6 322	4.4	R46.82	\$6.45
7	R10 255	4.0	R84.31	\$11.61
8	R14 014	4.0	R115.21	\$15.86
9	R19 654	3.6	R179.53	\$24.71
10	R29 512	3.6	R269.58	\$37.11

### 3.2. Sampling methodology

In order for the results of this study to be applicable to the entire bottom of the pyramid population in South Africa, a sample that reflected the national geography of South Africa including its 9 provinces, 11 official languages and various ethnic groups was required. Many of the ethnic groups in South Africa reside in specific geographies, whilst there are also significant differences between urban and rural populations. It is thus difficult to obtain a



representative sample without undertaking a national survey. Due to the scope of such an exercise it would have been impossible for the researcher to undertake the data collection without logistical assistance. A research company, TNS Research Surveys, was appointed to provide logistical support for the work and to undertake the data gathering. TNS research surveys are a specialist survey company that undertakes research surveys for large clients across South Africa. TNS has been active in this field in South Africa since 1979. After development of the research instrument TNS undertook the field work over a period of 12 weeks.

To conduct a national survey and obtain a sample that represented the entire country it was decided to make use of enumerator area (EA) as the basis for data collection. In using this approach the work of a leading sampling expert, Dr Ariane Neethling from the University of Stellenbosch, was consulted. When drawing the sample, the EA framework used for this research was based on the 2001 Census demarcated EA. This was updated to be in line with the 2008 community survey and national population estimates (StatsSA, 2008). From the data collected at the municipal level in the community survey 2008 it was possible to determine a mean LSM for the 227 municipalities that made up 46 district or metropolitan municipalities. The 46 regional municipalities made up the 9 national provinces. A proportionally weighted sample of 650 EA was selected. A cut-off of LSM 1-6 was chosen for inclusion of EA in the sample. This cut-off ensured that the majority of South Africa's population based on LSM was covered.

Household level data was collected and no special institutions where people resided but were not consider a household, were included in the survey. Special

institutions were defined as prisons, hospitals and clinics, schools and school hostels, universities, caravan parks and old age homes. Once the areas for data collection were identified, the households to interview in the area were pinpointed. On arrival at the EA fieldwork teams travelled through the area to orientate themselves and determine which homes fell within the EA. To identify the respondent in the home to be interviewed, a Kish grid was used. This approach required the interviewer to record all the individuals at that visiting point who were 16 years or older at the time and who resided there for more than four nights of the week. Using the Kish grid an individual who was 16 years or older was randomly selected to complete the interview. Where respondents were not be available at the time that a home was visited, the interviewer made a further attempt to contact a respondent. If, after a second attempt, the interviewer could not complete the interview the first of the substitute points was selected.

Following these steps produced a randomly selected area, randomly selected house within the selected area and randomly selected person to interview. The questionnaire was administered in field between July and September 2011 and took on average 75 minutes per respondent to complete. Based on the costs associated with the exercise and the total number of interviewers deployed, a target of at least 2,000 completed surveys was planned for collection over the 12 week fieldwork period. Ultimately 1997 fully completed interviews were collected. From the LSM classification it was determined that 695 respondents in the sample could be classified as bottom of the pyramid. The total LSM 1-4 population of adults 15 years and older in South Africa was 10,542,000 (SAARF, 2011). The sample consequently had a 3.72 percent confidence interval at a 95

percent confidence level. The specific research interests were in those at the bottom of the pyramid who was unbanked, i.e. did not hold a bank account of any description. Out of the sample of 695 a total of 341 respondents did not hold a bank account.

### 3.3. Sample size

It was important to establish that the study had an adequate sample size. This was necessary to ensure that the study had a good chance of detecting a statistically significant result. To further to ensure that hypothesis were not incorrectly accepted or incorrectly rejected, the sample was checked for appropriate size. Two types of error may arise as a consequence of insufficient sample size. Type I and type II errors are terms used to describe where a true null hypothesis was incorrectly rejected. A Type I error is the incorrect decision that is made when a test rejects a true null hypothesis ( $H_0$ ). The rate of the type I error is denoted by  $\alpha$  and equals the significance level of a test. In the case of a simple null hypothesis  $\alpha$  is the probability of a type I error. Setting  $\alpha$  above 0.05 ensured that the null hypothesis was not incorrectly rejected. A type II error is the incorrect decision that is made when a test fails to reject a false null hypothesis.

The rate of the type II errors is denoted by the Greek letter  $\beta$  and is related to the statistical power of a test. The statistical power of a test is defined as  $(1 - \beta)$ . A target value of statistical power of above 80 percent is normally desired (Lipsey, 1989). A study with this power level implies that if there is a difference between two groups, there is an 80 percent chance of correctly detecting it as statistically significant. When the sample size is small a study is particularly

susceptible to a type-II error. Simon (1999) suggested an informal rule that  $\alpha$  is set to 0.05 and  $\beta$  to 0.2 for adequate sample size. Power in this scenario is 0.8. An additional consideration in determining adequate sample size for a study is to deal with effect size, denoted by  $d$ . Effect size quantifies the size of the difference between two groups and may therefore be said to be a true measure of the significance of the difference.

If two samples from the same population were taken there would always be a difference between them. The statistical significance is usually calculated as a 'p-value', the probability that a difference of at least the same size would have arisen by chance, even if there were no difference between the two populations. By convention, if  $p < 0.05$  the difference is taken to be large enough to be statistically significant. A number of problems arise in using statistical significance in this manner (Cohen, 1994; Harlow et al., 1997). The primary problem is that the p-value depends on two factors viz. the size of the effect and the size of the sample. A statistically significant result could occur either if the effect were very big (despite having only a small sample) or if the sample were very big (even if the actual effect size were small). It is important to know the statistical significance of a result, since without it there is a danger of drawing firm conclusions where the sample is too small to justify such a conclusion.

Guidelines on reporting size effect have been proposed (Cohen, 1988). In terms of this guidance, effect sizes were defined as small,  $d = 0.2$ , medium,  $d = 0.5$  and large,  $d = 0.8$ . In order to determine the effect size and power of the sample G\*Power software, version 3.1 was used (Erdfelder et.al,1996; Faul et.al, 2009). G\*Power computes power values for given sample sizes, effect sizes and  $\alpha$  levels.

It further computes sample sizes for given effect sizes,  $\alpha$  levels and power values. With  $N=341$ ,  $\alpha = 0.05$  and  $(1 - \beta) = 0.80$  the effect size of the sample was 0.152, which was below the cut off for small effect size. Using the parameter for small effect size (0.20), it was determined that the power of the sample with a  $\alpha$  of 0.05 and an  $N = 341$  was 0.957. This was above the cut-off of 0.80, which is considered acceptable to detect small effect sizes in the sample. It was concluded that the sample size of 341 was sufficient to exclude type II errors.

### **3.4. Instrument development**

The most commonly used instrument for collection of data in a standardized manner from a large population is a questionnaire. Questionnaires are a useful tool for investigating patterns in data and are used with success in management, marketing, consumer and policy research (Easterby-Smith et.al, 1993). Questionnaires have also been used as the primary data collection methodology in the Finscope study into financial inclusion in South Africa (Finscope 2010, 2011). In all cases the role of the questionnaire is to provide a standardized interview across subjects. This is to ensure that all respondents are asked the questions that are appropriate to them and so that, when those questions are asked, they are always asked in exactly the same way (Brace, 2008). The researched decided to make use of a questionnaire-based survey, as there was no practical alternative method to accurately collect standardized data from a sizeable population spread out over a large geographical area.

In evaluating questionnaires four types of questionnaire were considered – interviewer face-to-face, self-completion using paper, self-completion using electronic means and telephone based. The use of self-completed paper based

questionnaire was considered and rejected. There were a number of reasons for this rejection. Logistically it was not clear how a national self-completion survey could be distributed and collected. One of the main disadvantages of self-completed questionnaires is that the researcher has no control over who actually completes the questionnaire. It is also difficult to ensure that the respondent completes all the questions before returning the questionnaire and there may be problems with literacy or language that are difficult to identify. Good response rates would therefore be difficult to achieve. Electronic self-completion was deemed impractical given the low Internet penetration rate in South Africa and the expected low rate of home computers in the target population. It was further expected that the bottom of the pyramid portion of the population would have the lowest levels of Internet penetration and online access in the entire population. There was also no easy mechanism to identify the target population online and it was likely that any sample would have been biased towards more educated populations.

A telephone-based survey was rejected, as there was no publicly available database of contact numbers for the target population at the time of the research. The nature of the research topic would furthermore have produced telephone calls exceeding 1 hour for completion and this may have produced very low response rates. Legislative barriers in South Africa further prohibit companies calling citizens without first obtaining their consent to sell, market or research products or services. It was consequently decided to gather the data through an interviewer administered national survey. An interviewer-administered approach has additional advantages over the three alternatives. Research comparing the four types of questionnaire application - interviewer face to face,

telephone, self-completion paper based and self-completion electronic has been conducted (Bowling, 2005). Setting aside the logistics issues related to non face to face interviews it was found that face to face interview scored high on complete population coverage for sampling, had the lowest cognitive burden on respondents, scored the lowest for response choice order effects and scored the highest for respondents preferences for modes of administration compared to the alternatives.

#### **3.4.1. Question development**

In developing the questions in the questionnaire the literature was reviewed to identify best practices to incorporate in the design. Results of a multi-level analysis indicated that questions or statements on a questionnaire should be kept as short as possible in order to increase respondents' comprehension (Holbrook et al, 2006). For the English language, Brislin (1986) specified a maximum number of 16 words, while Oppenheim (1992) recommended 20 words, per sentence. In addition it has been reported data quality increased if questions or groups of questions concerning the same topic were preceded by a medium-length introduction (Blair et al. 1977; Andrews 1984). For each group of questions in the questionnaire a brief introduction to the section that was included. The interviewer read out this introduction before the questions were posed to the respondent. Various authors proposed that grammatical complexities should be kept to a minimum when formulating questions. Questions should employ the active rather than the passive voice, repeat nouns instead of using pronouns and avoid possessive forms (Brislin 1986; Dillman 2000; Dörnyei 2003). In this way cognitive demands on respondents are minimised and mental

capacity is freed up in order to think about a response. All questions in the questionnaire were kept in the active voice.

A meta analyses showed that the invalidity of responses due to cognitive overload increases where recall of events is involved that have occurred not in the immediate past (Sudman and Bradburn, 1974; Bhandari and Wagner, 2006). Where information regarding past events was sought respondents were provided with a choice of time-defined answers. Only one section of the questionnaire required recollection of past events and in that section respondents were provided with previous time choices of “in the last month,” “in the last 12 months” and “longer than 12 months”. The worth of simplicity in question wording has been emphasized and the use of difficult vocabulary either in questions or instructions may lead to respondents feeling stupid or uneducated. It was reported that this increased the probability of obtaining ‘don’t know’ or socially desirable responses (Foddy, 1993). Socially desirable responses could lead to answers that inaccurately reflect respondents’ actual behaviours. Questions in the questionnaire were kept to as simple a language as possible and socially contentious questions such as “I think that crime in our country is a problem” were avoided.

Negatively worded questions or statements should be avoided (Belson 1981; Foddy 1993) as they have been found to take longer to process and have a greater likelihood of respondents making mistakes (Eifermann 1961; Dudycha and Carpenter 1973). The use of negatively worded questions was avoided in the questionnaire. Attention was further paid to order effect in the questions. Question order effects arise when answering behaviour changes depending on the



position of a question during the interview (Schuman and Presser 1996; Baker 2003). Question order effect is problematic in that it not only threatens the validity of the results but also the generalizability of results to the population. Systematic research into this issue has been inconclusive as regards the answering behaviour in response to specific questions. For general questions results tended to show that the general question is more appropriately placed before the specific question. Demographic questions about respondents, such as age, education, income and marital status, should come at the end of the questionnaire rather than at the beginning in order to avoid negative feelings about the provision of personal information impacting on the answering behaviour or participation (Converse and Presser 1986; Oppenheim 1992). The guidance in respect of order effect was followed and the demographics section of the questionnaire covering aspects of age, home language, marital status and education levels was included as the final section of the questionnaire before the interview was closed.

### **3.4.2. Question bias**

Bias in questionnaires is an important issue that was also addressed. To collect the most accurate data from respondents, interviewers should understand and be able to prevent or at least minimize bias in the design of questionnaires. Two types of interviewer bias considered could arise in interviewer-administered questionnaires (Choi and Pak, 2005). Interviewer bias could be caused by an interviewer's subconscious or even conscious gathering of selective data. If, for example, an interviewer knows that the respondent does not have a smoking-related disease and therefore is unlikely to be a smoker, he or she may rephrase the question and ask instead, "You don't smoke, do you?" Interviewer bias could

produce leading questions and is likely to lead to a negative answer. Printing each question to be asked on the questionnaire and training the administrators to read the question to the respondent minimized this bias. Non-blinding bias occurs when an interviewer is not blind to the study hypotheses. He or she may consciously gather selective data. None of the research hypothesis was shared with the administrators as a method of dealing with this bias.

### **3.4.3. Questionnaire scales**

For the responses to the questions, an appropriate scale needed to be chosen. A number of authors (Dillman 2000; Fink 2003) reported that between 5-point and 7-point Likert scale response options were the most commonly used scales in questionnaire based scale responses. The 7-point scale has been shown to be more reliable as it allows for greater differentiation of responses than the 5-point scale (Finn 1972). Shorter scales, such as 5-point scales, were preferable in situations where respondents are asked for absolute judgments. In contrast longer scales such as 7- to 9-point scales are more appropriate in situations where more abstract judgments are sought from respondents (Foddy, 1993). As the responses sought in the research required absolute judgments, a 5-point Likert scale was chosen for the majority of questions. The following descriptors were used for the scale - strongly disagree, disagree, neither agrees nor disagrees, agree, strongly agree.

In order to accommodate respondents who were unfamiliar with the question or who felt that the question was not applicable to them two additional categories to the 5 point Likert scale, namely don't know and not applicable, were included. Five of the questions in the survey required respondents to provide a score on a

response scale. Evidence from studies (Fowler 1995; O’Muircheartaigh et al. 1995) has shown a greater likelihood for respondents to choose positive ratings on a bipolar numeric scale than on a unipolar numeric response scale. This finding held for topics as different as the entertainment value of movies and TV to general life satisfaction. A bipolar numeric scale (-5;5) was not used but used but a unipolar (1-10) scale was when this was required.

#### 3.4.4. Questionnaire structure

The centre of the questionnaire framework involved situating people in the context of their households and community. Table 3.2 shows the 14 sections in the questionnaire and the number of questions in each section

Table 3.2: Questionnaire structure

Section	Focus	Questions
S	LSM screening questions	1
A	General and financial attitudes	3
B	Banking usage	4
C	Access to services in community	5
D	Exploration of livelihood	16
E	Sources of income and barriers to income generation	9
F	Financial tasks, payment places and channels	11
G	Pivotal events, financial risks and coping strategies	12
H	Savings behaviour	7
I	Access and attitudes to technology	2
J	Financial provider perceptions	1
K	Focus on the Post Office	6

L	Lifestyle indicators	1
M	Demographics	13

The researched decided to obtain as much relevant data from the target population as possible. From an individual response the researcher wished to identify demographics, including age, gender, race geography and income. The researcher also wanted to understand the role of money and the financial tasks the individual undertakes on a daily, weekly and monthly basis. From a household perspective the researcher wanted to understand a number of aspects. The role of money in people lives and what the financial tasks were at a daily, weekly and monthly level and what key events in their lives required money as well as respondents livelihoods including educational and economic capability, income vulnerability, financial planning capacity and ability to handle financial trauma were sought. Attitudes are often important predictors and the questionnaire sought to explore attitudes and perceptions to life, money and service providers. Finally the researcher wanted to understand the social networks respondents belonged to. The researcher delved into the needs of respondents, both current and the desired future states as well as triggers that could lead to an expansion or deepening of financial engagement and the use of technology. From a community perspective the researcher sought to identify access to infrastructure and access to facilities within the communities for respondents.

In order to access all the areas of the framework the questionnaire had 14 sections. The full questionnaire is included in appendix 8.3 along with the show cards developed to show to respondents in appendix 8.4. Section S covered LSM screening. The aim of this section was to ensure that data from the respondent

could be used to post hoc determine their LSM. Section A explored respondent's attitudes toward life and finances and to help understand claimed behaviour with respect to money. In section B banking penetration was covered and its aim was to establish at a high level respondents banking status and whether they used their own or someone else's banking account. This section also explored lack of documentation as a barrier to access. Section C covered access to services. This section sought to understand which services were available in the community at the time of the survey. In section D livelihoods were dealt with and the reality of respondents day-to-day lives was established. The relevance of products and services to respondents living situations and how those could be complimentary to existing networks in the community was explored.

Section E explored respondent's financial ability in terms of employment and other sources of money to pay for expenses. Possible barriers to earning money and discretionary spending power were also explored to give a sense of what product or service interventions were relevant and sustainable. In section F financial tasks were studied. The objective was to explore what people did with their money and how they managed daily, weekly and monthly financial tasks. Section G dealt with events, borrowings and payments. This section allowed determination of financial risks those respondents had to deal with and coping strategies that respondents put in place.

Section H covered savings, in particular how respondents saved and section I dealt with access and attitudes toward technology. The aim of this section was to understand respondent capabilities in terms of using technology and the relevance of particular channels in order to identify relevant ways of delivering

products and services. Section J covered perceptions relating to financial providers. Section K was a section specifically covering the South African Post Office (SAPO). The research focussed on the SAPO as an intermediary for the provision of financial services and the intent of this section was to understand desire for the proposed services offered by the SAPO. Section L covered lifestyle indicators used to assess poverty levels in the household while section M covered demographics. This section was used to gain a full and detailed understanding of individual and household demographics that could be used for the modelling and profiling.

### 3.5. Model construct development

For each of the constructs in the proposed model identified in section 3.4, relevant questions that tested the proposed construct were identified. Table 3.3 shows the latent constructs and the questions that tested the indicative variables drawn from the questionnaire to define the construct.

Table 3.3: Latent constructs of the hypothesized model and associated variables.

Factor	Variables
BI	Q147E: It would be good for you to bank through the Post Office
	Q147H: You would be keen to try banking products offered at the Post Office:
	Q152D: If you were to do banking, you would be willing to bank at the Post Office.
TSE	Q156D: Confidence using technology – Mobile money transfer (sending or receiving money)
	Q156E: Confidence using technology - ATM
	Q156G: Confidence using technology – Withdrawing cash at a supermarket till using your ATM or bank card



	Q156H: Confidence using technology – Getting bank notification via SMS
SOC	Q152J: You would bank at the Post Office if someone you respect like your favourite radio show presenter or DJ does
	Q152G: You would bank at the Post Office if your chief or community elders do.
	Q152A: You would bank at the Post Office if your family, friends or neighbours do.
PU	Q147C: You would use the Post Office to do banking because it would offer the services that you need.
	Q147G: Banking at the Post Office would help you do things you already do but better.
	Q147J: Banking at the Post Office will allow you to do banking services that you cannot do yet.
PEOU	Q147B: Post Office banking products will be easy to understand.
	Q147D: The Post Office will make banking easier.
	Q147K: You would trust the Post Office for your banking
	Q147M: Banking through the Post Office will be easy to use.
	Q147L: Banking through the Post Office will be quicker than at normal banks.
ATT	Q142: Overall Postbank concept rating
	Q143: Postbank concept rating with regard to banking services.
	Q144: Postbank concept rating with regard to government services.
	Q145: Postbank concept rating with regard to other services.
TASK	Q135M: They speak your own language – Post Office
	Q135AC: They treat you well – Post Office
	Q135AS: You can depend on them to get things done – Post Office.
	Q135BA: They are cheap to use – Post Office
HED	Q152H: Banking at the Post Office will be comfortable.
	Q152E: You feel comfortable enough in a Post Office to try using an ATM.
	Q152C: Banking at the Post Office will be enjoyable.

The questions in table 3.3 were taken from previous empirical research into financial exclusion (Finscope 2010, 2011), and adapted accordingly. Behavioural intent (BI) in the original TAM proposed by Davis (1989) described the behavioural intention of the subject to use a system. In this research three questions were identified that demonstrated a future intent to use financial services provided through an intermediary. All three variables were scored on a 5-point Likert scale. The technology self-efficacy (TSE) construct relates to the belief that one is capable of performing in a certain manner to attain certain goal. This construct assessed respondent's self-confidence in using technology for financial services. This is a four variable factor and all variables were dichotomous. A total of three questions were drawn from the questionnaire to form the social (SOC) construct. This construct was defined as relating to how an individual perceives himself or herself within their broader social context and in particular how they perceive that others would view their decisions. All variables were on a 5-point Likert scale.

Perceived usefulness (PU) was defined as how useful banking through an intermediary would be. This was a three variable factor and all variables were on a 5-point Likert scale. Perceived ease of use (PEOU) was defined as the degree to which a person believes that adopting the system will be free of effort. For this construct questions related to how easy services through an intermediary would be to use were identified. Five questions made up this construct and all were scored on a 5-point Likert scale. ATT defined the attitude construct where it describes predisposition or a tendency to respond positively or negatively towards a certain idea. Attitude influences an individual's choice of action. This was a



four variable scale and each of the variables was scored on a 10-point numeric scale where 1 was terrible to 10 being excellent.

The TASK construct relates to aspects of executing the task. It encapsulates the information, effort, expected performance and resource expectancy a customer has in executing the tasks associated with the using financial services through an intermediary. A total of four questions comprised this construct. All variables were scored on a 5-point Likert scale. The hedonist (HED) construct described adoption in terms of self-fulfilling rather than instrumental value to the user. It related to how comfortable and enjoyable a user would find the activity. A total of three variables comprised this construct. All variables were scored on a 5-point Likert scale.

### **3.5.1. Construct reliability and validity**

The two most important and fundamental characteristics of any measurement procedure are reliability and validity. These two principles will be discussed in turn. In relation to construct definition reliability is defined as the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials. In short, it is the stability or consistency of scores across raters. The reliability of the latent constructs was evaluated by measuring the internal consistency, or the extent to which items on the questionnaire measured the same thing. The reliability of the scale was determined using the Cronbach's  $\alpha$ . Cronbach's  $\alpha$  is a coefficient of reliability and is commonly used as a measure of the internal consistency or reliability. Cronbach's  $\alpha$  is defined as;

$$\alpha = \frac{K}{K - 1} \left( 1 - \frac{\sum_{i=1}^K \sigma_{Y_i}^2}{\sigma_X^2} \right) \quad [3.1]$$

where  $K$  is the number of items,  $\sigma_X^2$  the variance of the observed scores and  $\sigma_{Y_i}^2$  the variance of the component  $i$  for the sample. For this study the standardized Cronbach  $\alpha$  was used. A high Cronbach  $\alpha$  indicates a high degree of internal consistency (Thorndike, 1996). The desired cut-off value of the Cronbach  $\alpha$  has been suggested as 0.70 (Carmines and Zeller, 1979; DeVellis, 2003). Validity is defined as the extent to which the instrument measures what it purports to measure. Construct validity of the instrument was evaluated by examining both inter-item correlation analysis and factor loading (Hair et.al, 1998). An inter-item correlation cut-off of 0.30 has been proposed (Hair et.al, 1998). Any items below the desired cut-off for item-to-total correlation and inter-item correlation respectively should be evaluated and consideration should be given to dropping the item from the scale.

The factor loading of the variables on the latent factor measures to what extent the latent factor explains the observed variance in the variable. The factor loadings are the regression coefficient between an indicator and its factor. Rules of thumb for assessing the practical significance of standardised factor loadings have been proposed (Hair et al, 1998). The factor loading is related to the sample size and a cut-off of 0.30 for a sample size of 350 and 0.35 for a sample size of 250, has been proposed. Smaller sample sizes have progressively higher cut-off for factor loadings. When the items have different frequency distributions more stringent cut-offs going from 0.32 (poor), 0.45 (fair), 0.55 (good), 0.63 (very good) or 0.71 (excellent) have been proposed (Comrey and Lee, 1992). To determine the

validity and reliability of the constructs IBM SPSS Statistics 20.0.0 software was used to perform the calculations. Shown in the table 3.4 below are the latent factors (with the constituent scale variable) Cronbach  $\alpha$  , the factor loading of the variables on the latent factor and the item – total correlation.

Table 3.4: Data reliability and validity

Factor	$\alpha$	Variables	Loading	Item-total
BI	0.695	Q147E: It would be good for you to bank through the Post Office	0.707	0.525
		Q147H: You would be keen to try banking products offered at the Post Office:	0.656	0.551
		Q152D: If you were to do banking, you would be willing to bank at the Post Office.	0.611	0.462
TSE	0.734	Q156D: Confidence using technology – Mobile money transfer (sending or receiving money)	0.479	0.430
		Q156E: Confidence using technology - ATM	0.658	0.571
		Q156G: Confidence using technology – Withdrawing cash at a supermarket till using your ATM or bank card	0.754	0.597
		Q156H: Confidence using technology – Getting bank notification via SMS	0.737	0.596
SOC	0.803	Q152J: You would bank at the Post Office if someone you respect like your favourite radio show presenter or DJ does	0.809	0.601
		Q152G: You would bank at the Post Office if your chief or community elders do.	0.783	0.669
		Q152A: You would bank at the Post Office if your family, friends or neighbours do.	0.694	0.691
PU	0.675	Q147C: You would use the Post Office to do banking because it would offer the services that	0.649	0.480

		you need.		
		Q147G: Banking at the Post Office would help you do things you already do but better.	0.646	0.481
		Q147J: Banking at the Post Office will allow you to do banking services that you cannot do yet.	0.633	0.513
PEOU	0.817	Q147B: Post Office banking products will be easy to understand.	0.560	0.506
		Q147D: The Post Office will make banking easier.	0.728	0.623
		Q147K: You would trust the Post Office for your banking	0.710	0.625
		Q147M: Banking through the Post Office will be easy to use.	0.771	0.690
		Q147L: Banking through the Post Office will be quicker than at normal banks.	0.686	0.615
ATT	0.946	Q142: Overall Postbank concept rating	0.892	0.860
		Q143: Postbank concept rating with regard to banking services.	0.890	0.860
		Q144: Postbank concept rating with regard to government services.	0.910	0.876
		Q145: Postbank concept rating with regard to other services.	0.914	0.879
TASK	0.835	Q135M: They speak your own language – Post Office	0.785	0.697
		Q135AC: They treat you well – Post Office	0.779	0.689
		Q135AS: You can depend on them to get things done – Post Office.	0.775	0.685
		Q135BA: They are cheap to use – Post Office	0.653	0.594
HED	0.705	Q152H: Banking at the Post Office will be comfortable.	0.676	0.568
		Q152E: You feel comfortable enough in a Post	0.591	0.480

		Office to try using an ATM.		
		Q152C: Banking at the Post Office will be enjoyable.	0.747	0.525

From the analysis it was found that the Cronbach's  $\alpha$  were acceptable. The highest Cronbach's  $\alpha$  was 0.946 (ATT) and the lowest was 0.675 (PU). The average factor loading was 0.719. The highest factor loading was 0.914 and the lowest 0.479. Only one factor loading was below 0.55. The scales showed good internal consistency. A total of 5 out of 28 variables had item to total correlations slightly below 0.50, however these were mostly quite close to the 0.50 recommended cut off values. The lowest was 0.430 (Q156D - TSE). This question was regarded as quite important to the scale and considering the Cronbach's  $\alpha$  for the scale was 0.734 it was decided to retain the item. The remaining four items had statistic of 0.462 to 0.481, which was considered close enough to 0.50 not to merit being dropped. Below in table 3.5 we show the Unidimensional inter-item correlations for each of the latent factors.

Table 3.5: Unidimensional inter-item correlations.

Factor	Mean	Min	Max	Range	Var.
TSE	0.430	0.331	0.571	0.240	0.008
ATT	0.813	0.790	0.828	0.038	0.000
SOC	0.577	0.529	0.643	0.114	0.003
TASK	0.558	0.492	0.618	0.126	0.003
PEOU	0.476	0.352	0.585	0.233	0.005
PU	0.413	0.385	0.430	0.045	0.001
BI	0.431	0.380	0.496	0.114	0.003
HED	0.447	0.390	0.508	0.117	0.003

The mean inter item correlations ranged from 0.413 (PU) to 0.813 (ATT). Only one factor (TSE) had a minimum inter item correlation below 0.35, scoring 0.331. The underlying variables were thus sufficiently unidimensional. As the scale had a Cronbach's  $\alpha = 0.734$  it was felt that this correlation was close enough to 0.35 not to warrant it being dropped. Overall the analysis of the reliability and validity of the scale was acceptable and the factors explained a significant portion of the variance in the variables, as evidenced by the factors loading.

### **3.6. Sample descriptive statistics**

Following the data collection a statistical analysis of the data was performed using SPSS Statistics 20.0.0. The analysis provided descriptive statistics for the bottom of the pyramid as well as allowing comparison of bottom of the pyramid people who were banked to those who were unbanked. Appendix 8.5 shows the frequency measures for the key variables in the study. Of the sample 61.2 percent were female while 38.8 percent were male. This ratio is higher than the ratio for the country, which is 51.5 percent female and 48.5 percent male. The difference may be due to the time of day when agents visited homes to conduct the survey with males away working, but may also indicate that in rural areas males migrate to the cities and remit money back to families. The portion of women who were unbanked was slightly lower than men. The bottom of the pyramid was found to reside overwhelmingly in rural areas. Some 79.3 percent of the sample lived outside of major urban areas. For unbanked respondents some 83.9 percent lived in rural areas.

The average age of the sample was 37.81 years with a standard deviation of 16.34. The average age of banked bottom of the pyramid respondents was slightly

higher than unbanked respondents. There was a significant failure to complete formal education at the bottom of the pyramid with only 2.6 percent of respondents having completed their schooling while 29.8 percent of respondents had no schooling at all. The ratio for various levels of schooling was similar between banked and unbanked portions of the bottom of the pyramid. The portion of banked respondents who had no schooling was, however, higher than for unbanked respondents. The problem of unemployment in South Africa is also clearly seen in the data, with a significant portion of the bottom of the pyramid respondents formally unemployed. Only 21.1 percent of respondents were formally employed compared to the national employment rate of 74.7 percent. The data indicates that the bottom of the pyramid bear a disproportionate share of the unemployed in the population. The formal employment rate for banked respondents was significantly higher at 29.5 percent when compared to unbanked respondents of whom only 10.8 percent are in formal employment.

South Africa has in recent years significantly expanded its social welfare program. At the bottom of the pyramid social grants were significant sources of income with 40.4 percent of respondents indicating that it was their primary source of income. In the absence of formal employment, respondents at the bottom of the pyramid are dependent on friends and family to provide financial support. This was particularly the case for unbanked respondents, 24.2 percent of whom reported this as their primary source of income. In the absence of formal employment it might be expected that self-employment would be higher than in the general population, but the data indicated low levels of self-employment. Home ownership rates were found to be high at the bottom of the pyramid, but

this may be due to the significant number of respondents who live in rural areas and who may reside in traditionally constructed homes.

The majority of respondents at the bottom of the pyramid (72.1 percent) were either unmarried, or not living with a partner. This figure was similar for banked and unbanked respondents. The average number of dependents was 2.81, but the standard deviation was high at 2.13. The average number of dependents for banked respondents was slightly higher than that for unbanked respondents. The most spoken language at the bottom of the pyramid was isiZulu (25.9 percent) followed by isiXhosa (22.7 percent). The number of respondents who cited English as their home language was very low. Between banked and unbanked respondents the spread of languages as home language was similar with the exception of isiXhosa. There was a significant difference in the number of banked people who cited isiXhosa as a home language when compared to unbanked respondents.

### **3.7. Factors associated with being unbanked**

In order to determine which of the nine variables identified in the descriptive statistics were significantly associated with being unbanked at the bottom of the pyramid, a logistic regression was performed. Logistic regression has been used in other studies to determine the most important factors correlated with financial exclusion (Devlin, 2009; Johnson and Nino-Zarazua, 2011). A logistics regression is an ideal complement to multiple regressions due to its ability to utilise a binary dependent variable (Hair et.al, 1998). The variables that were used in the model were age (A), gender (G), urban vs. rural location (R), home ownership status (H), primary source of income (I), number of dependents (D), home



language (L), relationship status (R) and educational level (E). The form of the model, where UN is the dependent variable, unbanked status was;

$$UN = f(A, G, R, H, I, D, L, M, E) \quad [3.2]$$

IBM SPSS Statistics 20.0.0 was used to conduct the logistic regression. As all of the explanatory variables were categorical variables, they were modelled using the standard dummy variable procedure in SPSS 20.0.0, specifying simple comparisons and using the first mentioned category in each case as the reference category in the final model. Logistic regression is a statistical method for analysing a data set in which there are one or more independent variables that determine an outcome. The outcome is measured with a dichotomous variable. In logistic regression, the dependent variable is binary or dichotomous, i.e. it only contains data coded as 1 or 0. The goal of logistic regression is to find the most suitable model to describe the relationship between the dichotomous characteristic of interest and a set of independent variables. Logistic regression generates the co-efficients (and their standard errors and significance levels) of a formula to predict a logit transformation of the probability of presence of the characteristic of interest. Consequently the logistic regression expression was;

$$\text{logit}(p_{UN}) = b_0 + b_1A + b_2G + b_3R + b_4H + b_5I + b_6D + b_7L + b_8M + b_9E \quad [3.3]$$

where  $p_{UN}$  is the probability of being unbanked and  $b_i$  are the co-efficients of the expression. The Hosmer and Lemeshow (Hosmer and Lemeshow, 2000) goodness-of-fit test statistic was used to determine the significance of the results. The Hosmer-Lemeshow test is performed by dividing the predicted probabilities into

deciles and then computing a Pearson chi-square that compares the predicted to the observed frequencies. Lower values indicate a good fit to the data and, therefore, good overall model fit. The Hosmer-Lemeshow statistic is

$$H = \sum_g^n \frac{(O_g - E_g)^2}{N_g \pi_g (1 - \pi_g)} \quad [3.4]$$

where  $O_g$ ;  $E_g$ ;  $N_g$ ;  $\pi_g$  denote observed events, expected events, observations, predicted risk for the  $g$ th risk decile group and  $n$  is the number of groups. While the overall logistic regression may be a good fit to the data it may be that some of the variables are not significant in explaining the probability of being unbanked. The Wald statistic was utilised to determine the significance of individual coefficient in the model. The Wald test (Polit, 1996; Agresti, 2007) establishes whether the parameters associated with a group of explanatory variables is zero. If for a particular explanatory variable, or group of explanatory variables, the Wald test is significant, then it would be concluded that the parameters associated with these variables were not zero, so that the variables should be included in the model. If the Wald test is not significant then these explanatory variables can be omitted from the model. The Wald statistic is

$$W = \frac{(\hat{\theta} - \theta_0)^2}{\text{var}(\hat{\theta})} \quad [3.5]$$

where the maximum likelihood estimate  $\hat{\theta}$  of the parameter of interest  $\theta$  is compared to the proposed value  $\theta_0$  with the assumption that the difference between the two will be approximately normal. The results of the logistics regression are shown in appendix 8.6. The recommendation of Peng et.al, (2002)

was used in reporting the results of the analysis. The test of the full model against a constant only model was statistically significant, indicating that the predictors as a set, reliably distinguished between being banked versus unbanked at the bottom of the pyramid. The  $\chi^2 = 162.8$ ,  $p < .000$  the Hosmer and Lemershow  $p = 0.216$  indicating that the null hypothesis must be rejected viz. that the model equation is a constant. Prediction success overall was 69.8 percent (62.3 percent for predicting being unbanked and 74.3 percent for being banked).

The Wald test for each of the variables in the equation was determined. Gender was found to be insignificant in explaining being unbanked, with a Wald statistic of 2.247 and a  $p = 0.134$ . Home ownership (Wald statistic of 1.685 and a  $p = 0.640$ ) and relationship status (Wald statistic of 0.227 and a  $p = 0.973$ ) were also insignificant with respect to being unbanked. Area was also insignificant (Wald statistic of 2.836 and a  $p = 0.092$ ) indicating that living in a rural as opposed to an urban area by itself is not a significant predictor in being unbanked. The remaining variables in the model namely age, primary source of income, number of dependents, language and level of education were significant. For rural versus urban area's, it may be that those variable associated with being unbanked are more prevalent in rural rather than urban area's, and hence area by itself was not found to be associated with being unbanked.

For each of the significant variables a further regression was conducted to determine if all categories within the variable were equally significant, or if some were more significant than others. The results of the logistics regression with significant variables are shown in appendix 8.7. For age it was found that the respondents younger than 25 were significantly ( $p = 0.010$ ) associated with being

unbanked. The other age groups were not significantly associated with being unbanked with p values ranging from  $p=0.208$  for the age bracket 35-44 to  $p=0.978$  for the age bracket 25-34. The analysis showed that respondents younger than 25 were significantly likely to be unbanked. A cross check of the results was carried out by calculating the level of being unbanked for each age group. It was found that 78.1 percent of respondents younger than 25 were unbanked compared to the next highest age group (65-74) where only 52.6 percent of respondents were unbanked. In analysing the association of primary source of income with being unbanked, it was found that three categories of primary source of income were significantly associated with being unbanked. Surprisingly, the most significant category was people who received income from a job or paid work with a Wald of 30.676 and  $p < 0.000$ . The second most significant category with Wald of 18.377 and  $p < 0.000$  were respondents whose primary source of income was child support grants, while unemployed respondents were also significantly associated with being unbanked.

The analysis of number of dependents indicated that having any number of dependents was significant with  $p < 0.000$  for all categories. Inspection of the Wald values for number of dependents showed they were similar, although it was noted that the value was highest for respondents with 3 or 4 dependents. Because the significance for all categories was the same it could not conclusively be said that respondents with 3 or 4 dependents were more likely to be unbanked than those with fewer or more dependents. The analysis of which language groups are more likely to be associated with being unbanked was complicated by the very small samples sizes for some of the languages reported as being a first language. English (2 respondents) and iSiNdebele (12) were categories that had

small sample sizes and were close to, the minimum number of 10 events per independent variable that has been recommended for a valid logistic regression (Peduzzi et.al, 1996; Agresti, 2007). The fit of the regression for language was poor with Hosmer and Lemeshow of 0.024 and consequently it could not be determined with any level of confidence, which of the language groups were more likely to be unbanked.

For educational level it was found that all groupings of educational attainment were associated with being unbanked except respondents who had completed their formal education, who were not significantly associated with being unbanked. There was a relationship between degree of significance with being unbanked and level of education in that respondents with no formal schooling were the most significantly associated with being unbanked ( $p=0.000$ ). The degree of significance decreased as educational levels rose with respondents having some high schooling having the lowest Wald value (6.640) and  $p=0.010$ . A crosscheck of degree of being unbanked as a function of educational level found that 71.4 percent of respondents who had no schooling were unbanked dropping to 52 percent of respondents who have some high schooling who are unbanked.

The logistic regression was repeated, removing the variables that were not significantly associated with being unbanked (gender, area, home ownership and marital status). The resultant analysis had a Hosmer and Lemeshow statistic  $\chi^2 = 6.832$  with  $p = 0.555$  (compared with  $p=0.216$  before). Both results indicated a superior fit when compared to the model with nine variables and the prediction success overall was 70.6 percent (64.6 percent for predicting being unbanked and 75.5 percent for being banked). In terms of the independent variables, education

level was the most significant predictor of being unbanked with a Wald of 50.202 and  $p < 0.000$ . The second most significant variable was source of income while language was the third most significant variable. The final expression for the prediction of being unbanked at the bottom of the pyramid in South Africa was thus:

$$\text{logit}(p_{UX}) = 3.74 - 1.81A + 0.85I - 0.81D - 0.92L - 3.87E \quad [3.6]$$

According to the model the probability of being unbanked at the bottom of the pyramid were negatively associated with age, number of dependents, language and educational levels. People younger than 25 were more likely to be unbanked, while having no dependents and improved levels of education was more likely to reduce the odds of being unbanked. The finding regarding income was surprising and interesting. While unemployed people and those receiving child support grants were more likely to be unbanked the finding in respect of formal employment was a surprise. It may indicate that at the bottom of the pyramid, those in formal employment may be in low-level jobs where remuneration is still paid in cash rather than into a bank account.

### **3.8. Intermediary adoption at the bottom of the pyramid**

The research sought to investigate the adoption of financial services through an intermediary. It was thus important to test adoption propensity of bottom of the pyramid people to make use of financial services through an intermediary. In evaluating the propensity of unbanked bottom of the pyramid people to use specific channels for financial services a sample of 341 respondents who had indicated they did not hold a bank account was analysed. Survey evidence

suggests that the main reasons poor people did not use bank accounts were that: (1) they do not trust the bank, (2) service is unreliable and (3) withdrawal fees are prohibitively expensive (Dupas and Robinson, 2012). The majority of the financially excluded people are low-income individuals and stereotypes and misconceptions about the poor may cause providers to treat them differently from other clients. The experience or perception of how they will be treated by formal providers of financial services may trigger self-exclusion.

South Africa has 11 official languages, however communication relating to financial services takes place mostly in English. Language is of interest as bottom of the pyramid people who are unable to understand the language of financial services and may not be able to explain their needs. They may further not be able to make enquiries when they encounter service providers unable to engage with them in their mother tongue. Channels are the delivery mechanism through which banking services are provided. Post offices, supermarkets, Cell phone providers and other non-traditional outlets offer potential for expansion of access to financial service delivery (Midgley, 2005; Kumar, 2006). To compare the adoption propensity between traditional banking channels and intermediaries such as the post office or supermarkets, respondents rating of four variables that had previously been shown to be barriers to adoption viz. trust, cost, language and how people were treated, were compared between channels. For each of the variables the responses of unbanked respondents per channel were compared. Respondents were asked to positively or negative associate each variable with each channel. To compare the resultant proportions, Cochran's Q test was used, as the independent variables were all dichotomous. The Cochran's Q test statistic is (Conover, 1999);

$$Q = \frac{k(k-1) \left( \sum_{j=1}^k \left( X_j - \frac{N}{k} \right)^2 \right)}{\sum_{i=1}^b X_i (k - X_i)} \quad [3.7]$$

where  $k$  is the number of channels,  $X_j$  is the column total for the  $j^{\text{th}}$  observation,  $b$  is the number of groups,  $X_i$  is the row total for the  $i^{\text{th}}$  block and  $N$  is the grand total. As three groups of responses were compared it is necessary to use the Bonferroni adjustment (Tabachnick and Fidell, 2007). The Bonferroni adjustment involves setting a more stringent level for each comparison, to keep the across all the tests at a reasonable level. The correction entails dividing the level (0.05) by the number of comparisons that were compared (3) and then using this new value as the required level. The statistically significant using the Bonferroni correction was thus 0.167. The results of Cochran Q test for each variable are shown in appendix 8.8. For all four variables it was found that the p value was less than the Bonferroni corrected value of 0.167.

For the statement “you trust them with your money”  $p=0.016$  was found, for the statement “they are cheap to use”  $p=0.000$  was found, for the statement “they speak your language”  $p=0.000$  was found and for the statement “they treat you well”  $p=0.000$  was found. There are thus statistically significant differences in unbanked bottom of the pyramid respondent’s views across the channels for each of the statements posed. In order to determine, for each variable, which channel had a lower or higher relative acceptance post-hoc comparisons were conducted. Post-hoc comparisons are designed to guard against the possibility of an increased type 1 error due to the large number of different comparisons being made to determine if there was a significant difference. The McNemar test was



used to conduct the post-hoc comparison. The McNemar's test (McNemar, 1947) is a non-parametric test that is used to compare two population proportions that are related or correlated to each other. It is applied using a 2×2 contingency table with the dichotomous variable. The test statistic is;

$$\chi^2 = \frac{(b - c)^2}{b + c} \quad [3.8]$$

where b and c are the outcomes for the two channels compared. IBM SPSS Statistics 20.0.0 was used to conduct the data analysis. IBM SPSS applies the Yates correction for continuity. The effect of Yates's correction is to prevent overestimation of statistical significance for small data (Yates, 1934). The test statistic with the Yates correction is;

$$\chi^2 = \frac{(|b - c| - 0.5)^2}{b + c} \quad [3.9]$$

there are several criticisms of the appropriateness of the Yates correction. In the analysis of 2×1 contingency tables, the p-values associated with the corrected statistic tend to overestimate the true p-values in the tails of the distribution and to underestimate them towards the centre (Agresti, 2002). As a result the p-values obtained with the continuity correction are much less accurate when the binomial probability p is substantially different from 0.5. It has been shown that the Yates's correction is systematically conservative when carrying out 2x2 tests (Maxwell, 1976). The analysis using the McNemar test was conducted with the Yates corrected and uncorrected version and the output of both are reported on. The findings were further tested for effect size.

The higher the effect size the greater the possibility that the measured effect is not a true effect. For 2x2 tables the most commonly used test for effect size is the  $\phi$  coefficient, which is a correlation coefficient and can range from 0 to 1, with higher values indicating a stronger association between the two variables. Criteria for the relative size and influence of  $\phi$  have been developed. Values of  $\phi$  were 0.10 for small effect, 0.30 for medium effect and 0.50 for large effect (Cohen, 1988).  $\phi$  values were determined for all post-hoc comparisons.

The results of the post-hoc comparisons using the Yates corrected and uncorrected McNemar test are shown in appendix 8.9. For trust, when comparing banks to the post office,  $\chi^2=0.752$  indicating that there was no difference in perceptions of trust between banks and the post office. A small size effect was recorded ( $\phi = 0.078$ ). When comparing banks to supermarkets  $\chi^2=0.018$ . The uncorrected McNemar value was  $\chi^2=0.0148$ . The effect size was minimal ( $\phi = -0.167$ ). The results show that bottom of the pyramid customers trust supermarkets more for financial services (24.9 percent) than banks (16.7 percent) or the post office (17.9 percent). For cost when comparing banks to the post office  $\chi^2=0.000$  and  $\phi = 0.074$ . The uncorrected McNemar produced  $\chi^2=0.000$ . The results indicated that bottom of the pyramid customers perceived the post office to be cheaper than banks, while the size effect was minimal. When comparing the post office to supermarkets the McNemar test produced  $\chi^2=0.014$  and  $\phi = -0.104$  (negligible size effect). The uncorrected McNemar produced  $\chi^2=0.011$ . Respondents perceived that supermarkets were cheaper to use (31.4 percent) than the post office (22.3 percent), which was higher than traditional banks (2.9

percent). The low responses recorded indicate that costs across all channels were seen as high.

For language when comparing banks to the post office  $\chi^2=0.000$  and  $\phi = 0.314$ , indicating a medium size effect. The uncorrected McNemar result was  $\chi^2=0.000$ . The results showed that bottom of the pyramid customers perceived that the post office was more likely to speak their language than banks. When comparing the post office to supermarkets  $\chi^2=0.000$  and  $\phi = 0.068$ , indicating a small effect size. The uncorrected McNemar result was  $\chi^2=0.000$ . The results showed that respondents perceived that supermarkets were more likely to speak their language (50.2 percent) than the post office (31.4 percent). On the final statement which relates to the perception of how well bottom of the pyramid customers are treated by each channel, the comparison between banks and the post office produced a McNemar  $\chi^2=0.000$  and  $\phi = 0.082$ , showing small effect size. The uncorrected McNemar was  $\chi^2=0.000$ . Respondents perceived they were treated better in the post office than traditional banks. When comparing the post office to supermarkets  $\chi^2=0.000$  and  $\phi = -0.046$ , or negligible size effect. The result for the uncorrected McNemar was  $\chi^2=0.000$ . The results show that bottom of the pyramid respondents perceived that they were treated better in supermarkets (38.4 percent) compared to the post office (22.3 percent) and traditional banks (8.8 percent).

Relative access of each of the three channels was evaluated by comparing what proportion of the unbanked respondents reported the availability of the channels in their community. Cost of access was corrected for by evaluating the proportion

of respondents who reported that the channel was within walking distance of their residence. The results for channel availability are shown in appendix 8.10. It was found, using the McNemar test, that there was no statistical difference between supermarkets and the post office in terms of availability of the channels within communities. The McNemar  $\chi^2=0.615$  with  $\varphi = 0.615$ , showing a large effect size on the results and they should thus be interpreted with some care. Both supermarkets and the post office appear to have greater availability than traditional banks. Some 36.4 percent of respondents indicated that a supermarket was within walking distance of their residence, 30.2 percent indicating a post office was within walking distance while 8.2 percent reported a bank branch within walking distance.

### **3.9. Conclusion**

Using the LSM methodology, it was determined that people living in LSM 1-4 defined the bottom of the pyramid in South Africa. For the data collection an interviewer-administered questionnaire was developed and a sample of 1997 responses were collected. From this sample 695 were determined to be from the bottom of the pyramid, of which 341 were unbanked. From the sample it was determined that the bottom of the pyramid had high levels of formal unemployment, low levels of education and were heavily dependent on government grants as a primary source of income. Very few respondents had completed formal schooling. The bottom of the pyramid respondents was also overwhelmingly rural dwellers and the use of English as a home language was insignificant.

A logistic regression performed on the bottom of the pyramid showed that age, primary source of income, education level and home language were associated with being unbanked at the bottom of the pyramid. Adoption propensity of unbanked people through an intermediary was tested. It was found that supermarkets and the post office had higher adoption propensities than traditional banks, indicating that intermediary were viable channels through which to offer financial services at the bottom of the pyramid. A total of 29 questions were identified which were mapped to the 9 constructs in the proposed model. The Cronbach  $\alpha$  for the constructs were all found to be acceptable. Both the validity and reliability of the constructs were acceptable and latent factors were found to explain a significant portion of the variance in the underlying variables. Analysis of the sample size showed that it was adequate and large enough to detect type II errors. The statistical power of the sample was good and the effect size was small. The sample size was thus appropriate to draw statistically significant findings from.

## CHAPTER 4

### Structural equation modelling in extended TAM

In this chapter an overview on the structural equation modelling (SEM) technique is provided and the use of SEM to validate the extended TAM model is proposed. SEM is also used to test the hypothesis of the proposed model. In section 4.1 an overview and some of the history of SEM is provided. The nature and objectives of SEM are described. The advantages of SEM over other comparable techniques are discussed in section 4.2. In section 4.3 methods used to estimate the parameters associated with SEM are discussed along with measures of model fit. Many of the statistical tests associated with SEM depend on the assumption of multivariate normality in the sample data. Sample normality and multicollinearity are described in section 4.4 along with approaches to dealing with non-normal data. Sample size relative to SEM is explained in section 4.5.

A SEM model consists of two parts – a measurement component and a structural component. In section 4.6 the measurement component, namely confirmatory factor analysis (CFA), is described. The various components of a CFA are discussed along with the nomenclature associated with the technique. The mathematics that underpins CFA is briefly described while the requirements to conduct a CFA are presented. This section concludes with the CFA conducted on the proposed extended TAM model. In section 4.7 the structural part of a SEM model, path analysis, is discussed. An explanation of the various components of a

path analysis is presented and the mathematics that underpins it is discussed. The various aspects of the structural model including specification, identification and estimation are described. Modification and evaluation of the path analysis are presented and the outcome of the path analysis is tabled. This chapter concludes in section 4.8 with a discussion of the outcome of the SEM.

#### **4.1. Structural Equation Modelling – an overview**

SEM is a statistical technique for testing and estimating causal relations between variables using a combination of statistical data and qualitative causal assumptions. This definition of SEM was articulated by Wright (1921), Simon (1953) and formally defined by Pearl (2000). SEM models allow both confirmatory and exploratory modelling and are suited to both theory confirmation and theory development. Confirmatory modelling starts out with a hypothesis that is represented in the form of a causal model. The concepts used in the model are then tested. The hypothesis in the model is tested against empirical data to determine how well the model fits the data. With an initial model SEM can be used inductively by specifying a corresponding model and using data to estimate the values of the parameters. The initial hypothesis may require adjustment in light of model evidence. When SEM is used purely for exploration this is normally in the context of an exploratory factor analysis.

In SEM, interest usually focuses on latent constructs. Latent constructs are abstract concepts that cannot be directly observed and measured. Examples of latent factors include intelligence and attitude. In place of direct measurement, variables that are assumed to indirectly measure the latent construct are analysed. SEM allows multiple measures, called manifest variables, to be

associated with a single latent factor. Once the model parameters have been estimated, the resulting model-implied covariance matrix can then be compared to an empirical covariance matrix. If the two matrices are consistent with one another then the SEM model can be considered a plausible explanation for the measured data. SEM is widely used because it provides a quantitative method for testing substantive theory and it explicitly accounts for measurement error (Raykov and Marcoulides, 2006). SEM models are divided into two parts, a measurement component and a structural component. The measurement component deals with the relationship between manifest variables and latent variables, whereas the structural component deals with the relationship between latent factors only.

#### **4.2. Advantages of using SEM over other techniques**

There are several aspects of SEM that set it apart from the other multivariate techniques. SEM takes a confirmatory rather than exploratory approach to data analysis. By demanding the pattern of inter-variable relations be specified a priori, SEM lends itself well to the analysis of data for inferential purposes. Many other multivariate techniques are essentially descriptive by nature and consequently hypothesis testing is difficult. SEM further provides explicit estimates of measurement error (Byrne, 2006). Alternative techniques rooted in regression analysis assume that error in the manifest variables vanishes. Applying multiple regression analysis when there is an error in the manifest variables is equivalent to ignoring an error that may lead to inaccuracies. SEM can also incorporate both latent variables (unobserved) and manifest variables in a single model. This allows SEM to be useful in understanding abstract concepts. Because SEM has the capability to model multivariate relationships, it allows



comparison between groups such as gender, age and education level within a single model (Byrne, 2006). SEM has further been found to be superior to other techniques in testing whether a proposed model successfully accounts for the actual relationships observed in a sample (Kline, 2004).

Whilst SEM has significant advantages over alternative techniques, it does have disadvantages. SEM cannot test directionality in relationships. The direction of a relationship in a SEM model represents a researcher's hypotheses of causality within a system. The researcher's choice of variables and pathways represented will thus limit the SEM ability to recreate the sample covariance and variance patterns that have been observed. There may thus be several models that fit the data equally well and consequently SEM can provide confirmation for a proposed model, but cannot exclude other models that may explain the data equally well. In spite of this shortcoming the SEM approach remains useful in understanding relational data in multivariate systems. The abilities of SEM to distinguish between indirect and direct relationships, among variables and to analyse relationships between latent variables without random error differentiate SEM from other relational modelling techniques.

### **4.3. Model estimation and fit**

The estimator takes the measured data as input and produces an estimate of the parameters, which can explain the observed behaviour in the data. Fitting a model is thus an iterative process that begins with an initial fit, tests how well the model fits, adjusts the model, tests the fit again and so forth, until the model fits well enough. The most common methods of estimation used in SEM are Maximum Likelihood (ML), Generalised Least Squares (GLS) and Weighted

Least Squares (WLS). When a hypothesized model is correctly specified and manifest variables are multivariate normal, it has been shown that ML, GLS and WLS produce estimates that converge to the same number (Browne, 1984a, 1984b).

Model specification involves determining apriori which parameters are fixed, which are free and what the relationships are between the variables. Under ideal conditions the choice between methods is thus arbitrary. Under the more realistic assumption of miss-specified models and data that are not always multivariate normally distributed, the different procedures may not converge to the same optimum (Olsson et.al, 2000). A comparison of the three estimation methods in the presence of mild misspecification of models showed that ML compared to GLS under conditions of misspecification provides more realistic indices of overall fit and less biased parameter values for paths that overlap with the true model. WLS under no conditions was preferable to the two other estimation procedures in terms of parameter bias and fit (Olsson et.al, 2000). It has further been found that ML is much less biased than WLS estimators for all distributions and sample sizes (Yuan and Bentler, 1997). The accuracy of alternative estimation method to ML (i.e. GLS and WLS) was investigated for different sample sizes using a Monte Carlo simulation (Rhee, 1992). As the number of non-normal variables increased, outcomes produced by WLS became worse whilst GLS was only slightly inferior to ML.

The objective of the estimation technique is to obtain estimates for each parameter of the model. These parameters include factor loadings, factor variances and covariances, manifest error variances and manifest error

covariances. The outcome of this estimation is a predicted variance–covariance matrix ( $\hat{\Sigma}$ ) that resembles the data sample variance–covariance matrix ( $S$ ) as closely as possible. The ML technique entails using a fitting function to minimize the difference between  $\hat{\Sigma}$  and  $S$ . The fitting function that is minimized in ML is:

$$F_{ML} = \ln|S| - \ln|\hat{\Sigma}| + \text{trace}[(S)(\hat{\Sigma} - I)] - p \quad [4.1]$$

where  $|S|$  is the determinant of the input variance–covariance matrix,  $|\hat{\Sigma}|$  is the determinant of the predicted variance–covariance matrix,  $p$  is the order of the input matrix (i.e., the number of input indicators) and  $I$  is the identity matrix.

Model fit refers to the ability of a model to reproduce the observed data. The fit of a model is evaluated using a fit index. A good-fitting model is one that is reasonably consistent with the observed data and a good-fitting model is required before interpreting the causal paths of the structural model. In recent years computer software programs such as SAS, SPSS, Lisrel, EQS and others have made the fitting of SEM models to data much easier. As a consequence there has been a significant increase in the number of fit indices available to researchers. With regards to which fit indices should be reported, it is not necessary or realistic to include every index included reported in a program's output as it may burden both reader and reviewer (Hooper et.al, 2008). Given the plethora of fit indices, it becomes a temptation to choose those fit indices that indicate the best fit. This should be avoided.

Fit indices can be broadly characterized as falling into three categories: absolute fit; fit adjusting for model parsimony and comparative or incremental fit. This typology is not perfect, as some fit indices have features of more than one category. Researchers are advised to consider and report at least one index from each category when evaluating the fit of their models (Jackson et.al, 2009). It has also been recommended that the acceptability of a fitted SEM solution should be evaluated on the basis of three major aspects: (a) overall goodness-of-fit; (b) the presence or absence of localized areas of strain in the solution and (c) the interpretability, size and statistical significance of the model parameter estimates (Brown, 2006). Jackson (2009) reviewed a number of papers that reported model fit indices and found that after  $\chi^2$  values the most commonly reported measures of fit were the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and the Tucker-Lewis Index (TLI). Nearly all papers reported  $\chi^2$  values. The number of fit measures reported in studies was three or four.

It has been recommended to report fit indices that have different measurement properties such as absolute fit indices, an incremental fit index such as the CFI and a residuals-based fit index, such as SRMR (Hu and Bentler, 1999). Absolute fit indices assess model fit at an absolute level. They assume the reasonability of the hypothesis that  $S = \Sigma$  without taking into account other aspects such as fit in relation to more restricted solutions. Absolute fit indices assess how well a priori model reproduces the sample data. Incremental fit indices evaluate the fit of a user-specified solution in relation to a more restricted, nested baseline models. Typically, the baseline model is a “null” or “independence” model in which the covariance’s among all input indicators are fixed to zero. A

comparative measure of fit is only interpretable when comparing two different models.

The CFI (Bentler, 1990) is a statistic that performs well even when sample size is small (Tabachnick and Fidell, 2007). The CFI is defined by the following formula;

$$CFI = 1 - \left[ \frac{\max[(\chi_T^2 - df_T), 0]}{\max[(\chi_T^2 - df_T), (\chi_B^2 - df_B), 0]} \right] \quad [4.2]$$

where  $\chi_T^2$  is the  $\chi^2$  value of the target model,  $df_T$  is the degree of freedom ( $df$ ) of the target model,  $\chi_B^2$  is the  $\chi^2$  value of the baseline (null) model and  $df_B$  is the  $df$  of the baseline model. The CFI has a range of possible values of 0.0 to 1.0, with values closer to 1.0 implying good model fit.

Another popular fit index falling under this category is the TLI (Tucker and Lewis, 1973). The TLI has features that compensate for the effect of model complexity and includes a penalty function for adding freely estimated parameters that do not markedly improve the fit of the model. The TLI is calculated using the formula:

$$TLI = \frac{\left[ \left( \frac{\chi_B^2}{df_B} \right) - \left( \frac{\chi_T^2}{df_T} \right) \right]}{\left[ \left( \frac{\chi_B^2}{df_B} \right) - 1 \right]} \quad [4.3]$$

where as with CFI,  $\chi_T^2$  is the  $\chi^2$  value of the target model,  $df_T$  is the  $df$  of the target model,  $\chi_B^2$  is the  $\chi^2$  value of the baseline (null) model and  $df_B$  is the  $df$  of the baseline model. The TLI is interpreted in a fashion similar to the CFI in that

values approaching 1.0 are interpreted in accord with good model fit. Methodologists have noted that CFI and TLI values below 0.90 should lead the researcher to strongly suspect the solution. CFI and TLI values in the range of 0.90 – 0.95 may be indicative of acceptable model fit (Bentler, 1990).

Having a model with relatively few free parameters and high complexity means that the estimation process is dependent on the sample data. This may result in a less rigorous theoretical model that paradoxically produces better indices (Mulaik et al, 1989; Crowley and Fan, 1997). To overcome this problem Mulaik et al (1989) developed the Parsimony Goodness-of-Fit Index (PGFI). The PGFI is based upon the standard goodness-of-fit index and adjusts it for the loss of degrees of freedom (Mulaik et al 1989). The index penalizes model complexity and results in parsimony fit index values that are considerably lower than other goodness-of-fit indices. While no threshold levels have been recommended for these indices, Mulaik et al (1989) noted that it was possible to obtain parsimony fit indices within the 0.50 region while other goodness-of-fit indices achieve values over 0.90 (Mulaik et al 1989).

The RMSEA is an “error of approximation” index and assesses the extent to which a model fits reasonably well in the population (Steiger and Lind, 1980). RMSEA is a fit adjusting for the model parsimony and is a population-based index. RMSEA is calculated as

$$RMSEA = \sqrt{\max \left[ \frac{(\chi^2_T - df_T)}{(ndf_T)}, 0 \right]} \quad [4.4]$$

where  $\chi^2_T$  is the  $\chi^2$  value of the target model,  $df_T$  is the  $df$  of the target model and  $n$  is the number of samples. The RMSEA values can be classified into four categories: good fit (0.00 – 0.05), fair fit (0.05 – 0.08), mediocre fit (0.08 – 0.10) and poor fit over 0.10). RMSEA smaller than 0.05 indicates good fit and the non-central  $\chi^2$  distributions can be used to obtain confidence intervals for RMSEA (a 90 percent interval is typically used). The confidence interval indicates the precision of the RMSEA point estimate. Methodologists recommend including this confidence interval when reporting the RMSEA (MacCallum et al., 1996). Additional support for the fit of the solution would be evidenced by a 90 percent confidence interval of the RMSEA whose upper limit is below these cut-off values.

The SRMR is an absolute measure of fit and is defined as the standardized difference between the observed correlation and the predicted correlation. It is a positively biased measure and an absolute measure of fit. The bias is greater for small  $n$  or for low  $df$ . This measure tends to be smaller as sample size increases and as the number of parameters in the model increases. The SRMR has no penalty for model complexity. The SRMR is the root of the mean of the squared standardized residual and is calculated as;

$$SRMR = \sqrt{\frac{2}{n(n+1)} \sum_i^n \sum_j^i \frac{(s_{ij} - c_{ij})^2}{s_{ij}c_{ij}}} \quad [4.5]$$

where  $n$  is the sample size,  $s_{ij}$  is the  $i, j^{th}$  element of the covariance matrix and  $c_{ij}$  is the  $i, j^{th}$  element of the predicted model matrix. The SRMR can take a range of values between 0.0 and 1.0, with 0.0 indicating a perfect fit. A value less

than 0.08 is generally considered a good fit (Hu and Bentler, 1999). From the review of recommended fit indices to report, this study will report CFI, PCFI, RMSEA, SRMR and TLI as measures of fit.

#### 4.4. Assessment of normality and multicollinearity

Multivariate normality of the sample data is assumed for most SEM estimation methods, including ML. Research has found that the failure to meet the assumption of multivariate normality can lead to an overestimation of the  $\chi^2$  statistic and to an inflated type 1 error (Curran et.al, 1996; Powell and Schafer, 2001). It may also lead to downward biased standard errors (Bandalos, 2002; Nevitt and Hancock, 2001). Where there is a significant departure from the assumption of multivariate normality in the sample data the assumptions inherent in several ancillary fit measures may be undermined (Yuan, 2005). It should be noted that ML estimation might perform well with mild departures from multivariate normality (Chou et.al, 1991; Fan and Wang, 1998). When conducting a SEM researchers are advised to report on both univariate and multivariate normality (Jackson et.al, 2009).

Multivariate normality implies that all variables in the data set under consideration are univariate normally distributed, the distribution of any pair of variables is bivariate normal and all pairs of variables have linear and homoscedastic scatterplots (Kline, 2004). The overall distribution of the data should also be normal. To determine the multivariate and univariate normality of the sample data, IBM SPSS Statistics 20.0.0 software was used to determine the skewness and kurtosis of the data, as well as the Mardia co-efficient. Mardia's coefficient is determined by  $\frac{p(p+2)}{p}$  where  $p$  is the number of observed



variables. According to Bollen (1989), if Mardia's coefficient is lower than  $p(p + 2)$ , then the combined distribution of the variables is multivariate normal.

In table 4.1 below are the values for skewness and kurtosis used to test for normality, as well as the Mardia co-efficient.

Table 4.1: Data normality assessment.

Variable	min	max	skew	c.r.	kurtosis	c.r.
Q147K	1.000	7.000	-.303	-2.287	.521	1.964
Q152C	1.000	7.000	-.334	-2.522	-.059	-.222
Q152E	1.000	7.000	.080	.600	-.139	-.525
Q152H	1.000	7.000	-.427	-3.217	.399	1.505
Q135BA	.000	1.000	1.332	10.040	-.226	-.853
Q135AS	.000	1.000	1.253	9.443	-.431	-1.625
Q135AC	.000	1.000	1.332	10.040	-.226	-.853
Q135M	.000	1.000	.803	6.051	-1.356	-5.111
Q145	1.000	10.000	-1.105	-8.328	.748	2.820
Q144	1.000	10.000	-1.216	-9.167	1.031	3.885
Q143	1.000	10.000	-1.122	-8.456	.943	3.554
Q142	1.000	10.000	-1.139	-8.588	.841	3.171
Q147L	1.000	7.000	-.308	-2.325	-.318	-1.198
Q147M	1.000	7.000	-.280	-2.114	.146	.551
Q147D	1.000	7.000	-.101	-.762	.096	.361
Q147B	1.000	7.000	-.387	-2.920	.049	.185
Q147J	1.000	7.000	-.070	-.530	-.239	-.900
Q147G	1.000	7.000	-.129	-.975	-.433	-1.632

Q147C	1.000	7.000	-.186	-1.401	.026	.100
Q152A	1.000	7.000	-.302	-2.274	-.155	-.584
Q152G	1.000	7.000	.095	.714	-.780	-2.940
Q152J	1.000	7.000	.051	.383	-.745	-2.809
Q156H	.000	1.000	3.449	26.004	9.898	37.311
Q156G	.000	1.000	3.117	23.498	7.716	29.083
Q156E	.000	1.000	1.505	11.343	.264	.994
Q156D	.000	1.000	3.757	28.320	12.112	45.656
Q152D	1.000	7.000	-.245	-1.844	.413	1.558
Q147H	1.000	7.000	-.239	-1.804	.338	1.275
Q147E	1.000	7.000	-.351	-2.649	.469	1.769
Mardia					256.439	55.838

A Mardia value of 256.439 was obtained which is lower than the Mardia coefficient cut-off of 449.50 obtained with  $P = 29$  observed variables. To test for univariate normality, the skewness and kurtosis for each variable in the data set was determined. There is no consensus regarding an acceptable degree of non-normality, but cut-off values of 3.00 for univariate skewness and 7.00 for univariate kurtosis have been proposed (Finney and DiStefano, 2006). Inspection of the assessment of normality table shows that there are 3 variables (Q156H, Q156G and Q156D) which displays skewness  $> 3.00$  and kurtosis  $> 7.00$ . From the total of 29 variables, 89.7 percent of the variables are thus normally distributed. It is concluded that the sample data is not multivariate normal but instead displays mild non-normality, whilst the overall data distribution meets the criteria for normality.

One means of addressing multivariate non-normal data is through the use of a procedure known as the bootstrapping. While Mardia's statistic shows that the data is normally distributed and consequently it should be possible to use estimation techniques that are suited for data that are normally distributed, the presence of 3 variables in the sample data set that are non-normal is cause for caution. The sample data set does not meet the strict criteria for multivariate normality that all variables in the data set being normally distributed. With non-normal data, the  $\chi^2$  statistics may be inflated when using ML. Bootstrapping is best described as a resampling procedure in which the original sample is considered to represent the population. Multiple sub-samples of the same size as the parent sample are drawn randomly with replacement from the population. The subsamples provide the data for an empirical investigation of parameter estimates and indices of fit.

Bootstrapping is based on the notion that when the assumptions of normality in a distribution are violated, a sampling distribution can be relied upon to describe the actual distribution of the population (Varian, 2005). Cases from the original data set are randomly selected with replacement to generate other data sets, usually with the same number of cases as the original. Because of sampling with replacement, (1) the same case can appear in more than one generated data set and (2) the composition of cases will vary slightly across the generated samples. When repeated many times bootstrapping simulates the drawing of numerous random samples from a population (Kline, 2011). The bootstrapped averaged estimates and their standard errors can be compared against the results from the original sample to evaluate the stability of model parameters. Nevitt and

Hancock (2001) suggested that using bootstrapping standard errors from complete data sets may be unwise with a sample size of 100 and recommended sample sizes of 200 or above. The sample size in the study was 341. Inspection of the sample data found that there were no missing values in any of the 341 cases and no adjustment for missing data was needed.

When using bootstrapping the Bollen-Stine  $p$  value can provide corrected values for the  $\chi^2$  goodness-of-fit statistic (Bollen and Stine, 1992). The Bollen-Stine  $p$  value adjusts the standard error of the path estimates to help adjust for the non-normality of the estimation. Using a conventional significance level of 0.05, the model would be rejected if the  $p$ -value was smaller than 0.05. If  $p$ -value were larger than 0.05, the model would not be rejected. When conducting a bootstrap exercise, it is recommended that at least 2000 bootstraps be utilised (Nevitt and Hancock, 2001). A potential limitation of the bootstrap confidence intervals is that two researchers analysing the same set of data may obtain different confidence intervals because the bootstrap samples generated by each researcher may be different (Gleser, 1996; MacKinnon et al., 2004). The differences should be negligible when the number of bootstrap samples is large.

In order that the results of the analysis were valid, it was important to check the data for multicollinearity. Multicollinearity refers to a situation in which two or more explanatory variables in a model are highly and linearly related. In perfect multicollinearity the correlation between two independent variables is equal to 1 or -1. Multicollinearity increases the standard errors of the coefficients that in turn mean that coefficients for some independent variables may be found not to be significantly different from 0. Without the presence of multicollinearity these

same coefficients might have been found to be significant and the researcher may not have come to null findings. Multicollinearity may thus inflate standard errors and make some variables statistically insignificant where they should be otherwise significant. Very high multicollinearity can result in matrix entries that approach 0. Given that SEM uses covariance matrices as input, very high multicollinearity may cause the model-fitting program to be empirically under identified and thus to generate estimates which are not reliable (Kline, 2004).

If a data set has variables that are multi-collinear, the researcher should possibly consider combining them into a single variable or drop one or more of the affected variables from the data set. Multicollinearity can be detected the correlations between independent variables are larger than 0.80 or 0.90. In general if the correlation value between two items is higher than 0.90, multicollinearity is a problem in data analysis (Hair et. al., 1998). Kline (2004) suggested the cut-off of 0.85 as the border of “extreme”. In appendix 8.11 the matrix of implied correlations between the independent variables in the data is shown. The highest value is 0.831, which is below the cut-off proposed by Kline (2004). It was concluded that there was no multicollinearity in the sample data set and consideration of dropping any variables from the data set need not be given.

#### **4.5. SEM sample size**

Where structural equation modelling (SEM) is proposed as the basis for testing a research hypothesis it is further necessary to determine the optimal sample size for an SEM. Ad hoc rules of thumb requiring the choosing of 10 observations per indicator in setting a lower bound for the adequacy of sample sizes have been widely used since their original articulation (Nunnally, 1967). Justifications for

this rule of 10 appear in several publications (Barclay et al. 1995, Chin, 1998, Kahai and Cooper, 2003). The rule of 10 couches the sample size question in terms of the ratio of observations (sample points) to free parameters. Bollen (1989) stated that “though I know of no hard and fast rule, a useful suggestion is to have at least several cases per free parameter” and Bentler (1989) suggested a 5:1 ratio of sample size to number of free parameters. Sample size in SEM can be computed through two methods: the first as a function of the ratio of indicator variables to latent variables and the second as a function of minimum effect, power and significance. Software and methods for computing both have been developed (Westland, 2010).

A meta-study into lower bounds on sample sizes in structural equation modelling found that there was a systematic bias towards choosing sample sizes that were significantly too small (Westland, 2010). Actual sample sizes averaged only 50 percent of the minimum needed to draw the conclusions the studies claimed. Overall, 80 percent of the research articles in the meta-study drew conclusions from insufficient sample sizes. An algorithm for computing the lower bound on sample size required to confirm or reject the existence of a minimum effect in an SEM at given significance and power levels has been developed (Westland, 2010). Whereas the sample size for hypothesis testing is typically determined from a critical value ( $z$ ) that defines the boundary between the rejection (set by  $\alpha$ ) and non-rejection (set by  $\beta$ ) regions the minimum sample size that can differentiate between  $H_0$  (null hypothesis) and  $H_A$  (alternative hypothesis) occurs where the critical value is exactly the same under the null and alternative hypotheses. To just detect the minimum effect size  $\delta$

$$H_0: d - d_0 = 0 \quad [4.6]$$

$$H_A: d - d_0 = \delta \quad [4.7]$$

The minimum sample size  $n$  is given by

$$n = \frac{1}{2H} \left( A \left( \frac{R}{6} - B + D \right) + H + \sqrt{\left[ A \left( \frac{R}{6} - B + D \right) + H \right]^2 + 4AH \left( \frac{R}{6} + \sqrt{A} + 2B - C - \right)} \right) \quad [4.8]$$

and where

$$A = 1 - d^2 \quad [4.9]$$

$$B = d \arcsin\left(\frac{d}{2}\right) \quad [4.10]$$

$$C = d \arcsin(d) \quad [4.11]$$

$$D = \frac{A}{\sqrt{3 - A}} \quad [4.12]$$

$$H = \left( \frac{\delta}{z_{1-\frac{\alpha}{2}} - z_{1-\beta}} \right)^2 \quad [4.13]$$

where  $d$  is the effect size. Specifically an apriori solution is sought viz. a sample size that will be sufficient given the prior requirement on what the minimum effect is that the tests will need to detect. Minimum effect, in the context of SEM, is the smallest correlation between latent variables that should be detectable with the sample size and model parameters.

Using the above methodology software has been developed that can compute the sample size required for a study that uses a SEM model given the number of

observed and latent variables in the model, the anticipated effect size and the desired probability and statistical power levels (Soper, 2012). The software also determines the minimum sample size required to detect the specified effect and the minimum sample size required given the structural complexity of the model. The proposed SEM to validate the extended TAM model has 9 latent constructs and 29 observed variables. Using the software developed by Soper (2012) with an anticipated size effect of  $d = 0.2$ , a desired statistical power level of 0.8 and a  $p = 0.05$  the minimum sample size to detect effect is 157. The minimum sample size for model structure is 170. These findings yields a recommended minimum sample size of 170 at the  $p=0.05$  level. For a probability level of 0.01 the minimum sample size to detect effect rises to 222 while the minimum sample size for model structure remains 170. With the data set having 341 observations it is concluded that the data set is large enough to detect effect and determine model structure at both the  $p=0.05$  and  $p=0.01$  levels. From the analysis it was found that the sample of 341 was large enough to conduct an SEM analysis.

#### **4.6. Measurement model - Confirmatory factor analysis**

The first component of an SEM is the measurement model, conducted using CFA. CFA tests hypothesized relationships between the manifest variables and latent constructs or factors. When a CFA is conducted, the researcher uses a hypothesized model to estimate a population covariance matrix that is then compared with the observed covariance matrix. Latent factors are theoretical in nature and they cannot be observed directly. Consequently latent factors cannot be measured directly either. To measure a latent factor, researchers capture indicators that are assumed to represent the underlying construct. The indicators are directly observable and believed by the researcher to accurately represent the



construct that cannot be observed. An example of a latent factor is happiness. Happiness cannot be measured directly as it is a state of mind. A researcher can identify manifest variables that together would define the factor happiness - such as being healthy; being in love, being financially secure etc. All of these manifest variables are assumed to be indicators of happiness.

CFA explicitly tests the priori hypotheses about relationships between manifest variables and latent factors. CFA is often the analytic tool of choice for developing and refining measurement instruments, assessing construct validity, identifying method effects and evaluating factor invariance across time and groups (Brown, 2006). A key aspect of CFA evaluation is the ability of the parameters from the measurement model to reproduce the observed relationships among the indicators. The results of CFA can provide evidence of the convergent and discriminant validity of theoretical constructs.

Convergent validity refers to the degree to which scores on a test correlate with scores on other tests that are designed to assess the same construct. Convergent validity is indicated by evidence that different indicators of theoretically similar or overlapping constructs are strongly interrelated. Discriminant validity is the degree to which scores on a test do not correlated with scores from other tests that are not designed to assess the same construct. A fundamental strength of CFA is that the resulting estimates of convergent and discriminant validity is adjusted for measurement error. CFA provides a stronger analytic framework than traditional methods such as ordinary least squares approaches or multiple regressions, which assume variables in the analysis are free of measurement error. Brown (2006) states that the fundamental intent of CFA is to determine

the number and nature of latent constructs that account for the variation and co-variation among a set of manifest variables. The observed measures are inter-correlated because they share a common underlying construct. If the latent construct were removed the correlations among the manifest measures would be zero.

In CFA the researcher must specify all aspects of the model. The number of factors, pattern of indicators–factor loadings and so forth. In figure 4.1 below the structure of typical CFA along with its notation and components is shown. Latent factors are drawn as circles or ellipses ( $F_i$ ), manifest variables are drawn as squares ( $X_i$ ) with the error associated with the manifest variables drawn as a circle ( $\epsilon_i$ ). Single headed arrows indicate the causal paths between latent factors with the factor loading denoted as  $\lambda_{ij}$ . Double-headed arrows denote either correlation between the error terms of manifest variables or latent factors.

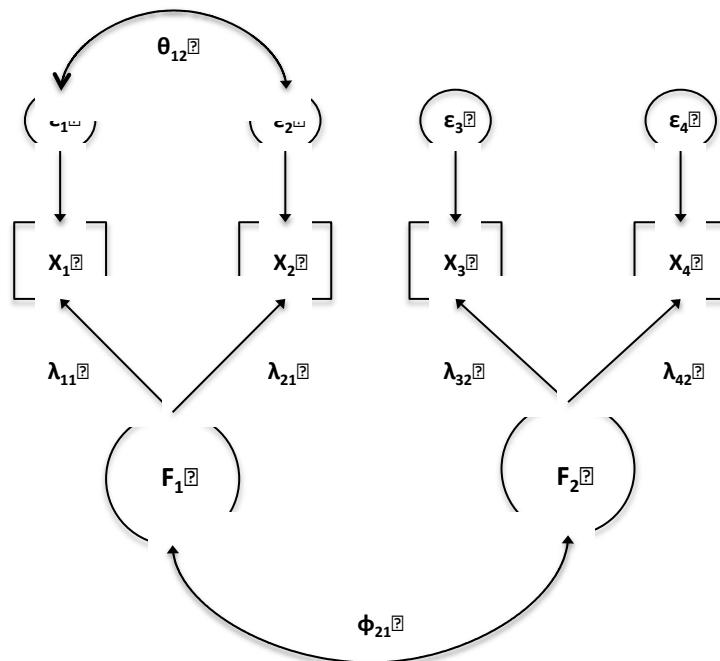


Figure 4.1: Typical CFA model

Correlations between manifest variables are denoted by  $\Theta_{ij}$  while that between latent factors is denoted by  $\Phi_{ij}$ . The fundamental equation of the common factor model is the variable  $X$  explained in terms of the latent factor is,

$$X_i = \lambda_{ij}F_j + \varepsilon_i \quad [4.14]$$

where  $X_i$  is the  $i$  th manifest variable,  $F_j$  represents the  $j$  th latent factor and  $\lambda_{ij}$  the factor loading relating the  $i$  th variable to the  $j$  th factor.  $\varepsilon_i$  represents the variance that is unique to the variable  $X_i$ . A series of equations will result, one for each variable associated with a latent factor. This set of equations can be summarized into a single equation that expresses the relationships among observed variables  $\mathbf{Y}$ , latent factors  $\boldsymbol{\eta}$  and unique variances  $\boldsymbol{\varepsilon}$  :

$$\mathbf{X} = \boldsymbol{\Lambda}_x \mathbf{F} + \boldsymbol{\varepsilon} \quad [4.15]$$

or in expanded matrix form:

$$\boldsymbol{\Sigma} = \boldsymbol{\Lambda}_x \boldsymbol{\Psi} \boldsymbol{\Lambda}_x' + \boldsymbol{\Theta}_\varepsilon \quad [4.16]$$

where  $\boldsymbol{\Sigma}$  is the  $p \times p$  symmetric correlation matrix of  $p$  indicators,  $\boldsymbol{\Lambda}_x$  is the  $p \times m$  matrix of factor loadings  $\boldsymbol{\lambda}$ ,  $\boldsymbol{\Psi}$  is the  $m \times m$  symmetric correlation matrix of the factor correlations and  $\boldsymbol{\Theta}_\varepsilon$  is the  $p \times p$  diagonal matrix of unique variances  $\boldsymbol{\varepsilon}$ . Matrices are represented in SEM by uppercase Greek letters (e.g.,

$\Lambda$ ,  $\Psi$  and  $\Theta$ ) and specific elements of these matrices are denoted by lowercase Greek letters (e.g.,  $\lambda$ ,  $\psi$  and  $\epsilon$ )

In order to estimate the parameters in CFA the model must be identified. A model is identified if, on the basis of known information it is possible to obtain a unique set of parameter estimates for each parameter in the model whose values are unknown (e.g., factor loadings, factor correlations, etc.). Model identification pertains in part to the difference between the number of freely estimated model parameters and the number of pieces of information in the input variance-covariance matrix. In order to conduct a CFA every latent factor must have its scale identified. By definition latent factors are unobserved and thus have no defined units of measurement. The researcher must set these units of measurement and two methods exist to establish scales for latent factors. In the first method the researcher fixes the metric of the latent factor to be the same as one of its indicators. The indicator selected to pass its metric onto the latent factor is referred to as a marker or reference indicator. In the second method the variance of the latent variable is fixed to a specific value, usually 1.0 (Brown, 2006).

This approach produces both a standardized and an unstandardized solution. Although the latent factors would have been standardized (i.e., their variances are fixed to 1.0) the fit of this model is identical to the unstandardized model (i.e., models estimated using marker indicators). Besides scaling the latent variable, the parameters of a CFA model can be estimated only if the number of freely estimated parameters does not exceed the number of pieces of information in the input variance/covariance matrix. For these and other reasons such as increased

statistical power and precision of parameter estimates researchers recommend that latent factors be defined by a minimum of three indicators (Marsh et.al, 1998).

#### **4.6.1. CFA specification and estimation**

The CFA for the extended TAM model is shown in figure 4.2. The model comprises of the nine latent factors hypothesized in the extended TAM model along with the 29 manifest variables that are loaded onto the respective latent constructs. For each of the manifest variables an error term is included. The manifest variables each loaded onto a single latent factor and no cross loadings were permitted. Whilst CFA does allow for the covariance of error terms across manifest variables that load onto a single factor, the researcher excluded any covariance between error terms. The covariance of error terms would need empirical justification and none was readily identified in then literature to support any cross loading. Figure 4.2 shows covariance between latent factors, but for simplicity in drawing figure4.2 not all covariances between latent facts were shown. It should be noted that all latent factors were covaried with each other in the model. To conduct the CFA, the researcher used SPSS AMOS. A ML minimization function using 3,000 bootstrap samples was used to evaluate the CFA.

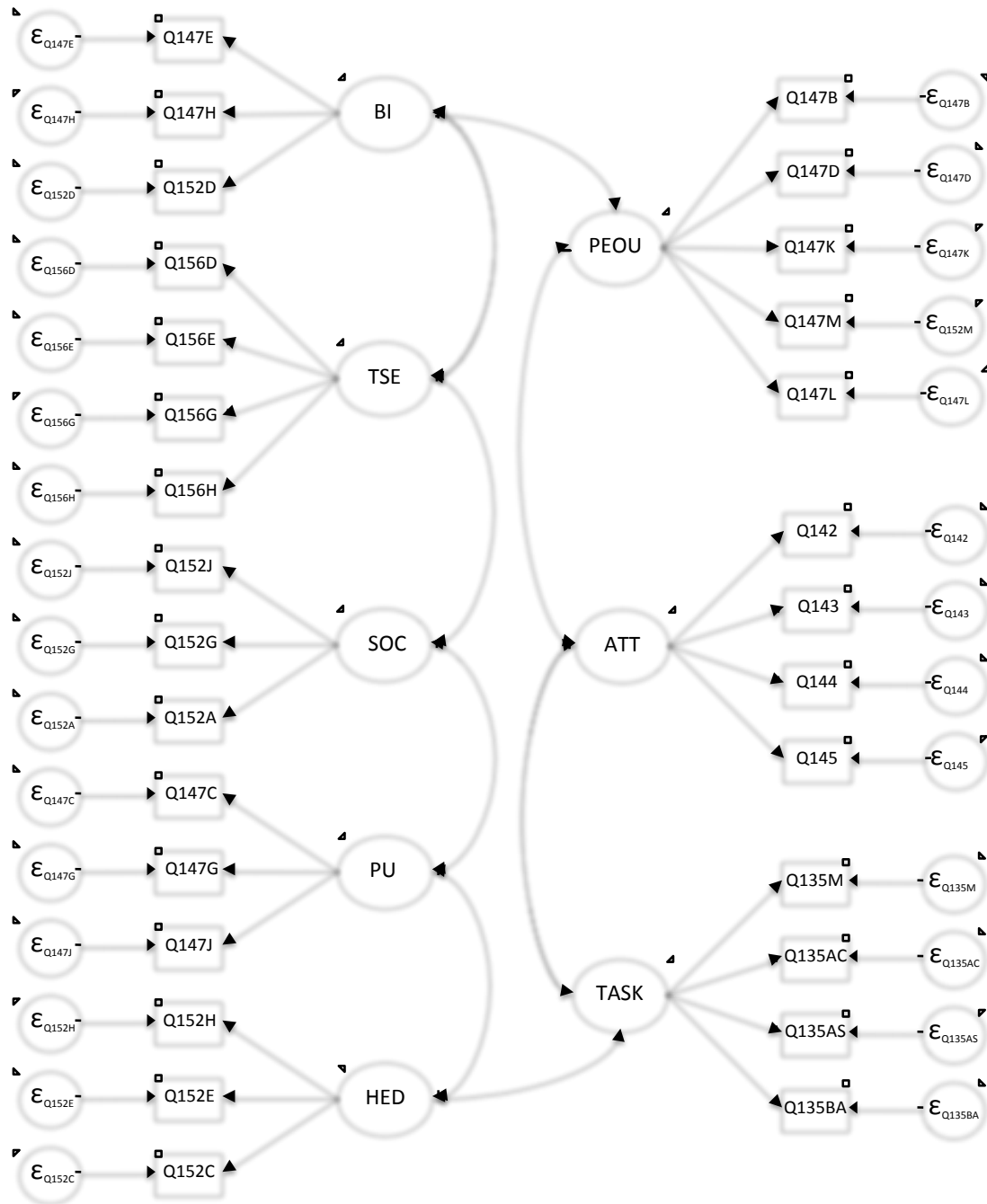


Figure 4.2: CFA for the extended TAM model

Before conducting the CFA it is essential to ensure that the proposed model is properly identified. CFA models must be identified to enable the estimation of parameters. When a model is identified, it is possible to fit unique estimates for each parameter with unknown values in the model. It further implies that there is one best value for each parameter in the model whose value is not known. To

be properly identified CFA models must consequently have degrees of freedom ( $df$ ) greater than 0 for models (Kline, 2004). The proposed model had 434 distinct sample moments and 112 parameters, producing 322  $df$ . The measurement model was thus identified. The researcher utilized IBM SPSS AMOS version 20.0.0 to conduct the model fit. The indices reported on (CFI, TLI, PCFI and RMSEA) are shown in the table 4.2 below. The complete set of fit indices generated by the software is included in appendix 8.12

Table 4.2: CFA model fit values

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0.891	0.874	0.960	0.953	0.959
Saturated model	1.000		1.000		1.000
Independence model	0.000	0.000	0.000	0.000	0.000
Model	PRATIO		PNFI		PCFI
Default model	0.860		0.766		0.825
Saturated model	0.000		0.000		0.000
Independence model	1.000		0.000		0.000
Model	RMSEA	LO 90		HI 90	PCLOSE
Default model	0.039	0.032		0.046	0.997
Independence model	0.180	0.176		0.185	0.000

The Bollen-Stine  $p$ -value = 0.083 which was above the 0.05 cut-off for rejecting the null hypothesis that the model does not describe the sample data. The CFI for the model was 0.964, which is above 0.95 indicating a good fit. The TLI for the analysis was 0.957, which is above 0.95 also indicating a good fit. The RMSEA for the model is 0.038, which is below 0.05 indicating a good fit. Furthermore the 90 percent confidence interval for RMSEA is (0.030 - 0.045) which is below 0.05

indicating a good fit at the 90 percent confidence interval. The Standardized Root Mean Square Residual (SRMR) = 0.0427 which is less than 0.08 indicating a good fit. The PCFI is 0.825, which was also acceptable.

Goodness-of-fit indices provide a global descriptive summary of the ability of the model to reproduce the input covariance matrix, but the other two aspects of fit evaluation, localized strain and parameter estimates, provide more specific information about the acceptability and utility of the solution. There are three matrices associated with the typical CFA model: the sample variance–covariance matrix ( $S$ ), the model-implied or predicted variance–covariance matrix ( $\Sigma$ ) and the residual variance–covariance matrix which reflects the difference between the sample and model-implied matrices. In some instances, overall goodness-of-fit indices suggest acceptable fit despite the fact that some relationships among indicators in the sample data have not been reproduced adequately. Large, positive standardized values in the residual variance–covariance matrix may indicate that additional parameters are needed in the model to better account for the covariance between the indicators. Negative standardized residual suggests that the model's parameters overestimate the relationship between two indicators to some extent.

Standardized residuals that greater than  $|1.96|$  are regarded as significant because this value corresponds to a statistically significant  $Z$  score at  $p < 0.05$ . In general, larger sample sizes are associated with larger standardized residuals because the size of the standard errors of the fitted residuals is often inversely related to sample size. For this reason, some methodologists recommend the use of larger cut-off values of  $|2.58|$  which corresponds to the 0.01  $\alpha$  level (Byrne,



1998). The standardized CFA residual matrix is included in appendix 8.13. The sample size of 341 was characterized as a large sample. The values in the matrix ranged from -1.743 to +2.654. There was only a single value (+2.654), which was outside the acceptable range and consequently it was concluded that the solution does not have areas of localized strain.

Another aspect of model evaluation that focuses on specific relationships in the solution is the modification index (Sorbom, 1989). Modification indices can be computed for each fixed and constrained parameter in the model. The modification index reflects an approximation of how much the overall model fit index would improve if the fixed or constrained parameter were freely estimated. Researchers undertaking modifications may capitalize on chance variations in the obtained sample and any such modifications should be viewed as tentative until cross-validated on an independent sample. The researcher did not undertake any modification to the CFA. As part of its standard output AMOS provides modification indices and these have included this in appendix 8.14. Inspection of the table indicated that the implied parameter change for the proposed modification indices were small, indicating that minimal improvement in fit would be obtained if modification indices had been used to improve the fit of the model.

#### **4.6.2. Outcome of the measurement model**

The measurement model contained no double-loading indicators and all measurement error was presumed to be uncorrelated. The model was over identified with 322 *df* . As noted in the introduction section, the data was gathered from 341 respondents. All 341 cases had complete data and there were

no missing values. Prior to the CFA analysis, the data was evaluated for univariate and multivariate normality by examining inter-item and item to total correlations for each variable loading onto latent factors. Normality of the data was examined using SPSS AMOS 20.0.0 and the joint test of non-normality in terms of skewness and kurtosis, Mardia's co-efficient, was not significant.

The CFA was analysed using SPSS AMOS 20.0.0 and a maximum likelihood minimization function using 3,000 bootstrap samples was used. Goodness-of-fit was evaluated using PCFI, RMSEA and its 90 percent confidence interval, CFI and the TLI. Multiple indices were used because they provided different information about model fit. When used together these indices provided a more conservative and reliable evaluation of the solution. Each of the overall goodness-of-fit indices suggested that the nine-factor model fits the data well. Bollen-Stine  $p$ -value = 0.083, SRMR = 0.046, RMSEA = 0.038 (90 percent CI = 0.030; 0.045; CFI = 0.99), TLI = 0.957 and CFI = 0.964. Inspection of standardized residuals and modification indices indicated no significant localized points of ill fit in the solution. It can thus be concluded that the latent factors and associated variables are a good measurement fit for the data.

#### **4.7. Structural model – Path Analysis**

The second component of a SEM is the structural model. The structural model in SEM is essentially a path analysis. Path analysis is a statistical technique used to examine causal relationships between two or more variables. It is based upon a linear equation system and was first developed by Sewall Wright in the 1930s for use in phylogenetic studies. Path analysis is different from other linear equation models in that in path analysis mediated pathways viz. those acting

through a mediating variable can be examined. Pathways in path models represent hypotheses of the researcher. The introduction of a measurement model in SEM has the effect that the estimated parameters in the structural model are free from the influence of measurement errors. As a result of this the errors in the structural model are separated from the errors in the measurement model.

The parameters of a structural model are the variances, regression coefficients and covariances among variables. In figure 4.3 below a typical structural model is shown along with its key components. The nomenclature for structural models used in SEM is similar to that used for CFA. Latent factors are drawn as circles or ellipses ( $F_i$ ), observed variables are drawn as squares ( $X_i$ ) with the error associated with the observed variables drawn as a circle ( $\epsilon_i$ ). Endogenous latent variables are in a sense dependent and consequently have a residual error associated with them. This residual is drawn as a circle and denoted ( $\delta_i$ ) and measures the portion of the variance in the latent variable unexplained by the exogenous latent variables. Single headed arrows indicate the causal paths between latent variables with the factor loading denoted as  $\beta_{ij}$ .

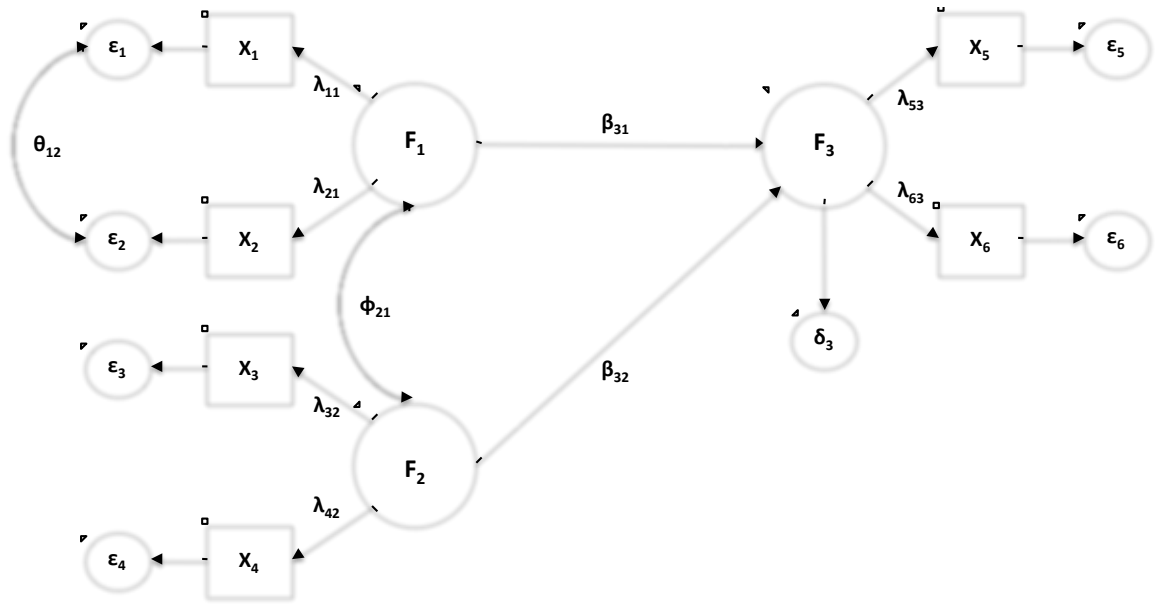


Figure 4.3: Typical SEM structural model

As with CFA the factor loadings between the observed variables and the exogenous latent factors are denoted ( $\lambda_{ij}$ ). Double-headed arrows denote either correlation between the error terms of observed variable (denoted by  $\theta_{ij}$ ) or between exogenous latent factors (denoted by ( $\phi_{ij}$ )). The causal model illustrated in fig 4.2 can be written as a series of equations:

$$F_3 = \alpha_{31}F_1 + \beta_{32}F_2 + \delta_3 \quad [4.17]$$

and;

$$\begin{aligned} X_1 &= \lambda_{11}F_1 + \varepsilon_1 & X_2 &= \lambda_{21}F_2 + \varepsilon_2 & X_3 &= \lambda_{32}F_2 + \varepsilon_3 \\ X_4 &= \lambda_{42}F_2 + \varepsilon_4 & X_5 &= \lambda_{53}F_3 + \varepsilon_5 & X_6 &= \lambda_{63}F_3 + \varepsilon_6 \end{aligned} \quad [4.18]$$

in order to estimate the regression coefficient  $\beta_{ij}$  between two latent factors  $i$  and  $j$  a simple regression model is used. This is described by

$$Y = \beta X + \delta \quad [4.19]$$

where both  $X$  and  $Y$  are observed variables and it is assumed that both variables are measured as deviations from their average. Under this assumption the following expected values  $E$  arise

$$E(Y) = E(X) = E(\delta) = 0 \quad [4.20]$$

and further:

$$Var(Y) = E(Y^2) \quad [4.21]$$

$$Var(X) = E(X^2) \quad [4.22]$$

$$Cov(Y, X) = E(YX) \quad [4.23]$$

now:

$$Var(Y) = Var(\beta X + \delta) = \beta^2 \sigma_X^2 + \sigma_\delta^2 \quad [4.24]$$

because  $E(X\delta) = 0$  following the usual assumption of regression analysis and from the above;

$$Cov(Y, X) = E(YX) = E[(\beta X + \delta)X] \quad [4.25]$$

$$Cov(Y, X) = \beta E(X^2) + E(X\delta) \quad [4.26]$$

$$Cov(Y, X) = \beta \sigma_X^2 \quad [4.27]$$

which can then be written as two covariance matrices:

$$\begin{bmatrix} \sigma_X^2 & \\ \sigma_{YX} & \sigma_Y^2 \end{bmatrix} = \begin{bmatrix} \sigma_X^2 & \\ \beta\sigma_X^2 & \beta^2\sigma_X^2 + \sigma_\delta^2 \end{bmatrix} \quad [4.28]$$

the simple regression model implies a functional connection between the theoretical covariance matrix and the parameters of the model namely  $\beta$  and  $\sigma_\delta^2$ . If the empirical values are substituted for the theoretical ones, the above becomes

$$\begin{bmatrix} s_X^2 & \\ s_{YX} & s_Y^2 \end{bmatrix} \cong \begin{bmatrix} s_X^2 & \\ bs_X^2 & b^2s_X^2 + s_\delta^2 \end{bmatrix} \quad [4.29]$$

It cannot be expected that the two matrices to be exactly equal, but the better the model describes the data the more equal the matrices will be. If there is a one to one correspondence between the sample covariance matrix and the parameters of a model assumed to have generated the sample then the model can be estimated, its fit tested and measures of fit can be calculated based on the difference between the two matrices which is the residual matrix given by:

$$\begin{bmatrix} s_X^2 & \\ s_{YX} & s_Y^2 \end{bmatrix} - \begin{bmatrix} s_X^2 & \\ bs_X^2 & b^2s_X^2 + s_\delta^2 \end{bmatrix} = \begin{bmatrix} 0 & \\ s_{YX} - bs_X^2 & s_Y^2 - b^2s_X^2 + s_\delta^2 \end{bmatrix} \quad [4.30]$$

minimising the elements of the residual matrix leads to the traditional estimates of  $\beta$  and  $\sigma_\delta^2$

$$\beta \approx b = \frac{s_{YX}}{s_X^2} \quad [4.31]$$

$$\sigma_\delta^2 \approx s_Y^2 - s_{YX}^2 \quad [4.32]$$

The above is the basis in which estimation is built. The model formulation implies a certain form of the covariance matrix of the manifest variables and the parameters are estimated as the values that minimise the difference between the sample covariance matrix and the implied covariance matrix or residual matrix.

#### **4.7.1. Path analysis specification and identification**

In order to conduct the path analysis the model must be specified. Model specification involves determining every relationship and parameter in the model that is of interest to the researcher. In this step the parameters, which are set to be fixed or free, are determined. Fixed parameters are not estimated from the sample data and are typically fixed at zero indicating no relationship between variables. Free parameters are estimated from the observed data and are hypothesized by the researcher to be non-zero. Determining which parameters are fixed and which are free in a SEM is important because it determines which parameters will be used to compare the hypothesized model with the sample population variance and covariance matrix in testing the fit of the model. The choice of which parameters are free and which are fixed in a model is up to the researcher. This choice represents the researcher's apriori hypothesis about which pathways in a system are important in the generation of the observed system's relational structure.

In figure 4.4 the proposed structural model for the data is illustrated. In chapter 2 the proposed model to explain financial services adoption through an intermediary was derived and in figure 4.4 this is expressed as a path diagram in SEM.

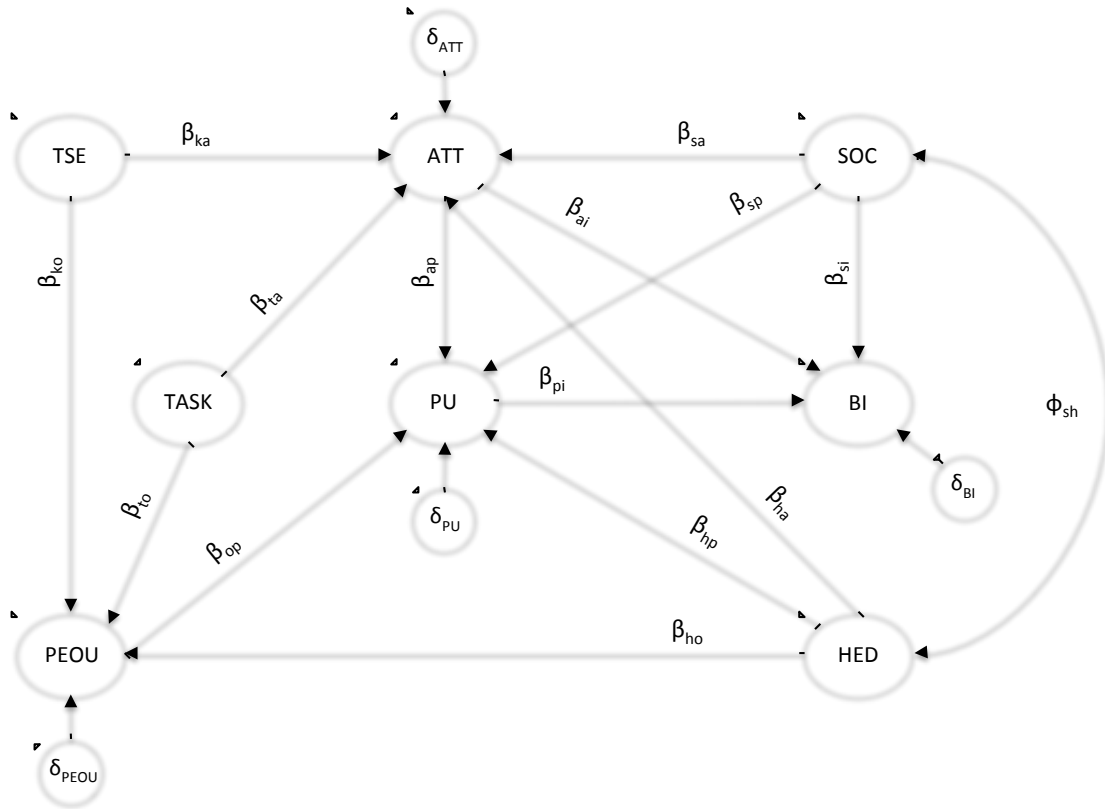


Figure 4.4: Proposed SEM model

The proposed model can be reduced to a set of simultaneous equations that the estimation will optimize and obtain parameter estimates for. As for a CFA, a path analysis uses two different kinds of variables, namely exogenous and endogenous variables. The distinction between these two types of variables is whether the variable regresses on another variable or not. An exogenous variable is influenced by other variables in the path diagram. An endogenous variable is free from the influence of other variables in the model. The set of equation describing the model is shown below;

$$BI = \beta_{pi}PU + \beta_{ai}ATT + \beta_{si}SOC + \delta_{BI} \quad [4.33]$$

$$PU = \beta_{hp}HED + \beta_{op}PEOU + \beta_{ap}ATT + \beta_{sp}SOC + \delta_{PU} \quad [4.34]$$

$$PEOU = \beta_{ho}HED + \beta_{to}TASK + \beta_{ko}TSE + \delta_{PEOU} \quad [4.35]$$



$$ATT = \beta_{na}HED + \beta_{ta}TASK + \beta_{ra}TSE + \beta_{sa}SOC + \delta_{ATT} \quad [4.36]$$

where  $\beta_{xy}$  represents the path co-efficient between the latent factors  $x$  and  $y$  and  $\delta_x$  represents the error associated with the latent exogenous factor  $x$ . The latent factors behavioural intent (BI), perceived usefulness (PU), perceived ease of use (PEOU) and attitude (ATT) are exogenous factors. Each of these factors consequently has an error term associated with them that explains the portion of the variance that is unexplained by the dependent latent factors in our model. The remaining factors hedonistic (HED), task (TASK), technology self-efficacy (TSE) and social (SOC) are endogenous variables, which are independent and do not have error terms associated with them.

The proposed model is also recursive in that there are no feedback loops in the proposed relationship between the latent factors. Recursive models can pose a problem when trying to estimate parameters in a model. Once a structural equation model has been specified the next step is to determine whether the model is identified. An identified model is a model where a specific parameter value uniquely identifies the model and no other equivalent formulation can be given by a different parameter value. Model identification was determined by first checking the order condition. The order condition requires that the number of free parameters to be estimated must be less than or equal to the number of distinct values in the matrix S. In the model there are 97 free parameters that need to be estimated. There are a total of 29 observed variables. The number of distinct values in the matrix S is equal to  $\frac{p(p+1)}{2}$  where  $p$  is the number of observed variables. Consequently the number of distinct values in the S matrix is 406, which is larger than the number of free parameters and consequently the

model order condition is acceptable. The model has 464 distinct sample moments and 102 parameters that need to be estimated. The model consequently had 362 degrees of freedom and is identified. With the model meeting the order condition and being identified it was possible to obtain unique estimates for the model parameters.

#### 4.7.2. Path analysis estimation

In path analysis estimation start values of the free parameters are chosen in order to generate an estimated population covariance matrix,  $\Sigma$ , from the model. Start values can be chosen by the researcher from prior information or by computer programs used to build SEMs. For the SEM the software estimated start values. For the analysis bootstrapping using the ML estimator and 3,000 samples was used to deal with the mild non-normality. SPSS AMOS version 20.0.0 software was used to conduct the analysis. Using this technique a Bollen-Stine  $P = 0.079$  was obtained. As this is greater than 0.05 the null hypothesis is rejected and it was concluded that the model fits the data well. The indices reported on (CFI, TLI, PCFI and RMSEA) are shown in the table 4.3 below. The complete set of fit indices generated by the software is included in appendix 8.15

Table 4.3: SEM Model fit values.

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0.889	0.875	0.960	0.954	0.959
Saturated model	1.000		1.000		1.000
Independence model	0.000	0.000	0.000	0.000	0.000
Model	PRATIO		PNFI		PCFI
Default model	0.892		0.792		0.855

Saturated model	0.000	0.000	0.000	
Independence model	1.000	0.000	0.000	
Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.038	0.032	0.045	0.999
Independence model	0.180	0.176	0.185	0.000

All the values indicate that the model is a good fit to the data. The RMSEA for the hypothesized model had a value of 0.38. The confidence interval at the 90 percent level was 0.31 to 0.45. Both RMSEA and the confidence interval are within the values that indicate good fit. In addition, the researcher noted that the PGFI indicated good parsimony fit for the model. For the hypothesized model a PGFI of 0.777 was obtained that indicated a good fit. The CFI for the hypothesized model was 0.963 that is above the cut-off of 0.95 indicating a good fit.

#### 4.7.3. Path analysis modification and evaluation

If the covariance matrix estimated by the model does not adequately reproduce the sample covariance matrix, the initial hypotheses can be adjusted and the model retested. To adjust a model, new pathways are added or original ones removed. In modification parameters are changed from fixed to free or from free to fixed. It should be noted that adjusting a model after initial testing increases the chance of making a Type I error. There are benefits and disadvantages to using model modification. Any re-specification of the model implicitly changes its meaning in some way. In many instances a change in model specification results in a trivial or unimportant corresponding alteration of the model's substantive meaning, but in other cases model modification can foreshadow a strong shift in the model's meaning from a theoretical standpoint. A second consideration to

take into account when modifying a model is that there is a reliance on empirical data rather than theory to help specify the model.

The more empirically based modifications that are incorporated into the final model, the less likely the model is to be replicated in new samples of data. For these reasons modification of models should be based upon theory as well as the empirical results provided by the modification indices. Appendix 4.6 shows the modification indices for the SEM analysis. The threshold for modification Indices allows one to specify what level of change is required for a path to be included in the modification index output. The default value is 4.00 because it slightly exceeds the tabled critical value of a chi-square distribution with one degree of freedom that is 3.84. Inspection of the modification indices shows that despite several large modification indices identified, the impact on model fit improvement would be relatively small and none of the suggested modifications could be readily supported by the theory or derivation of the model. Consequently the researcher decided against modifying the model using modification indices.

With the model having an acceptable fit to the data, the researcher analysed the parameter estimates to identify the significance of specific model paths. The values associated with each path are standardized regression coefficients. These values represent the amount of change in  $Y$  given a standard deviation unit change in  $X$ . Because standardized residuals can be roughly interpreted as  $Z$  scores, the  $Z$  score values that correspond to conventional statistical significance levels are employed as practical cut-offs. The size of standardized residuals is influenced by sample size. In general larger samples sizes are associated with larger standardized residuals because the size of the standard errors of the fitted

residuals is often inversely related to sample size. For this reason, some methodologists recommend the use of larger cut-off values such as  $|2.58|$  which corresponds to the .01  $\alpha$  level (Byrne, 1998). Confidence intervals can be created for parameters estimated with SEM by the bootstrap method. In table 4.4 the unstandardized regression weights for the paths in the proposed model are shown

Table 4.4: Bootstrap unstandardized regression weights with 95 percent confidence intervals

Regression path			Estimate	S.E.	Lower	Upper	C.R.
PEOU	<---	TASKm	-.153	.091	-.180	.005	-1.689
PEOU	<---	HED	.585	.075	.611	.854	<b>7.769</b>
PEOU	<---	TSEm	.034	.299	-.088	.098	.115
ATT	<---	TASKm	1.437	.287	.209	.388	<b>5.000</b>
ATT	<---	SOC	.072	.098	-.110	.221	.732
ATT	<---	TSEm	-1.022	.934	-.181	.042	-1.095
ATT	<---	HED	.360	.169	-.018	.335	<b>2.135</b>
PU	<---	PEOU	.973	.138	.572	1.035	<b>7.045</b>
PU	<---	SOC	-.073	.035	-.283	.002	<b>-2.056</b>
PU	<---	ATT	.033	.020	-.034	.207	1.648
PU	<---	HED	.261	.091	-.007	.552	<b>2.857</b>
BI	<---	PU	.903	.092	.718	.934	<b>9.762</b>
BI	<---	SOC	.149	.039	.108	.415	<b>3.853</b>
BI	<---	ATT	-.011	.025	-.146	.096	-.429

The critical ratio (CR) and 95 percent confidence interval values for the parameter estimates, indicated as Lower and Upper in the table, are also displayed. If the critical ratio associated with a path in the hypothetical model exceeds the critical value of  $|1.96|$ , (at  $\alpha = 0.05$ ) and the critical value of  $|2.58|$  (at  $\alpha = 0.01$ ) the null hypothesis that the parameter was equal to 0 is rejected and the hypothesized relationship is supported (Mueller, 1996). From the critical ratio six paths were identified that were significant at the  $p = 0.01$  levels and two paths that were significant at the  $p = 0.05$  level. The significant critical ratios are highlighted in the table. Unstandardized regression weights are indicated in the Estimate column. TASK has a significant effect on ATT (CR = 4.998, Std. = 0.298) at the  $p = 0.01$  level. HED has a significant effect on ATT (CR = 2.130, Std. = 0.174) but only at the  $p = 0.05$  level. HED as a significant effect on PEOU (CR = 6.768, Std. = 0.781) at the  $p = 0.01$  level whilst PEOU has a significant effect on PU (CR = 6.534, Std. = 0.908) at the  $p = 0.01$  level. Finally PU has a significant effect on BI (CR = 5.288, Std. = 0.669) at the  $p = 0.01$  level as does SOC on BI (CR = 2.606, Std. = 0.192). None of the other paths in the hypothesized model have significance at either the  $p = 0.05$  or the  $p = 0.01$  level.

Cheung and Lau (2008) have highlighted the importance of mediation effects in SEM and advised researchers to include these in any complete analysis of an SEM model. Mediation effect is frequently referred to as an indirect effect, where the effect of the independent variable  $X_1$  on the dependent variable  $Y$  goes through a mediator  $X_2$ . The mediation effect is commonly defined as the reduction in the regression coefficient of  $X_2$  on  $Y$ , when the effects of  $X_2$  are controlled for (Baron and Kenny, 1986; Judd and Kenny, 1981). When the suppression effect is not controlled for, the relationship between  $X_1$  and  $Y$  would

appear to be smaller (Cohen and Cohen, 1983). MacKinnon et. al. (2002; 2004) suggest using the bootstrap method to define the confidence intervals for mediation effects estimated with SEM by the bootstrap method. To determine the significance of the indirect effects a critical ratio was calculated by dividing the standard estimate generated from the 3,000 bootstrap examples by its associated standard error. In table 4.5 below the critical ratios for the indirect effects is shown.

Table 4.5: Indirect effects

	TASKm	SOC	TSEm	HED	ATT	PEOU	PU	BI
ATT	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
PEOU	-0,308	-0,200	0,177	-0,235	0,000	0,000	0,000	0,000
PU	-1,496	-0,365	-0,408	<b>3,732</b>	-0,300	0,000	0,000	0,000
BI	-0,897	-0,939	0,160	<b>2,014</b>	0,606	<b>2,198</b>	0,000	0,000

One indirect effects was significant at the  $p = 0.01$  level and an additional two were significant at the  $p = 0.05$  level. The statistically significant indirect effects are highlighted in the table. HED has a significant indirect effect on BI (CR = 2.014) at the  $p = 0.05$  level. PEOU has a significant indirect effect on BI (CR = 2.198) at the  $p = 0.05$  level. HED will also have a significant indirect effect on PU. This is confirmed in the table at the  $p = 0.01$  level (CR = 3.732). None of the other indirect paths in the hypothesized model have significance at either the  $p = 0.05$  or the  $p = 0.01$  level.

The SEM standardized residual covariance matrix is included in appendix 8.17. Standardized residuals that are equal to or greater than +2.58 or less than -2.58

are used to identify localized areas of weakness. The values in the matrix ranged from +2.626 to -3.125. There was only a single value (+2.626) above the range and a single value (-3.125) below the range. It was concluded that the solution did not have significant areas of localized strain. Modification indices were computed for each fixed and constrained parameter in the model. The table of SEM modification indices is included in appendix 8.16. Inspection of the table indicated that the implied parameter change for the proposed modification indices were small, indicating that minimal improvement in fit would be obtained if these had been used to improve the fit of the model. Consequently no post hoc modification to the initial fit was undertaken.

#### **4.7.4. Outcome of the structural model**

The structural model was analysed with a maximum likelihood minimization function using 3,000 bootstrap samples. Goodness-of-fit was evaluated using the SRMR, RMSEA and its 90 percent confidence interval (90 percent CI), CFI and the PCFI. Each of the overall goodness-of-fit indices suggested that the nine-factor structural model fit the data well. The Bollen-Stine  $p$ -value = 0.079, SRMR = .046, RMSEA = 0.038 (90 percent CI = 0.030 – .045) and PCFI = 0.863. Inspection of standardized residuals and modification indices indicated no localized points of ill fit in the solution. The final SEM model with significant paths is shown in figure 4.5 below. Path analysis identified five causal paths that had statistical significance at the  $p = 0.01$  level ( $CR > 2.58$ ) and one path that had statistical significance at the  $p = 0.05$  level. Two latent factors were identified that had a direct causal effect on behavioural intent (BI) to utilize financial services through an intermediary (SOC, PU) and one latent factor was



identified that had a statistically significant indirect effect on behavioural intent through an intermediary (HED).

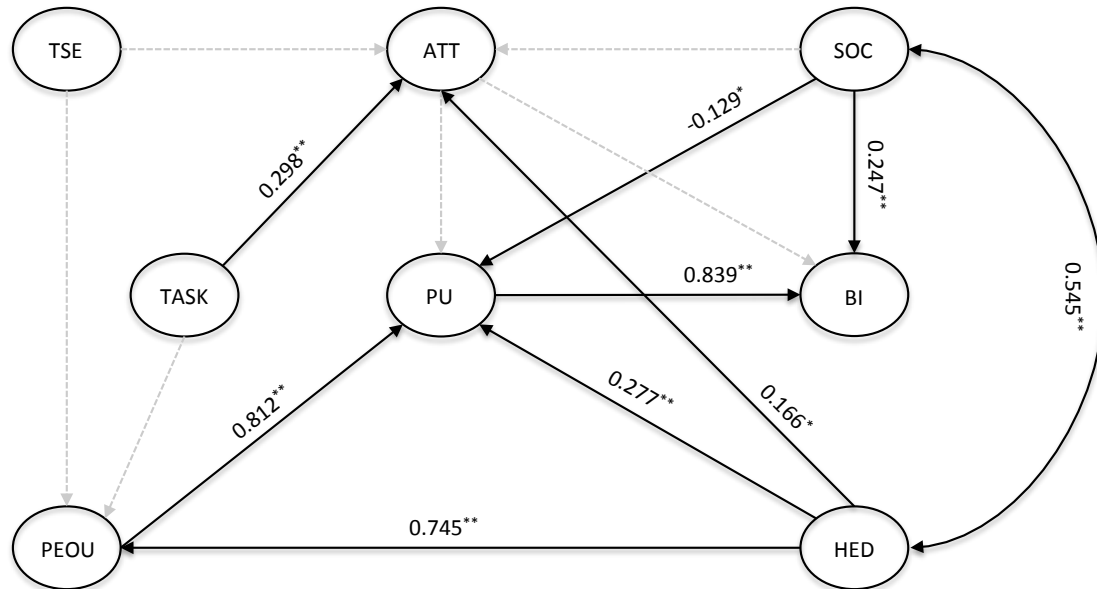


Figure 4.5: Final SEM model with significant causal paths highlighted

#### 4.8. Conclusion

This chapter provided an overview of the structural equation modelling (SEM) technique. The researcher has shown that SEM is well suited to test hypothesized causal models against measured data. The advantages of SEM over similar techniques are that it allows the researcher to take a confirmatory rather than an exploratory approach to the data analysis, obtain explicit estimates of measurement error variance and allow the incorporation of latent and observed variables into a single model. SEM is shown to consist of two parts, a measurement part and a structural part. The measurement part used for the analysis is confirmatory factor analysis (CFA), a special form of factor analysis. CFA is used to confirm that a set of latent factors constructed from a group of observed variables is able to account for the variance seen in the associated data.

The objective of CFA is to obtain estimates for each parameter in the measurement model and to identify measurement error explicitly before attempting the structural component of the model.

The structural component of the model is derived using path analysis and allows researchers to confirm or reject the proposed causal relationships in a proposed model. A variety of model fit indices was described that are used equally for CFA as well as SEM model fits and the values associated with acceptable fits in the indices was also discussed. The analysis of the hypothesis extended TAM model for financial services adoption through an intermediary was conducted using structural equation modelling. The sample size of 341 was found to have the appropriate power to detect type II errors and was large enough to carry out a SEM analysis. The combined distribution of the data is assumed to be normal, however three of the 29 variables used were not univariate normal and the combined data was characterized as mildly non-normal.

With the data distribution being mildly non-normal a bootstrap maximum likelihood estimation approach was used with 3,000 bootstrap samples. The observed variables that described the nine latent factors were tested and found to be valid and reliable indicators of the latent constructs. The SEM model comprised two components, the measurement component and the structural component. The measurement component of the model was tested using confirmatory factor analysis and showed good fit across all reported indices and no post hoc modification was deemed necessary. It was concluded that the eight latent factors were a good fit to the data. The structural equation component of the SEM was over identified, allowing estimation of the model parameters. The

structural model showed good fit across all reported indices. The hypothesized model was thus confirmed as a good fit to the data. The critical ratios of the path analysis identified six statistically significant relationships in the model. Two latent factors were found to directly affect behavioural intent and two latent factors were found to indirectly affect behavioural intent to adopt financial services through an intermediary.

## CHAPTER 5

### Results

In this chapter the results of the analysis is discussed. In section 5.1 the hypothesis associated with each of the latent factors in the proposed model is tested. In section 5.2 a multi-group analysis to test the model for invariance and mediation effects between subgroups is conducted. Section 5.3 contains the conclusion.

#### 5.1. Hypothesis

The extended TAM model proposed in section 2.4 implied a number of hypotheses that were expanded on in section 2.5. Each hypothesis was tested and the results are discussed in turn. The critical ratio (CR) for each of the hypothesis was presented in table 4.4.

##### *HYPOTHESIS 1: SOC will directly affect BI*

This hypothesis was supported. A CR of 3.853 was determined, indicating that the hypothesis is supported at the  $p=0.01$  level. The relationship was positive indicating that SOC has a positive influence on BI. The loading for the path was 0.247 indicating that SOC explained 6.1 percent of the observed variance in BI. Squaring the factor loading determines the amount of variance in the latent factor due to the factor under discussion. The results show that social factors have a direct effect on the behavioural intention of unbanked respondents at the bottom of the pyramid to use financial services through an intermediary.

*HYPOTHESIS 2: SOC will have an indirect effect on BI through PU.*

This hypothesis was supported. A CR of -2.056 was obtained indicating that the hypothesis is supported at the  $p=0.05$  level. The factor loading for the path was -0.129 indicating that SOC explained 1.7 percent of the observed variance in PU and would through PU it exerts a further influence on BI.

*HYPOTHESIS 3: SOC will have an indirect effect on BI through attitude.*

A CR of 0.732 was obtained indicating that the hypothesis is not supported. From the results it is found that social factors do not influence the attitude of respondents at the bottom of the pyramid in relation to their intention to adopt financial services through an intermediary.

*HYPOTHESIS 4: PU will directly affect BI*

This hypothesis was supported. A CR of 9.762 was obtained indicating that the hypothesis is supported at the  $p=0.01$  level. The relationship was positive indicating that PU has a positive influence on BI. The factor loading for the path was 0.839 indicating that SOC explained 70.4 percent of the observed variance in BI. Both the size of the CR as well as the factor loading shows that the relationship is very strong and explains a significant portion of the observed variance in BI.

*HYPOTHESIS 5: Attitude will directly affect BI*

A CR of -0.429 was obtained indicating that the hypothesis was not supported. The analysis that having a positive attitude or negative view of financial services offered through an intermediary, does not directly affect adoption intention.

*HYPOTHESIS 6: Attitude will have an indirect effect on BI through PU*

A CR of 1.648 was obtained indicating that the hypothesis was not supported. This result is consistent with hypothesis 5 in that attitude is neither a direct or indirect predictor of adoption intention.

*HYPOTHESIS 7: PEOU will indirectly affect BI through PU.*

This hypothesis was supported. A CR of 7.045 was obtained indicating that the hypothesis is supported at the  $p=0.01$  level. The relationship was positive indicating that PEOU has a positive influence on PU. The factor loading for the path was 0.812 indicating that SOC explained 65.9 percent of the observed variance in PU. Both the size of the CR as well as the size of factor loading shows that the relationship is very strong and explains a significant portion of the observed variance in PU.

*HYPOTHESIS 8: HED will directly affect PEOU.*

It was hypothesised that HED would have an influence on the PEOU of the respondents toward the adoption of financial services. A CR of 7.769 was obtained indicating that the hypothesis is supported at the  $p = 0.01$  level. The factor loading for the path was 0.745 indicating that HED explained 55.5 percent of the observed variance in PEOU. HED is clearly the most significant factor in determining PEOU. From the results and the variables that comprise the HED factor it is inferred that how respondents perceive comfort and enjoyment in carrying out the task will be the most significant determinant of how easy they perceive the task is to do.

*HYPOTHESIS 9: HED will have an indirect effect on BI through attitude.*

This hypothesis was not supported. A CR of 2.135 was obtained indicating that there was a statistically significant relationship between hedonistic factors and attitude at the  $p=0.05$  level. There is not, however, a statistically significant relationship between ATT and BI and consequently the hypothesis cannot be held as formulated.

*HYPOTHESIS 10: HED will have an indirect effect on BI through PU.*

This hypothesis was supported. A CR of 2.857 was obtained indicating that the hypothesis is supported at the  $p=0.01$  level. The relationship was positive indicating that PEOU has a positive influence on PU. The factor loading for the path was 0.277 indicating that HED explained 7.7 percent of the observed variance in PU. PU has a direct effect on BI and hence the hypothesis was supported.

*HYPOTHESIS 11: TASK will directly affect PEOU of a service. TASK will thus be a determinant of PEOU.*

This hypothesis was not supported. A CR of -1.689 was obtained indicating that the hypothesis is not supported. From the results and the variables that comprise the TASK factor, it is clear that matters of language, how well people are treated, how the cheap the service is to use and how dependable the service is affect the perception of the service itself but does not affect how respondent perceive how easy the service would be to use.

*HYPOTHESIS 12: TASK will have an indirect effect on BI through attitude.*

This hypothesis was not supported. A CR of 5.000 was obtained indicating that the TASK has a statistically significant effect on ATT at the  $p=0.01$  level. The relationship was positive indicating that TASK has a positive influence on ATT. The factor loading for the path was 0.298 indicating that TASK explained 8.9 percent of the observed variance in ATT. There is not, however, a statistically significant relationship between ATT and BI and consequently the hypothesis cannot be held as formulated.

*HYPOTHESIS 13: TSE will directly affect PEOU. TASK will thus be a determinant of PEOU.*

This hypothesis was not supported. A CR of 0.115 was obtained indicating that the hypothesis is not supported. It had been expected that confidence in the use of technology would positive or negatively influence how easy the technology-enabled service would be to use. It is clear from the results is that other non technology related variables such ease of understanding and making the service easy to use were more significant that confidence in using the technology that carried the service. If someone is confident using technology and thus finds it easy to use, such a cell phone, it does not necessarily translate into perceived ease of use of a associated service, such as cell phone banking.

*HYPOTHESIS 14: TSE will have an indirect effect on BI through attitude.*

This hypothesis was not supported. A CR of -1.095 was obtained indicating that the hypothesis is not supported. It had expected that being more confident with the technology associated with the provision of financial services through an



intermediary would have a positive effect on attitude. The results indicate that other factors determine attitude and that being confident in using technology is not an predictor that attitude toward using a technology enabled financial services through an intermediary would be affected by it.

A total of seven of the 14 hypotheses were supported in the model and seven were not. In table 5.1 a summary of the hypothesis and their outcomes is presented.

Table 5.1: Summary of hypothesis outcomes

	Hypothesis	Outcome
H1	Social constructs will directly affect behavioural intent	Supported
H2	Social constructs will have an indirect effect on behavioural intent through perceived usefulness	Supported
H3	Social constructs will have an indirect effect on behavioural intent through attitude	Not Supported
H4	Perceived usefulness will directly affect behavioural intent	Supported
H5	Attitude will directly affect behavioural intent	Not Supported
H6	Attitude will have an indirect effect on behavioural intent through perceived usefulness	Not Supported
H7	Perceived ease of use will indirectly affect behavioural intent through perceived usefulness	Supported
H8	Hedonistic factors will directly affect the perceived ease of use of a service	Supported
H9	Hedonistic factors will have an indirect effect on behavioural intent through attitude	Not Supported
H10	Hedonistic factors will have an indirect effect on behavioural intent through perceived usefulness	Supported
H11	Task factors will directly affect the perceived ease of use of a service. Task factors will thus be a determinant of perceived ease of use	Not Supported

H12	Task factors will have an indirect effect on behavioural intent through attitude	Supported
H13	Technology self-efficacy will directly affect the perceived ease of use of a service. Task factors will thus be a determinant of perceived ease of use	Not Supported
H14	Technology self-efficacy will have an indirect effect on behavioural intent through attitude.	Not Supported

In the hypothesized model HED and SOC were allowed to co-vary. The rationale for this was that people are likely to relate experiences to friends, family and others if they feel comfortable and enjoy using an intermediary. In poor communities where community bonds are likely to be stronger and services fewer such engagement will likely re-enforce positively or negatively collective views surrounding the comfort and enjoyably of encounters. The hypothesis that HED and SOC would co-vary was supported. A CR of 2.595 was obtained indicating support at the  $p=0.01$  level that these factors do co-vary. One of the advantages in using a bootstrapping approach to determining the parameter estimates in the model is that in addition to accommodating the mild non normality in our data it is possible, using the AMOS software, to determine the standardized direct, indirect and total effect across the model. In table 5.2 below the standardized indirect effects for the model are shown.

Table 5.2: Standardised indirect effects

	TASK	SOC	TSE	HED	ATT	PEOU	PU	BI
ATT	.000	.000	.000	.000	.000	.000	.000	.000
PEOU	.000	.000	.000	.000	.000	.000	.000	.000
PU	-.048	.004	.000	.618	.000	.000	.000	.000
BI	-.047	-.106	.001	.747	.064	.681	.000	.000

From the results we can see that HED has the largest indirect effect on BI followed by PEOU. SOC has an indirect effect that is negative whilst the indirect paths for ATT, TSE and TASK were all found to be statistically not significant. The analysis shows that the factor loading for these paths is in any case extremely low. The determination of the standardized direct and indirect effects allows the determination of the total effect of each of the latent variables on BI. In table 5.3 below we show the total standardised effect (direct + indirect) for the model.

Table 5.3: Standardised total effect

	TASK	SOC	TSE	HED	ATT	PEOU	PU	BI
ATT	0.298	0.055	-0.066	0.166	0.000	0.000	0.000	0.000
PEOU	-0.088	0.000	0.006	0.745	0.000	0.000	0.000	0.000
PU	-0.048	-0.125	0.000	0.895	0.077	0.812	0.000	0.000
BI	-0.047	0.141	0.001	0.747	0.041	0.681	0.839	0.000

Completing the analysis in this manner is important because there may be a sign difference between the direct and indirect effects of a specific latent variable reducing the total effect on BI. This is seen in the effect of the latent variable SOC on BI. SOC has a significant direct effect on BI at the  $p=0.01$  level with  $R^2 = 0.247$ . SOC also has an indirect effect on BI through PU at the  $p=0.05$  level, but in this case the value is negative.  $R = -0.106$ . The results shows that in terms of total effect on BI, the largest impact is from PU, followed by HED, PEOU and then SOC. A model that fits well and is parsimonious should ideally explain a significant portion of the variance in the primary latent factor of interest. Using AMOS we are able to calculate estimates of the squared multiple correlations for each of the endogenous variables. In table 5.4 the squared multiple correlation for the endogenous factors is shown.

Table 5.4: Squared multiple correlations

Factor	Estimate
ATT	0.134
PEOU	0.563
PU	0.991
BI	0.906

The results shows that the model is able to account for 90.6 percent of the variance observed in behavioural intent to utilise financial services through an intermediary by bottom of the pyramid respondents in South Africa.

## 5.2. Multi-group analysis

A methodology for comparing two or more groups to determine if a common model can be used to fit the data was developed by Joreskog (1971). In the first step the path coefficients are determined separately for each group. The resultant sets of coefficients represent an unconstrained model. A second analysis is performed in which the coefficients for the two groups are constrained to be equal. This represents the null model. The fit characteristics for each of the approaches are compared to determine if the unconstrained or null model fits the data better (Meyers et.al, 2005). If the fit index statistic does not reveal a significant difference between the unconstrained and the constrained-equal models then it is concluded that the model is invariant across the groups tested. A key advantage of multiple-groups analysis is that all aspects of measurement invariance and population heterogeneity can be examined such as factor loadings, intercepts, residual variances, factor variances, factor covariances and

latent means (Brown, 2006). If there is a significant difference between the unconstrained and null model, each pair of co-efficients between the two groups are analysed to determine which path differs significant between the two groups.

For the multigroup analyses, four variables of interest were identified. These were gender, age, location (rural or urban) and financial dependency. The variable were chosen as they may be significant in understanding how to develop, position, market and communicate financial services at the bottom of the pyramid. For each of the variables of interest the resultant groups were exclusive, i.e. no case could be a member of both groups. The groups were identified in the data set using ordinal variables. For each of the variables of interest the objective was to determine if they moderated the strength of the relationships in the model, or changed the relationships in the model, which would have theoretical and practical implications.

SPSS AMOS 20.0.0 software was used to conduct the multi group analysis with the variables of interest moderating the two groups. When testing for effect between groups the latent variables that the analysis found did not have a direct or indirect effect on BI, notably TASK and TSE, were eliminated. There are consequently 6 latent variables of interest and 29 observations. Using Soper's (2012) work with 6 latent variables, 29 observed variables, an anticipated effect size of 0.2 and desired statistical power level of 0.8, the minimum sample size required to detect effect at a probability level of 0.05 was 124, whilst the minimum sample size for model structure was 94. Each of the subgroups derived from the variable of interest thus had to ideally have a minimum sample size of 124. This requirement was met for all groups except location. In the sample

groups for location only 55 bottom of the pyramid respondents were from urban areas. Using Soper's (2012) software it was determined that the size effect was 0.29 and the researcher deemed this acceptable to draw meaningful conclusions. This deduction was based on Cohen (1986) classification of effect size. The value of 0.29 is between small and medium effect size and is still relatively close to 0.20, the cut-off for small effect size.

To conduct the analysis the statistically significant paths identified in chapter 5 were labelled  $F_i$  where  $F$  is the latent factor and  $i$  is the  $i^{th}$  path in the structural model that is significant. The values of  $i$  ranged from A to G, matching the statistically significant paths identified in the analysis. For each variable of interest two mutually exclusive groups were identified. The analysis compared, firstly, the parameters for each  $F_i$  between the groups to determine if the paths were the same in each groups or statistically different. Secondly the analysis determined if the factor loading between the groups for each of the paths was statistically difference from each other. The structural diagram used to conduct the multi-group analysis is shown in figure 5.1 below.

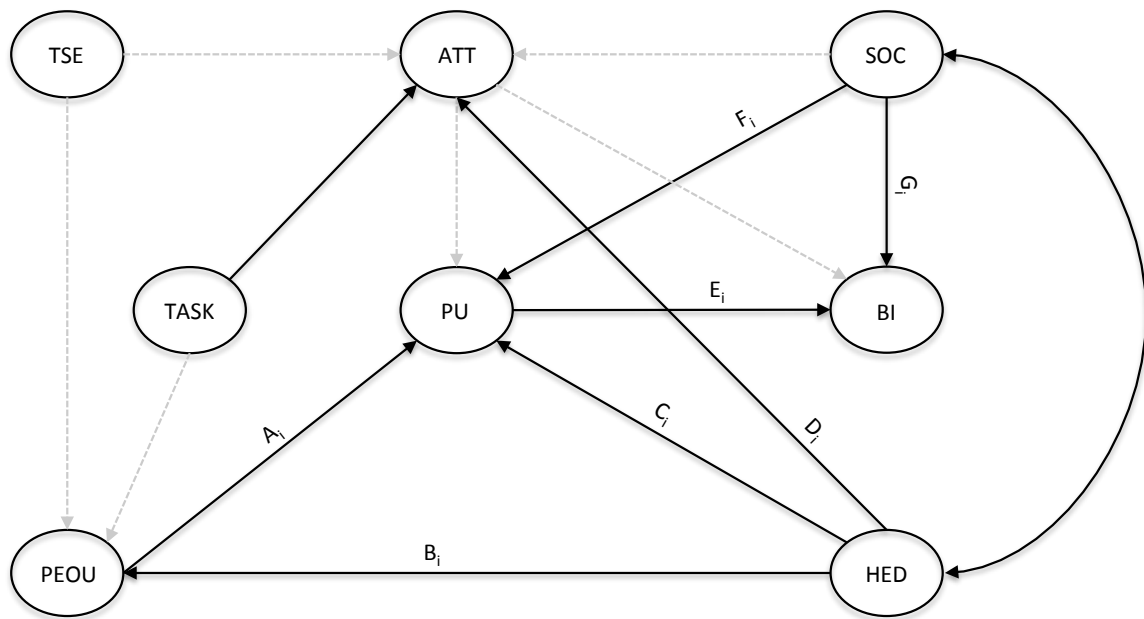


Figure 5.1: SEM for conducting multi-group comparison

### 5.2.1. Gender

For gender two groups were defined, men (n=137) and women (n=204). A total 3,000 bootstrap examples were used for the analysis. The model fit indices for the unconstrained (unrestricted loadings) model and the null (equal loadings) model is shown in table 5.5 below. The complete fit indices generated by the software are included in appendix 8.18. From the results both models fit the data well with both the unrestricted and equal loading models having RMSEA < 0.50 and TLI and CFI above 0.90.

Table 5.5: Gender multi-group analysis model fit values

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	0.807	0.784	0.933	0.924	0.932
Equal loadings	0.807	0.785	0.934	0.925	0.933
Saturated model	1.000		1.000		1.000

Independence model	0.000	0.000	0.000	0.000	0.000
Model	PRATIO		PNFI		PCFI
Unrestricted loadings	0.892		0.720		0.831
Equal loadings	0.900		0.726		0.840
Saturated model	0.000		0.000		0.000
Independence model	1.000		0.000		0.000
Model	RMSEA	LO 90	HI 90	PCLOSE	
Unrestricted loadings	0.036	0.030	0.040	1.000	
Equal loadings	0.035	0.030	0.040	1.000	
Independence model	0.129	0.125	0.132	0.000	

SPSS AMOS 20.0.0 allows the comparison of the two models to test if there is a statistically significant difference in fit between the two. The null hypothesis is that there is no difference between the two models whilst the alternative is that there is a statistical difference. In table 5.6 below the two models are compared. The output shows that the equal loadings model can be obtained by constraining the unrestricted loadings model. Under the hypothesis that the equal loadings model is correct, a test of the additional constraints of the equal loadings model can be based on the chi-square statistic 3.649, which has 7 degrees of freedom. The probability of a chi-square statistic with 7 degrees of freedom exceeding 3.649 is distinguishable with  $p = 0.819$  which is  $> p = 0.05$  at the 95 percent level. Therefore we cannot reject the null hypothesis that there is no difference between the two models. It is therefore concluded that the model is invariant under gender and applies equally to men and women.



Table 5.6: Model comparison for gender.

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Equal loadings	7	3.649	0.819	0.001	0.001	-0.001	-0.002

To test if the model is moderated by gender, the latent factor loadings for each model was compared using the unrestricted model described above. A total of 3,000 bootstrap examples were used to conduct the analysis and factor loadings were unrestricted between the two models. In appendix 8.19 the matrix of critical ratios for differences between the parameters between the male and female models is shown. This matrix has a row and column for each parameter of the model. Each off-diagonal entry in the matrix gives a statistic for testing the hypothesis that some two-model parameters are equal in the population. The value for each cell in the matrix is the value of the z-test for the difference between coefficients from the male to the female model. For a two tailed test this value should be greater than  $|1.96|$  for the difference between paths to be statistically significant at the  $p < 0.05$ . The relevant comparative cells are highlighted in the matrix. There are no path coefficient critical ratio's where the value is greater than  $|1.96|$ . It can therefore be concluded that there is no difference between the two groups on path significance and that the model is not moderated by gender.

### 5.2.2. Age

Two groups were defined, respondents younger than 35 ( $n=161$ ) and those 35 and older ( $n=180$ ). The age groupings were chosen based on the average age of the population in the sample data. The mean age of respondents was 37.17 years.

Ages below this were labelled young and ages older than the mean was labelled old. As the ages were classified into bins, the closest age bin to the mean was ages 35-44. It was decided to apply the age cut-off at 35 and thus two groups' were produced. One group had respondents aged 16-34 and the second group had respondents 35 years and older. As with gender, in the first model the latent factor loadings are allowed to be free and take on different values in each of the two models to optimise the fit. In the second model the constraint that the factor loading should be equal across the two groups is introduced. The fit of both models is shown in table 5.7. The complete fit indices generated by the software are included in appendix 8.20. From the results both models fit the data well

Table 5.7: Age multi-group analysis model fit values

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	0.817	0.794	0.942	0.934	0.941
Equal loadings	0.814	0.794	0.941	0.934	0.940
Saturated model	1.000		1.000		1.000
Independence model	0.000	0.000	0.000	0.000	0.000
Model	PRATIO		PNFI		PCFI
Unrestricted loadings	0.892		0.728		0.839
Equal loadings	0.900		0.733		0.846
Saturated model	0.000		0.000		0.000
Independence model	1.000		0.000		0.000
Model	RMSEA	LO 90		HI 90	PCLOSE
Unrestricted loadings	0.033	0.028		0.038	1.000
Equal loadings	0.033	0.028		0.038	1.000
Independence model	0.129	0.126		0.133	0.000

The null hypothesis is that there are no differences between the two models whilst the alternative is that there is a statistical difference. In table 5.8 below the two models are compared. The output shows that the equal loadings model can be obtained by constraining the unrestricted loadings model. Under the hypothesis that the equal loadings model is correct, a test of the additional constraints of the equal loadings model can be based on the chi-square statistic 12.553, which has 7 degrees of freedom. The probability of a chi-square statistic with 7 degrees of freedom exceeding 12.553 is distinguishable with  $p = 0.084$  which is  $> p = 0.05$  at the 95 percent level. Therefore we cannot reject the null hypothesis that there is no difference between the two models. It is therefore concluded that the model is invariant for the variable age.

Table 5.8: Model comparison for age

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Equal loadings	7	12.553	0.084	0.002	0.003	0.001	0.001

To test if the model is moderated by age, the latent factor loadings for each model was compared using the unrestricted model described above. A total of 3,000 bootstrap examples were used to conduct the analysis and factor loading were unrestricted between the two models. In appendix 8.21 is the matrix of critical ratios for differences between the parameters between the under 35 and 35 years and older models is shown. There were no path coefficient critical ratio's where the value was greater than  $|1.96|$ . We can therefore conclude that there is no difference between the two groups on path significance and that the model is not mediated by age.

### 5.2.3. Location

Two groups were defined, urban (n=55) and rural (n=286) dwellers. The fit of both models is shown in table 5.9. The complete fit indices generated by the software are included in appendix 8.22. From the results both models fit the data well.

Table 5.9: Location multi-group analysis model fit values

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	0.793	0.768	0.909	0.897	0.908
Equal loadings	0.789	0.766	0.906	0.893	0.904
Saturated model	1.000		1.000		1.000
Independence model	0.000	0.000	0.000	0.000	0.000
Model	PRATIO		PNFI		PCFI
Unrestricted loadings	0.892		0.707		0.809
Equal loadings	0.900		0.710		0.814
Saturated model	0.000		0.000		0.000
Independence model	1.000		0.000		0.000
Model	RMSEA	LO 90	HI 90	PCLOSE	
Unrestricted loadings	0.043	0.038	0.047	0.997	
Equal loadings	0.043	0.039	0.048	0.994	
Independence model	0.133	0.130	0.136	0.000	

In the table 5.10 below the two models are compared. Under the hypothesis that the equal loadings model is correct, a test of the additional constraints of the equal loadings model can be based on the chi-square statistic 25.047, which has 7 degrees of freedom. The probability of a chi-square statistic with 7 degrees of freedom exceeding 25.047 is distinguishable with  $p = 0.001$  which is  $< p = 0.05$  at

the 95 percent level. Therefore we can reject the null hypothesis that there is no difference between the two models. NFI increases by 0.04 and IFI increases by .004 while RFI and TLI increases by .003. It is therefore concluded that the model is not invariant for location. There is a difference between rural and urban dwellers in the latent factors that impact how they adopt financial services through an intermediary.

Table 5.10: Model comparison for location

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Equal loadings	7	25.047	0.001	0.004	0.005	0.003	0.003

For completeness the matrix of critical ratios for differences between the urban and rural dwellers is shown in appendix 8.23. In table 5.11 below the standardised values for the path coefficients and critical ratio for each of the two models is shown. There are several paths highlighted in the table that appear significant for one group but not the other.

Table 5.11: Loading factors for urban and rural respondents

			Urban		Rural	
Path			C.R.	R	C.R.	R
PEOU	<-- -	TASKm	-0.081	-0.013	-1.445	-0.076
PEOU	<-- -	HED	1.233	0.225	7.593	0.820
PEOU	<-- -	TSEm	0.647	0.104	-0.261	-0.014
ATT	<--	TASKm	0.147	0.019	4.771	0.312

	-					
ATT	<-- -	SOC	1.599	0.264	0.655	0.054
ATT	<-- -	TSEm	-1.032	-0.144	-0.956	-0.062
ATT	<-- -	HED	2.388	0.368	1.682	0.143
PU	<-- -	PEOU	0.754	0.823	6.156	0.832
PU	<-- -	SOC	0.512	0.139	-2.212	-0.143
PU	<-- -	ATT	0.048	0.009	1.540	0.072
PU	<-- -	HED	0.709	0.225	2.020	0.247
BI	<-- -	PU	0.766	0.924	10.040	0.842
BI	<-- -	SOC	0.075	0.015	3.669	0.240
BI	<-- -	ATT	1.705	0.335	-0.852	-0.046

To test if the model is also moderated by location, the latent factor loadings for each model was compared using the unrestricted model described above. A total of 3,000 bootstrap examples were used to conduct the analysis and factor loading were unrestricted between the two models. Appendix 5.6 shows the matrix of critical ratios for differences between the parameters between the two models. The value for each cell in the matrix is the value of the z-test for the difference between coefficients for the urban and rural dwellers. For a two tailed test this value should be greater than  $|1.96|$  for the difference between paths to be

statistically significant at the  $p < 0.05$ . The relevant comparative cells are highlighted in the matrix.

Three paths are identified as significant. The path  $B_i$  ( $PEOU \leftarrow HED$ ) has a critical ratio of -4.918. This indicates that there is a significant difference between the two groups at the  $p=0.01$  level. Rural respondents determined PEOU significantly by how comfortable and enjoyable the actual experience was. Urban dwellers do not correlate comfort and enjoyment with ease of use, but from the data appear to equate it directly with perceived usefulness. For urban dwellers the fact that an experience is comfortable and enjoyable makes it useful. For rural dwellers these factors make it easy to use, but not necessarily useful to them. The second path identified as significantly different between the two groups is  $F_i$ . The path  $F_i$  ( $PU \leftarrow SOC$ ) has a critical ratio of 2.066 indicating that there is a significant difference at the  $p=0.05$  level. For rural dwellers, social factors have a significant effect on PU, whilst for urban dwellers social factors have no impact on PU. The results seem to indicate that in rural areas social factors has a strong effect on respondent's perceptions of usefulness. This may reflect the current strength that traditional values and tribal and traditional societal structures continues to hold in rural areas. Once people migrate to urban areas these previous structures may no longer be present or accessible. As a result urban dwellers have less engagement with social structures in their daily lives with a likely diminished importance in their lives and decision-making.

The final path that was found to be significantly different between the two groups is  $A_i$ . The path  $A_i$  ( $PU \leftarrow PEOU$ ) has a critical ratio of -2.312. This indicates that there is a significant difference between the two groups at the

$p=0.05$  level. For rural dweller if they perceive that something is easy to use it will likely cause them to perceive that it is also useful. This association is not seen in urban dwellers. Urban dwellers appear to base the perception of utility more on factors related to enjoyment and comfort. This may indicate that urban dwellers have more choice and consequently expect that a service providers will have products and services that are easy to use, simple to understand and trustworthy. It may be that rural dwellers do not have choices and consequently aspects such as products that are easy to understand, simple to use, trustworthy and quicker than alternatives rendering it useful. From the above analysis it is found that the model is not invariant as a function of location and that urban respondents and rural respondents do differ in terms of which latent factors are significant in determining behavioural intent. Such a difference may have implication for service providers offering services in rural and urban areas.

#### **5.2.4. Financial dependency**

Two groups were defined; those defined as financially independent ( $n=159$ ) and those who are financially dependent ( $n=118$ ). Financial independence was defined as respondents whose primary source of income is not dependent on a government grant or money obtained from a parent, family member or friend. Within this grouping are respondents who's primary source of income is thus formal employment, money obtained from selling things to neighbours, money from rent, money from farming, money from piece job and money from a formal (i.e. not state provided) pension. Two models have been defined to compare the moderating effect of financial independence on the strength of the regression path between the latent variables. Table 5.12 shows the results of the model



fits. The complete fit indices generated by the software are included in appendix 8.24.

Table 5.12: Financial dependency multi-group analysis model fit values

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	0.765	0.736	0.907	0.893	0.905
Equal loadings	0.764	0.738	0.907	0.895	0.905
Saturated model	1.000		1.000		1.000
Independence model	0.000	0.000	0.000	0.000	0.000
Model	PRATIO		PNFI		PCFI
Unrestricted loadings	0.892		0.682		0.807
Equal loadings	0.900		0.688		0.815
Saturated model	0.000		0.000		0.000
Independence model	1.000		0.000		0.000
Model	RMSEA	LO 90	HI 90	PCLOSE	
Unrestricted loadings	0.043	0.037	0.048	0.991	
Equal loadings	0.042	0.037	0.047	0.994	
Independence model	0.131	0.127	0.134	0.000	

The null hypothesis is that there is no difference between the two models whilst the alternative is that there is a statistical difference. In table 5.13 the two models are compared. The probability of a chi-square statistic with 7 degrees of freedom exceeding 4.405 is distinguishable with  $p=0.732$  which is  $> p = 0.05$  at the 95 percent level. Therefore we cannot reject the null hypothesis that there is no difference between the two models. NFI and IFI increase by .001 while RFI decreases by 0.001 TLI decreases by .002. It is therefore concluded that the model is invariant under financial independence.

Table 5.13: Model comparison for financial dependency

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Equal loadings	7	4.405	0.732	0.001	0.001	-0.001	-0.002

To test if the model is moderated by financial independence, the latent factor loadings for each model was compared using the unrestricted model described above. A total of 3,000 bootstrap examples were used to conduct the analysis and factor loading were unrestricted between the two models. The matrix of critical ratios for differences between the parameters between the models is included in appendix 8.25. There are no path coefficient critical ratio's where the value is greater than  $|1.96|$ . It can therefore be concluded that there is no difference between the two groups on path significance and that the model is not moderated by financial dependence.

### 5.3. Conclusion

From the results we have determined that two of the three latent factors proposed to directly affect BI section 2.6 have been found to hold. Social factors and perceived usefulness were found to directly influence the behavioural intent of bottom of the pyramid respondents to adopt financial services through an intermediary. Social factors, perceived ease of use and hedonistic factors indirectly affected behavioural intention. Contrary to other studies using TAM to predict adoption of technology, attitude was not found to directly or indirectly affect behavioural intent. Combining indirect and direct effects it was found that perceived usefulness was the most significant factor that influenced BI, followed

by hedonistic factors, perceived ease of use and social factors. In total the model successfully explained 90.6 percent of the variance observed in behavioural intention of unbanked bottom of the pyramid respondents to make use of financial services offered through an intermediary.

The results raise a number of implications for the provision of financial services through an intermediary at the bottom of the pyramid. The work confirms previous studies using the TAM that shows perceived usefulness plays a significant role in determining adoption intention. The work extends this finding to adoption of technology enabled financial services at the bottom of the pyramid. The role that hedonistic factors play in determining adoption intention is a contribution to the body of research. This construct highlights the importance that bottom of the pyramid place on feeling comfortable to make use of a service and that using a service should be enjoyable. It raises important implications for how financial services are presented at the bottom of the pyramid. It further highlights the importance for service providers to understand what makes potential customers at the bottom of the pyramid comfortable in using a service. The findings confirm that perceived ease of use plays a significant role in determining behavioural intention as proposed by the TAM. The work extends this finding to adoption of technology enabled financial services at the bottom of the pyramid.

The role that social factors play in determining adoption intention is a new contribution to the field. The results highlight that the role of friends, family, community elders and social role models play is significant in determining adoption intention. The findings have important implications for how financial

service products are marketed at the bottom of the pyramid. The role that community elders and role models play also has implications for the launch of products. The finding that attitude does not play either a direct, or indirect, role in determining adoption intention is also significant. It raises an important factor when research into the types of products and services required at the bottom of the pyramid is conducted. The finding that a person may have a positive attitude toward a product does not translate into actual adoption of the product. Marketing surveys of financial services at the bottom of the pyramid should take this finding into account, as a positive attitude toward a financial services product may not translate into actual usage.

The multi-group analysis that was conducted showed that the model was invariance under gender, age and financial dependency. These variables also did not act as a mediator of relationships in the model. It was found, however, that the model was not invariant under location, i.e. if respondents were from a rural or urban area. Rural and urban dwellers had different latent factors determining behavioural intent. Location also mediated the strength of the relationships in the model. For rural respondents they determined ease of use significantly by how comfortable and enjoyable the actual experience was. Urban dwellers do not correlate comfort and enjoyment with ease of use, but from the data appear to equate it directly with perceived usefulness.

For urban dwellers the fact that an experience is comfortable and enjoyable makes it useful. For rural dwellers these factors make it easy to use, but not necessarily useful to them. For rural dwellers, social factors have a significant (negative) effect on usefulness, whilst for urban dwellers social factors have no

impact on usefulness. For rural dweller if they perceive that something is easy to use it will likely cause them to perceive that it is also useful. This association is not seen in urban dwellers, and may reflect reduced or absence of choices for rural dwellers as compared to urban dwellers. For urban dwellers there seems to be a clear separation between the ease of use of something and the utility thereof. The fact that the service may be easy to understand, use, quick compared to competitors and trustworthy still, for urban dwellers, does not render the service useful – the primary indicator of behavioural intent. An illustrative example may be cell phone banking. Cell phone banking is a channel for banking services. In urban areas people may have multiple channel choices for banking – cell phone, Internet, branch banking, etc. Whilst cell phone banking may be easy to use, because urban dwellers have alternatives they may not consider the service useful. Rural dwellers may have no alternative to cell phone banking and consequently an easy way to access banking may render the service useful. Urban dwellers appear to base the perception of utility more on factors related to enjoyment and comfort.

## CHAPTER 6

### **An architecture for expanding financial inclusion**

In this chapter the results obtained in the study are used to propose a strategic approach to expanding financial inclusion at the bottom of the pyramid in South Africa through the use of intermediaries. The approach consists of two pillars; the first described in section 6.1 positions the role that intermediaries should play. Four principles are proposed relating to intermediaries that if implemented would enable them to play a meaningful role in expanding financial inclusion. The second pillar, discussed in section 6.2, proposes the role that technology should play. Three principles are proposed which would enable technology to support intermediaries in the expansion of financial inclusion at the bottom of the pyramid in South Africa.

#### **6.1. The proposed role of supermarkets and the post office**

Using intermediaries rather than building their own branch network has the potential to reduce the cost of serving the bottom of the pyramid for banks. The approach of using intermediaries has been shown to lower the cost of delivery of financial services to the poor, including costs both to banks of building and maintaining a delivery channel and to customers of accessing services (Ivatury and Mas, 2008). The use of intermediaries thus holds promise as a strategic approach to expanding financial inclusion. Within the South African context the thesis has found that both supermarkets and the post office are potentially viable intermediaries for unbanked bottom of the pyramid people. The development of

financial intermediaries has previously been found to reduce income inequality in a country by disproportionately boosting the income of the poor (Beck et.al, 2004). Four principles are proposed for the use of intermediaries in South Africa for the expansion of financial inclusion.

The first principle tabled is that *supermarkets and the post office should be enrolled by banks as intermediaries for the provision of financial services to unbanked people at the bottom of the pyramid*. In South Africa retail agents are permitted only for licensed financial institutions. Non-banks are thus prohibited from accepting public deposits. In South Africa using intermediaries would thus need to be a bank led model and supermarkets and the post office would have to enter into partnerships with registered banks. A regulatory framework may be needed to ensure that banks do enrol supermarkets and the post office as intermediaries. It is recommended that the South African government compel banks to enter into such partnerships with supermarkets and the post office. This approach of regulatory intervention has worked well in Brazil where it has become one of the most promising strategies for offering financial services. In Brazil, where organisations have had the greatest success with a similar strategy about 1,600 municipalities are exclusively served by intermediaries. Over the last decade, Brazil has pioneered a model of banking, known as correspondent banking, involving distribution partnership between banks, several kinds of retailers and a variety of other participants, which have allowed an unprecedented growth in bank outreach (Jayo et.al, 2011). Signing up supermarkets or the post office would be a low investment, low-risk way to test the waters in new geographic markets. It will allow banks to acquire a customer

base and transaction volume that, with time, may warrant the opening of a bank branch.

This research work has identified that both supermarkets and the post office have greater accessibility than traditional banks in bottom of the pyramid communities. Measured presence of the post office was 56 percent of the communities in which the research was conducted whilst supermarkets were present in 57.5 percent of communities. These figures were higher than traditional banks, which was present in only 33.7 percent of communities. In addition to being more accessible, the cost of access for bottom of the pyramid people may be lower for supermarkets and the post office. The post office was within walking distance of their homes for 53.9 percent of respondents and supermarkets were within walking distance for 63.3 percent of respondents. For traditional banks only 24.3 percent of respondents indicated a branch was within walking distance. The alternative to walking is the use of transport that has a cost implication for bottom of the pyramid people. By enrolling supermarkets and the post office the costs of accessing a financial service provider for the bottom of the pyramid would be lower as both types of outlet are more prevalent within communities and cheaper to access than banks.

The use of the post office and supermarkets as intermediaries for the provision of financial services is also bolstered by the findings in the thesis that bottom of the pyramid people were more likely to use financial services offered through these two types of outlets rather than traditional bank. This adoption propensity was measured across cost, trust, how well people were treated and the language spoken. The study found that unbanked bottom of the pyramid people perceived



that the post office was cheaper to use than traditional banks and that supermarkets were cheaper still. As bottom of the pyramid respondents are significantly poor, surviving on R14.94 per day for LSM 1 to R25.48 per day for LSM 4, perceptions of costs are significant for adoption. The study found that respondents felt that the post office was more likely than banks to speak their language and supermarkets were more likely than the post office to speak the same language as bottom of the pyramid people.

Language may be a significant barrier to adoption at the bottom of the pyramid with Zulu (25.8 percent) and Xhosa (22.7 percent) the most spoken languages. These two languages cover nearly half the bottom of the pyramid respondents whilst English was only 0.3 percent respondent's home language. The thesis found that hedonistic factors, such as how comfortable people were when using a service, were a significant determinant of behavioural intention. For bottom of the pyramid people any service must be provided in such a manner that bottom of the pyramid users are comfortable in using it. The results showed that bottom of the pyramid people felt that the post office treated them better than traditional banks and supermarkets treated them better than the post office.

With hedonistic factors directly influencing behavioural intention it is likely that unbanked bottom of the pyramid people would use the post office and supermarkets more readily than traditional banks for financial services. On the aspect of trustworthiness with their money, the results showed that supermarkets were more trustworthy for unbanked bottom of the pyramid people than either banks or the post office. Respondents rated the post office and bank the same in respect of trustworthiness. In enrolling the post office and

supermarkets as intermediaries, it is further proposed that they should be allowed to offer services for multiple banks. A multibank approach would drive competition between banks and would increase overall transaction flow through intermediaries. This may, again, require regulatory intervention to ensure that intermediaries are not compelled to exclusively offer financial services in partnership with a single bank. Such a situation would reduce choice for bottom of the pyramid customers and would potentially drive prices of services up.

The second principle tabled is that *supermarkets and the post office should be marketed in a socially acceptable manner and have a further responsibility of promoting financial literacy*. Education levels at the bottom of the pyramid were found to be very low. A mere 2.6 percent of people have completed high school whilst 29.8 percent of people had no schooling. Low education levels were also found to be associated with being unbanked at the bottom of the pyramid. In order to expand financial inclusion it will be important to understand the implications of low education levels on potential adoption. Unless basic financial literacy education is provided it is unlikely that people with low education will adopt financial services.

It will thus be important for intermediaries to actively support financial literacy programs and to ensure that the marketing of financial services through the intermediary is underpinned by a financial literacy approach. The extended TAM model identified that social factors directly affected behavioural intention. In choosing the type of supermarket intermediary preference must be given to those establishments of high social standing and those supermarkets of low social standing should be avoided. An example of a supermarket of low social standing

may well be a liquor outlet, whilst supermarkets that actively engage in community improvement programs may be an example of a socially acceptable outlet. Once again regulatory intervention could prove helpful by prohibiting certain types of supermarket outlets from offering financial services. Because social factors determines behavioural intention, in rural areas traditional leadership structures should be enlisted as advocates. Popular personalities in the community should also be enlisted to talk about financial inclusion and used to promote products.

The third principle tabled is that *a revised pricing model based on a transaction charge should be implemented for intermediaries*. In order to serve the bottom of the pyramid profitably, it would not be enough for banks to move transactions to a lower-cost channel. Traditional bank pricing models are not well suited to the poor as they typically rely on interest margin. This model is unattractive to the bank for small-balance savers, no matter how cheap the transactions become. For the customers typical account maintenance fees are unattractive, as they may not want to commit to a fixed cost. Poor people may not have a lot of money to save, but they may have plenty of transactions to undertake. These transactions may include frequent small deposits building up to a savings objective, microloan instalments, funeral plan premiums, bills to pay and remittances among family and friends who support each other. Banks should adopt a per-transaction pricing model for serving the bottom of the pyramid.

The mobile telephony industry managed a similar transition in business model, from post pay to prepay, introducing billing by the second and from monthly subscriptions to per-event charging, which allowed the industry to dramatically

expand its distribution options and ultimately grow the size of its addressable market. By adopting this approach the typical monthly fee approach can be eliminated, making accounts more appealing to potential bottom of the pyramid customers. In order to incentivise the intermediary banks should adopt a per transaction commission for the intermediary. It is proposed that intermediaries be paid an income for every transaction that they process. This should be a percentage of the transaction value up to a maximum amount. The introduction of a maximum cap would dis-incentivise the post office and supermarket from inducing customers to withdraw large sums of money in a single transaction from their account and encourage them to maximize the number of transactions through better service to customers. A compensation system based on this approach would further directly reward or punish individual outlets as poor service to customer will see then transact through another outlet directly affecting the income of the outlet giving poor service.

The fourth principle tabled is that *intermediaries should be positioned as a payment and services hub at the bottom of the pyramid*. Intermediaries would need to take a systemic view and attract all parties who wish to transact with their customers. Being able to make payments to remote parties is particularly valuable to users, but this by itself may not generate a significant volume of transactions. Significant transaction volumes will develop only when people use electronic payments for their daily life, in the communities where they live, to pay for day labourers, buy goods at the store, pay local fees, transfer money between family members and so forth. Transaction costs will need to come down significantly if people are to use electronic payments within their communities and to manage their own daily financial lives. The system should work for

transactions of as little as \$4 or R30, the daily income for many, on agent commissions of not more than 2 percent. That means that customers' transaction fees should be in the range of R0.20-0.30. Positioning the intermediary, as a hub for payment services would attract more transactions, reducing the overhead cost per transaction.

One method of enabling this would be to couple financial inclusion with the existing social welfare program. The South African social welfare program has more than 12 million beneficiaries. Beneficiaries should receive their payment directly into a bank account and not as a cash payment. A similar approach has been proposed in India where the National Rural Employment Guarantee Program (NREGP) provides a regular and steady stream of income to the poor, although for a limited period of time in a year. Paying grants awarded under the scheme into a no-frills account and enabling the account to be used through an intermediary produces a reliable stream of income into the account (Natu et.al, 2008). Another approach in this direction would be for government to use intermediaries as the vehicle through which e-government is rolled out. E-government means different things to different researchers. Some researchers define e-government in terms of specific actions such as using a government kiosk to receive job information or applying for social security benefits through a web site. Other researchers define e-government more generally as automating the delivery of government services (Seifert, 2003).

In e-government, the state uses information technology and the Internet to support government delivery, engage citizens and provide services. The interaction may be in the form of obtaining information, conducting transactions

and other activities via the Internet (Sharma, 2005). While definitions of e-government by various sources may vary widely, there is a common theme. E-government involves using information technology, especially the Internet, to improve the delivery of government services to citizens and businesses (Sharma, 2005). The types of services that are provided through e-government include access to government information; the completion and submission of applications and obtaining required documents such as land titles, license renewals, identity documents and business permits. There is thus an overlap in technology requirements for the provision of financial services and the provision of e-government. Many of the beneficiaries of a rollout of e-government services would be bottom of the pyramid inhabitants. It would thus make sense to have a single access point for bottom of the pyramid citizens to obtain both social welfare grant payments and accessing government services.

## **6.2. A technology approach for expanding financial inclusion**

The research work has found that technology is a viable channel for the provision of financial services at the bottom of the pyramid. Technology offers the opportunity to expand financial inclusion into areas that are remote or not financially viable to establish a branch infrastructure for banks. The largest proportion of bottom of the pyramid people live in rural areas, where physical access to a financial services provider is a challenge. The results found that 83.9 percent of unbanked people at the bottom of the pyramid were rural dwellers. The thesis also found that people younger than 25 were significantly associated with being unbanked at the bottom of the pyramid. The greatest portion of the unbanked are younger than 25. This age group may more easily adopt technology enabled financial services.

The result provides support to this assertion with this age group having higher cell phone accessibility, lower need for people support in using technology and higher rates of Internet access. For this age group, 88.8 percent of respondents have access to cell phones. Some 10.7 percent have access to a computer and 11.2 percent have access to the Internet - including cell phones. Furthermore 44.4 percent prefer to be served by people rather than a machine compared to 63.7 percent of people older than 25 who prefer to be served by people. 46.2 percent would use an ATM or Internet banking if someone was there to help them compared to 63.9 percent of people older than 25 who would use an ATM or the Internet if someone was there to help them. The use of technology to expand financial inclusion may thus be an important tool in addressing the age group where financial inclusion is the greatest.

Consequently a fifth principle tabled is that *intermediaries should adopt a multichannel approach to providing financial services* at the bottom of the pyramid. This multichannel approach must include mobile banking, POS network, Internet banking and ATMs. People at the bottom of the pyramid suffer from high levels of formal unemployment. People may thus travel to find work and a multichannel approach must be followed to allow them to access their funds wherever they are. Workers may further be migrant or seasonal, working away from home and needing to remit money to family back home. Access to an ATM network allows account holders access or deposit cash whenever they are near an ATM. One of the most significant costs associated with withdrawing cash at an ATM is interchange fee. The interchange fee is a higher fee charged to the user when they access an ATM not owned by their bank. Intermediaries must

have access to a dedicated ATM network that offers basic cash in cash out services to eliminate the interchange fee. An alternative policy approach would be for government to compel banks to eliminate or reduce the interchange fee.

Supermarkets and the post office should participate in the POS network. This will allow new concepts such as the electronic wallet to become viable. An electronic wallet would allow the holder to use cash held in a card at retailers and a range of providers without the need to carry cash. This would reduce the risk for poor people who would not need to carry relatively large sums of cash around. Kiosk based Internet banking is another channel through which supermarkets and the post office should offer services. This could be a mechanism for encouraging self-service. The Internet could be used to teach people through on demand videos how banking works and the various products and services. Online applications could be made without the need to tie up staff in explaining such matters. Mobile banking, however, presents the greatest opportunity. 82.3 percent of bottom of the pyramid people had access to a mobile phone. This compares to 0.1 percent who had access to a computer in their homes. About 2.6 billion people in the world do not have access to formal financial services and yet one billion of them have a mobile phone (Dermish et.al, 2011).

The Sixth principle proposed is that the *design of technology enabled products and services must take the situation at the bottom of the pyramid into account*. With high levels of formal unemployment, bottom of the pyramid people may have work irregularly, or of a seasonal nature. Accounts provided for this segment of the market will have to deal with irregular cash flow and periods of



dormancy without being closed by the holding bank. It is proposed that current banking practice to close dormant accounts after 6 months should be revised and the policy changed to 12 or even 18 months. It has previously highlighted that language was associated with being unbanked at the bottom of the pyramid and that English is used as a home language by an insignificant portion of the bottom of the pyramid. Products will thus have to be developed in the languages spoken at the bottom of the pyramid, most notably isiZulu and isiXhosa. This requirement must be enforced, possibly through regulatory intervention, across all channels such as ATM, mobile banking and the Internet.

Because the bottom of the pyramid people also suffer from low education levels, product design must be simple and intuitive. The products offered to the bottom of the pyramid must their most basic needs so as to prevent them being overwhelmed with features they do not understand or need. An example of such an approach could be mobile banking initial focus should be on the most common transaction types possibly needed by the bottom of the pyramid. These transaction types may relate to an SMS advice of a payment into an account or a single button feature on a phone that sends an SMS in response to an account balance query. The products and services should also be designed so that they can operate on simple devices such as low cost or previous generation cell phones.

The seventh principle tabled is that *intermediaries should be positioned as a bridge in getting people to make use of technology for financial services*. In order to get bottom of the pyramid people to use technology for financial services, many will need to overcome anxiety of use and have support readily available. There is thus an interim step that a physical outlet staffed with people can play. Such an

interim step will allow bottom of the pyramid people to adopt technology in the presence of a person before developing the confidence over time to use the technology unaided. The thesis found that some 59 percent of respondents agreed or strongly agreed with the statement "you preferred to be served by a person rather than a machine". It was also found that 59.6 percent of respondents would make use of the Internet or an ATM if someone was there to help them. Positioning an ATM or Internet kiosk within an intermediary outlet, people could readily turn to staff for assistance. Over time people could progressively migrate to self-service and be able to use ATM, POS devices and self-service kiosks in remote areas where there was no support.

### **6.3. Conclusion**

The role that intermediaries can play in the expansion of financial inclusion in South Africa is significant. The use of intermediaries, coupled with the use of technology has the potential to significantly reduce the cost per transaction at the bottom of the pyramid. This reduction in costs should make financial services more affordable to bottom of the pyramid people. A per transaction fee commission model is proposed that will not only enable banks to reduce their cost of providing service, but also provide an income stream for intermediaries. In respect of the financial viability of such a model, the Panel of the Banking Enquiry, established in 2006 by the Competition Commission of South Africa to enquire into aspects of competition in retail banking provides some insight. The report published by the commission (Competition Commission, 2008) shows the impact on bank profitability in moving away from the existing ad valorem pricing structure to a cost per transaction structure would not negatively affect banking profitability.

A key component of the successful deployment of such an approach is to significantly increase the volume of transaction that goes through an intermediary. To this extent it is envisioned that the best opportunity is to expand the services that an intermediary offers such that they become a payment hub for clients. By expanding the service and positioning it as a single payment window to the bottom of the pyramid the costs would be amortised over a greater volume of transactions. In order that intermediaries are able to operate across different regions, environments and clients it is essential that intermediaries adopt a multichannel approach. This will enable them to deploy the most appropriate technology for their client needs and provide client choice. Taking this approach further, by aggregating demand and sharing the costs across numerous intermediaries and different service providers the intermediaries would be able to offer their client's access to ATM's as well as Internet and mobile capability.

## CHAPTER 7

### Conclusions

Advances in technology have allowed the delivery of financial services outside of the traditional branch infrastructure that banks have historically used. These advances have not only enabled more convenient banking in general, but allowed banks to address the challenge of serving the poor in a cost effective manner. Expanding financial inclusion for the poor or the bottom of the pyramid is both a social and national imperative. The growth of mobile phone and communication technology allows for the expansion of financial inclusion to the bottom of the pyramid where it may have been prohibitively expensive in the past. These developments have allowed for the emergence of a model that may successfully expand financial inclusion. The emergence of an intermediary, that uses the advance in technology to offer financial services, has led to meaningful expansion of financial services in countries like Brazil. This approach has potential in South Africa where supermarkets and the post office can play the role of intermediary.

Whilst the combination of technology and intermediary has potential to expand financial inclusion, research to date shows that the model has not realised its full potential. Very little, if any, work on this subject has been undertaken on the bottom of the pyramid in South Africa. It was determined that the bottom of the pyramid in South Africa had high levels of formal unemployment, low levels of education and were heavily dependent on government grants as a primary source of income. Very few respondents had completed formal schooling. The bottom of

the pyramid respondents was also overwhelmingly rural dwellers and the use of English as a home language was insignificant. The research found that age, primary source of income, home language, the number of dependents and education levels were associated with being unbanked at the bottom of the pyramid. An evaluation of two intermediaries, supermarkets and the post office showed that these were viable intermediaries for the delivery of financial services to unbanked people at the bottom of the pyramid. The expansion of financial inclusion is one way in which poverty can be alleviated.

Understanding the role of technology adoption is key to realising this potential and the most successful technology adoption theory, the TAM, provides a basis for undertaking such a study. The original TAM was developed to explain the adoption of technology in a workplace environment and has become the most widely used technology adoption model. As the usage of the TAM expanded into different work settings and outside of mandated use, extensions to the model were developed to deal with its original shortcomings. The introduction of TAM2 saw the incorporation of social related constructs and constructs related to executing a task. Further expansion of the TAM through the introduction of the UTAUT model and TAM3 expanded these factors further and also introduced the concept of moderators such as gender, age and educational levels. In considering the application of TAM to financial services a review of the literature has indicated that researchers have added additional constructs to enable the TAM to better predict adoption. A review of the literature, along with the use of grounded theory, identified new constructs in addition to that included in the original TAM that may explain adoption at the bottom of the pyramid. The additional constructs allows for the development of an extended TAM model, to

explain adoption of financial services through an intermediary at the bottom of the pyramid.

The proposed extended TAM model to explain adoption of financial services through an intermediary at the bottom of the pyramid in South Africa was validated using structural equation modelling. The extended TAM model successfully explained over 90 percent of the variance in adoption intention in the sample data. The extended TAM model introduced two significant new constructs, social factors and hedonistic factors, to explain adoption intention. The role that social factors play in determining adoption intention is a new contribution to the field. The results highlight that the role of friends, family, community elders and social role models play is significant in determining adoption intention.

The findings have important implications for how financial service products are marketed at the bottom of the pyramid. The role that community elders and role models play also has implications for the launch of products. The finding that attitude does not play either a direct, or indirect, role in determining adoption intention is also significant. It raises an important factor when research into the types of products and services required at the bottom of the pyramid is conducted. The finding that a person may have a positive attitude toward a product does not translate into actual adoption of the product. Marketing surveys of financial services at the bottom of the pyramid should take this finding into account, as a positive attitude toward a financial services product may not translate into actual usage.

The role that hedonistic factors play in determining adoption intention is a contribution to the body of research. This construct highlights the importance that bottom of the pyramid place on feeling comfortable to make use of a service and that using a service should be enjoyable. It raises important implications for how financial services are presented at the bottom of the pyramid. A multi-group analysis that was conducted showed that the model was invariance under gender, age and financial dependency. These variables also did not act as a mediator of relationships in the model. It was found, however, that the model was not invariant under location, i.e. if respondents were from a rural or urban area. Rural and urban dwellers had different latent factors determining behavioural intent. Location also mediated the strength of the relationships in the model. For rural respondents they determined ease of use significantly by how comfortable and enjoyable the actual experience was. Urban dwellers do not correlate comfort and enjoyment with ease of use, but from the data appear to equate it directly with perceived usefulness.

The validation of the extended TAM model presents an opportunity to expand financial inclusion in South Africa. Banks should partner with supermarkets and the post office to offer a new business model to expand financial inclusion. This model should be based on a per transaction charge for customers and a per transaction commission for the intermediary. Intermediaries should further seek to ensure the commercial viability of offering the service by seeking to become a single payment window into the bottom of the pyramid customer. By expanding the range of complimentary services they can offer, transaction volumes would increase further reducing the unit cost of service provision. In order for intermediaries to remain viable and relevant they should adopt a multichannel

approach to service provision. By offering services through a range of channels such as ATM, Internet, mobile phones and self-service terminals they would be able to offer services tailored to customer needs and commercial demands. Such an approach would ensure that intermediaries remain relevant and mitigate the risk of being left behind as technology advanced.

### **7.1. Specific contribution of the work**

The first contribution of the work was the identification of factors associated with being unbanked at the bottom of the pyramid in South Africa. The study found that being unbanked at the bottom of the pyramid was associated with age, education levels, language, primary source of income and number of dependents. Education was the most significant factor associated with being unbanked. The identification of factors associated with being unbanked allows the development of interventions targeting those specific factors as a way to improve financial inclusion.

The second contribution is that it has been shown that intermediaries such as the post office and supermarkets are viable intermediaries for the delivery of financial services to the bottom of the pyramid. Supermarkets were found to be more acceptable for delivery of financial services than the post office. The post office was found to be more acceptable than traditional banks. The finding indicates that using supermarkets and the post office to offer financial services in partnership with a bank maybe a significant method to improve financial inclusion at the bottom of the pyramid. For supermarkets the finding offers an approach to expand the range of services they offer customers and improve



returns. For the post office the finding provides one method for them to potential deal with decking revenue and a result of declining mail volumes.

The third contribution of the work is that an extended TAM model to explain adoption intention for technology enabled financial services at the bottom of the pyramid in South Africa has been validated. The model was able to account for over 90 percent of the behavioural intention of unbanked bottom of the pyramid people to use technology enabled financial services offered through an intermediary. The finding extends the utility of the TAM into a new field. The fourth specific contribution is the identification of two additional constructs, social and hedonistic that directly and indirectly influence adoption intention. The work extends the TAM model proposed by Davis (1989) through the addition of two constructs, social and hedonistic. Social constructs bring the role that others play in a person adoption intention. It highlights the important role that the opinion and influence of others can play in adoption decisions. The role of hedonistic highlights the importance of being comfortable and confident when using technology-enabled services. This finding compliments previous inclusions in the TAM that relate to self-confidence. The finding highlights that being comfortable in using a technology can have a direct and indirect effect on behavioural intention.

## **7.2. Research limitations**

The first limitation is that the extended model of TAM and the original TAM model, measures behavioural intention and not actual usage. It is assumed in both the extended model of TAM and the original model that behavioural intention translates into actual usage. There has previous criticism of the TAM

because there has been no consistent testing of the relationship between behavioural intention and actual usage (Taylor and Todd, 1995). There is no certainty that behavioural intention will translate into actual usage. For this study it was not possible to measure actual usage, as financial services are currently not being provided at the bottom of the pyramid through an intermediary in South Africa.

The second limitation that the study has is that it has been conducted in South Africa. The role of cultural factors has previously been highlighted in research into the TAM (Mao and Palvia, 2006). It is therefore not certain that the results would be replicated in another country. Consequently the research findings, whilst applicable to South Africa, may not be readily applied in another country facing the same challenge of poverty and financial inclusion as South Africa.

A third limitation of the study was the use of a single intermediary to study the problem. The intermediary chosen as a proxy for intermediaries was the SAPO. The advantage of this approach is that it was possible to eliminate the nature of the intermediary as a variable in the study. If several intermediaries had been chosen the ability to compare the results from one region to another may have been compromised by inter intermediary differences. It would thus not have been possible to distinguish between outcomes of the model and outcomes as a result of differences between regional intermediaries. The chosen approach allowed for the development of a model that could be generalized to the bottom of the pyramid population irrespective of region, language etc. The limitation is consequently the inability to see to what degree the intermediary itself affects the BI of the respondent. It is thus not known if the model would be applicable when

comparing between two small intermediaries who only have a regional presence, or to what degree the primary business of the intermediary affects behavioural intention.

### **7.3. Future scope of work**

The work showed that while the model was invariant under gender, age and financial dependency it was not invariant under location. There was a clear difference between the findings for rural as opposed to urban dwellers. As much of the financially excluded and poor reside in rural areas in South Africa, a comparison of the extended TAM model between rural and urban dwellers would provide additional insights. Due to the small sample of urban, bottom of the pyramid unbanked people; it was not possible to compare the two groups. A larger sample of urban, unbaked bottom of the pyramid would enable a comparative study to be conducted. A comparative study of adoption of financial services through an intermediary at the bottom of the pyramid would further inform how such services are developed, marketed and sold between rural and urban populations.

One of the limitations of the work provides an opportunity for future work. A comparison was done in this study between the post office and national retail stores. it would be valuable to extend this to comparing which types of intermediary is best suited to delivering financial services at the bottom of the pyramid. A study comparing adoption propensity across a range of potential intermediaries would allow identification of those best suited to deliver financial services. Intermediaries that are more acceptable to bottom of the pyramid

customers would more likely receive more transactions than those whom customers are less disposed to. The work focussed on studying the bottom of the pyramid. It would be of interest to study the middle class, i.e. LSM 5-8. The work has validated the model for bottom of the pyramid customers. The benefits of lower cost, greater convince and increased accessibility is potentially beneficial to middle class consumers. A study comparing the models validity across the middle class would validate it for a broader section of the population and may indicate that banking through intermediaries has a wider application than servicing the bottom of the pyramid.

## APPENDICES

### 8.1.LSM variables and weightings

Var	Attribute	Weight
1	Hot running water from a geyser	0.175948
2	Washing machine	0.150871
3	Electric stove	0.152859
4	Computer - Desktop/Laptop	0.292790
5	0 or 1 radio set in household	-0.249135
6	No domestic workers or household helpers in the household (this includes live-in and part time domestics and gardeners)	-0.285086
7	Flush toilet in/outside house	0.108169
8	TV set	0.122145
9	Motor vehicle in household	0.165298
10	Vacuum cleaner/floor polisher	0.142924
11	Microwave oven	0.118531
12	M-Net/DSTV subscription	0.144010
13	House/cluster house/town house	0.119211
14	Metropolitan dweller	0.084234
15	DVD player	0.094933
16	Tumble dryer	0.155577
17	3 or more cellphones in household	0.162906
18	2 cellphones in household	0.114391
19	VCR	0.106354

20	Tap water in house/plot	0.129953
21	Home security service	0.142023
22	Refrigerator or combined fridge/freezer	0.117871
23	Deep freezer - free standing	0.092228
24	Rural rest (excl. W. Cape & Gauteng rural)	-0.121163
25	Built-in kitchen sink	0.131772
26	Home theater system	0.096205
27	Home telephone (excl. cellphone)	0.090032
28	Dishwashing machine	0.160906
29	Hi-fi/music centre	0.061801

## 8.2.LSM groupings

LSM Group	Total Weight	
1	and lower	-1.070720
2	-1.070720	-0.855601
3	-0.855600	-0.625001
4	-0.625000	-0.295001
5	-0.295000	0.109999
6	0.110000	0.759999
7	0.760000	1.159999
7-Low	0.760000	0.955033
7-High	0.955034	1.159999
8	1.160000	1.499999
8-Low	1.160000	1.326049
8-High	1.326050	1.499999
9	1.500000	1.996939
9-Low	1.500000	1.723087
9-High	1.723088	1.996939
10	> 1.996939	

10-Low	1.996940	2.275307
10-High	2.275308	and higher

To determine the LSM, dichotomously assign variables to the responses. Sum the weights for the 29 variables and add the constant -0.442690

### 8.3. Research questionnaire

#### Research questionnaire

DP:	Query (1)	Omission (3)	Redo (5)	Late (6)	Excluded (8)
Yes	-1	-1	-1	-1	-1
Item numbers	(2)	(4)		2.4.1. D  at  e  (7  )	

Signature	Code (9)
Debriefed by	
Edited by:	
Coded by:	
Coding checked by:	
Consistency checked by:	
Editing checked by:	

QC:	B/Checked by (10)	Type of backcheck (11,12)	Date	Code (13,14)
QC	-1	Phone: - 1	FtF: -2	
F/Manager	-2	Phone: - 1	FtF: -2	
F/Worker	-3	Phone: - 1	FtF: -2	

Respondent number: (15)

QC Dept outcome (16):	-1	-2	-3	-4	-5
	Extr Satisfactory			Extr Dissatisfactory	

Comments:

Please could you give me your name, address and the exact suburb and town in which you live, even if there is no normal postal delivery there.  
*Ensure that spelling of suburb and town is correct.*

Name of respondent: \_\_\_\_\_

Address: \_\_\_\_\_

Suburb: \_\_\_\_\_ (code)

Telephone No: (H)(20)------(21)  (W) (22)------(23)

Cell Phone No: (24)------(25)

Interviewer: \_\_\_\_\_ (26)

Field Manager: \_\_\_\_\_ (27)

Start Time      (record using 24 hr clock, for example 15h00 and not 3pm) (28,29)

Date     /   /    (record day / month / year) (30,31,32)

d d / m m / y y y\_\_\_\_\_ y





INTERVIEW DETAIL

[Label with items 17,18,19,20,21]

VISITING POINT NUMBER  
(22)

--	--

PARTICULARS OF THE VISITING POINT

(40)

OFFICE USE ONLY		
8.1.  RIGINAL VISITING POINT	0	-1
SUBSTITUTE VISITING POINT		-2

Final respondent:  
 Name of respondent: .....  
 Address of respondent: .....  
 Complex / Flat Nr:.....(41) Complex / Flat Name: .....(42)  
 Street Nr:.....(43) Street Name: .....(44)  
 Suburb:.....(45)Town: .....(46)  
 Tel. No: (H) (47).....(48) (W) (49).....(50)  
 Cell No: (51).....(52)  
 Interviewer: .....  
 Field Manager: .....


PARTICULARS OF VISITS (69)

	(70.71) DAY	(72) DATE	(73) TIME	(74) RESPONSE
First visit				
Second visit				
Third visit				
<b>Substitute 1</b>				
First visit				
Second visit				
Third visit				
<b>Substitute 2</b>				
First visit				
Second visit				
Third visit				
<b>Substitute 3</b>				
First visit				
Second visit				
Third visit				

INTERVIEWER: FILL IN CODES  
APPLICABLE.  
FROM TIME, DAY AND RESPONSE  
BOXES BELOW.

Day	
Monday	-1
Tuesday	-2
Wednesday	-3
Thursday	-4
Friday	-5
Saturday	-6
Sunday	-7

Time	
1	00:01 - 11:59
2	12:00 - 13:59
3	14:00 - 14:59
4	15:00 - 15:59
5	16:00 - 16:59
6	17:00 - 17:59
7	18:00 - 18:59
8	19:00 - 19:59
9	20:00 - 20:59
10	21:00 - 24:00

Response	
1	Interview completed
2	Revisit: appointment made
3	selected respondent not at home
4	nobody at home
5	Do not qualify: vacant house/flat/stand/not a house or flat
6	Household does not qualify (LSM 7-10)
7	person qualifies according to the survey specifications
8	respondent is physically/mentally not fit to be interviewed
9	respondent cannot communicate with interviewer because of language
10	refusals: Contact person refused
11	interview refused by selected respondent
12	interview refused by parent

S1. I am going to read out a list of things to you. Some of these things might sound strange to you, but we need to ask them to understand a bit more about your lifestyle. Please tell me which of these, if any, are presently in your household or apply to your household.

- Circle the correct number for each statement.
- Add circled numbers as indicated.
- Do not read out the statements in bold – record correctly.

LSM 2008sv	YES=1	NO=2
1. Tap water in home or on stand	1	0
2. Hot running water from a geyser	2	0
3. Built-in kitchen sink	1	0
4. Flush toilet in house or on plot	1	0
5. Vacuum cleaner/floor polisher	1	0
6. A dishwashing machine	2	0
7. A washing machine	2	0
8. A tumble dryer	2	0
9. Microwave oven	2	0
10. An electric stove	2	0
11. Fridge with/without freezer	1	0
12. A deep freezer (separate from fridge)	1	0
13. A TV set	1	0
14. VCR in household	1	0
15. DVD player	1	0
16. Hi-fi/music centre	1	0
17. Two or more radios (not car radios)	0	minus 3
18. Home theatre system	1	0
19. M-Net and/or DSTv	1	0
20. A computer/laptop at home	3	0
21. A Telkom home telephone	1	0
22. No cell phone in household	0	0
23. Only one cell phone in household	0	0
24. Two cell phones in household	1	0
25. Three or more cell phones in household	2	0
26. Domestic worker/household helper (live in or part-time)	0	minus 3
27. Home security service	1	0
28. One or more motor vehicles	2	0
29. Live in a non-urban area outside of Gauteng or Western Cape	minus 1	0
30. Live in a metropolitan area	1	0
31. Live in a formal house/cluster/townhouse	1	0
<b>ADD THE "YES" COLUMN TO GET TOTAL A AND THE "NO" COLUMN TO GET TOTAL B Remember to SUBTRACT those numbers with the word MINUS IN FRONT OF THEM where necessary</b>	<b>A=</b>	<b>B=</b>
<b>TOTAL A + TOTAL B = TOTAL C</b>		<b>C=</b>
<b>ADD 8 TO TOTAL C</b>		<b>+8</b>
<b>Grand Total</b>		

INTERVIEWER, NOTE:	INTERVIEWER, CODE		
If total is between 0 and 13, then record as LSM 1-5	LSM 1-5	-01	⇒Continue for LSM 1-6
If total is between 14 and 20, then record as LSM 6	LSM 6	-02	
If total is between 21 and 24, then record as LSM 7	LSM 7	-03	⇒Close
If total is between 25 and 27, then record as LSM 8	LSM 8	-04	
If total is between 28 and 32, then record as LSM 9	LSM 9	-05	
If total is 33 or above record as LSM 10	LSM10	-06	



**HOUSEHOLD REGISTER**

- Record initials of all males and females in the household in separate grids below in order of oldest to youngest.
- Record respondent selected for interview from kish table in column provided.
- Record exact age and race next to each person
- Only respondents 16 years+ qualify for an interview.

		Write in from oldest (top) to youngest (bottom)	Age	Gender F=1, M=2	Race B=1, W=4, C=2, A=3	Respondent selected for interview
<b>ADULTS 16+</b>	People in household who qualify for this survey (persons who will be available for the duration of this survey)	01				-01
		02				-02
		03				-03
		04				-04
		05				-05
		06				-06
		07				-07
		08				-08
		09				-09
		10				-10
		11				-11
		12				-12
		13				-13
		14				-14
		15				-15
		16				-16
		17				-17
		18				-18
		19				-19
		20				-20
<b>NON-QUALIFIERS UNDER 16</b>	Persons in the household who do not qualify for this survey based on age  <b>Note: Do NOT ask respondent reasons why persons do not qualify or are not available</b>	01				
		02				
		03				
		04				
		05				
		06				
		07				
		08				
		09				
		10				
<b>NON-QUALIFIERS 16+</b>	Persons in the household who do not qualify for this survey or who will not be available for the duration of the survey (other than age)  <b>Note: Ask respondent reasons why persons do not qualify or are not available</b>	01				
		02				
		03				
		04				
		05				
		06				
		07				
		08				
		09				
		10				

*Reasons why non-qualifying persons 16+ do not qualify or are not available*

1 .....

2 .....

## KISH TABLE

*Interviewer: in order to determine who you will be interviewing you will need the last two digits of the questionnaire number as stated on page 1 of the questionnaire and the number of males/females in the household who qualify for the survey.*

- *Find the number running down the left side of the table that matches the end of the questionnaire number and the number of household members that qualify running across the top of the table.*
- *Circle the number where these two numbers meet in the table.*
- *This is the number of the person that you will interview – record on previous page and check details.*
- *Interview the selected individual.*

QUESTIONNAIRE NUMBER ENDS IN				NUMBER OF QUALIFYING PEOPLE IN HOUSEHOLD THE RESPONDENT MUST BE DRAWN FROM																								
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
01	26	51	76	1	1	1	3	2	4	1	3	5	8	6	5	12	10	1	6	8	7	19	19	13	21	13	24	25
02	27	52	77	1	2	3	4	3	1	2	2	3	4	8	3	7	2	5	14	4	15	4	8	6	16	14	22	19
03	28	53	78	1	1	2	1	4	2	7	6	9	3	5	11	2	1	3	11	7	10	16	16	10	5	2	2	3
04	29	54	79	1	2	3	2	1	3	5	8	6	2	4	2	4	8	11	10	16	6	9	10	15	11	12	11	18
05	30	55	80	1	1	1	4	5	6	3	5	7	5	9	8	13	3	2	13	5	18	1	4	1	20	11	5	24
06	31	56	81	1	2	2	2	3	5	6	7	8	7	1	4	9	14	8	2	17	17	14	12	14	22	10	3	14
07	32	57	82	1	2	1	1	4	1	4	1	4	6	3	6	5	7	13	9	2	3	13	14	8	2	7	20	4
08	33	58	83	1	1	2	3	2	5	1	4	2	1	7	10	6	5	4	15	10	5	2	13	4	17	5	17	8
09	34	59	84	1	1	3	2	5	6	2	2	1	9	10	1	10	4	6	6	1	9	10	1	5	6	9	1	12
10	35	60	85	1	2	2	4	1	3	3	6	9	10	11	12	3	9	15	7	8	11	6	3	9	4	3	10	1
11	36	61	86	1	1	1	3	1	4	5	3	1	6	2	9	13	11	14	4	11	4	15	15	17	1	1	23	2
12	37	62	87	1	2	3	1	3	2	7	5	6	5	7	7	8	6	10	3	3	1	12	20	7	13	22	12	16
13	38	63	88	1	1	2	1	5	3	6	4	3	4	6	2	11	13	12	1	15	8	7	2	12	15	21	13	7
14	39	64	89	1	2	3	2	4	1	4	7	8	2	5	6	11	12	9	16	13	16	11	18	18	14	16	18	23
15	40	65	90	1	2	1	4	2	4	3	8	7	7	11	1	3	5	7	12	14	13	8	17	20	19	20	19	11
16	41	66	91	1	1	3	3	1	6	5	1	5	9	10	3	2	11	13	8	12	12	5	6	21	8	8	4	15
17	42	67	92	1	1	2	3	4	2	6	4	2	3	2	12	5	2	10	13	5	8	18	9	16	10	17	16	20
18	43	68	93	1	2	1	4	2	6	4	1	4	8	9	10	7	9	3	12	12	9	7	20	19	9	19	21	13
19	44	69	94	1	2	2	1	3	5	2	8	9	10	4	9	8	13	1	1	14	10	19	10	11	18	15	7	6
20	45	70	95	1	1	3	2	5	4	1	3	8	1	3	8	6	6	9	5	7	13	4	15	1	7	22	15	21
21	46	71	96	1	1	1	2	5	1	7	2	3	2	1	11	4	7	5	3	2	1	3	12	18	5	19	14	9
22	47	72	97	1	2	1	3	1	3	2	6	2	1	8	7	1	4	2	11	8	2	17	4	17	21	16	3	5
23	48	73	98	1	2	3	4	2	2	6	7	7	8	3	4	9	3	6	2	11	11	16	2	8	11	23	6	22
24	49	74	99	1	1	2	1	4	6	3	5	5	3	1	5	13	1	14	8	14	6	15	9	14	3	6	9	17
25	50	75	00	1	1	2	3	3	2	4	6	4	7	5	3	12	12	12	4	6	2	17	11	2	12	4	8	10



**SECTION A: INTRODUCTION AND SCREENING**

Good day, my name is ..... and I'm from TNS, an independent research company. We are currently conducting a national survey to understand your perceptions around your financial and lifestyle needs and your means of accessing and using money. Will you be willing to participate? The interview will take about 45 minutes of your time.

May I continue and ask you the questions?

*If no or in doubt, thank respondent and close interview.*

Yes -1 ⇨ *Continue to the screener section*  
No -2 ⇨ *Close*

**SECTION A: GENERAL ATTITUDES**

In the next few questions I am going to ask you your feelings about different parts of your everyday life.

A1. Using the following scale, where 1 means extremely dissatisfied and 5 means extremely satisfied, please tell me to what extent you are satisfied with:

- *Showcard A1.*
- *Single mention per statement.*

	Extremely Dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Extremely Satisfied
Your current lifestyle? By this I mean the way you live your life at the present moment	-1	-2	-3	-4	-5

A2. Using the following scale, where 1 means you completely disagree and 5 means you agree completely, please tell me to what extent you agree with the following statements:

- *Hand respondent showcard A2.*
- *Interviewer please read out each statement. Rotate order of asking and mark starting point with an asterisk (\*).*
- *Single mention per statement.*

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know
1. You believe that your situation will improve	-1	-2	-3	-4	-5	-6
2. You are happy with your level of education	-1	-2	-3	-4	-5	-6
3. What government does affects your daily life in important ways	-1	-2	-3	-4	-5	-6
4. You are positive about your future	-1	-2	-3	-4	-5	-6
5. You feel positive about the South African Government	-1	-2	-3	-4	-5	-6
6. You are worried you will never achieve your goals in life	-1	-2	-3	-4	-5	-6
7. It is up to the South African government to provide for you and your family	-1	-2	-3	-4	-5	-6



A3. I'm going to read out some statements that other people have made. Please think about your own attitudes and for each statement, I would like you to tell me the extent to which you agree or disagree with each statement, using the options on this card.

- *Hand respondent showcard A3.*
- *Interviewer please read out each statement.*
- *Rotate order of asking and mark starting point with an asterisk (\*).*
- *Single mention per statement.*

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know/NA/ no dealings
1. You keep track of money that you get and spend	-1	-2	-3	-4	-5	-6
2. You only try things after your friends and people that you know have	-1	-2	-3	-4	-5	-6
3. It is important to you that others recognise your success	-1	-2	-3	-4	-5	-6
4. It is better to borrow as part of a group than to borrow on your own	-1	-2	-3	-4	-5	-6
5. You have a plan to ensure you have money in your old age	-1	-2	-3	-4	-5	-6
6. You don't know many people	-1	-2	-3	-4	-5	-6
7. If you could get a loan from a bank you would take it	-1	-2	-3	-4	-5	-6
8. You like to try new things	-1	-2	-3	-4	-5	-6
9. You have a plan to make your money last until the next time you get money	-1	-2	-3	-4	-5	-6
10. It is okay to borrow money	-1	-2	-3	-4	-5	-6
11. When you have to pay for something unexpected, you change your financial plan	-1	-2	-3	-4	-5	-6
12. You prefer staying at home to going out	-1	-2	-3	-4	-5	-6
13. It is better to save than to buy everything that you need	-1	-2	-3	-4	-5	-6
14. You are more quiet and serious than talkative and confident	-1	-2	-3	-4	-5	-6



SECTION B: LIVELIHOODS

B1a. *Interviewer note:*  
*Capture type of dwelling area that respondent's house is in without asking.*

- *Do not ask this question, capture from observation.*

Organised houses, townhouses or flats only	-1
Blocks of shacks only	-2
Mixture of organised houses and shacks	-3
Houses made of traditional materials	-4
Other (SPECIFY)	-5
.....	

B1b. Please tell me if you live in (*read out statements*)

- *Single mention.*

Main part of the house	-1
Back room or garage	-2
Other (SPECIFY)	-3
.....	

B2. *Interviewer note:*  
*Capture type of road in front of respondent's house without asking.*

- *Do not ask this question, capture from observation.*

Tar road	-1
Gravel road	-2
Other (SPECIFY)	-3
.....	
No road	-4

B3. Please tell me whether your household (*read out statements*).

- *Single mention.*

Owns the house	-1
Rents the house	-2
Does not pay anything for the house	-3
Other (SPECIFY)	-4
.....	
Don't know ( <i>Do not read out</i> )	-5

*Ask Q.B4 and Q.B5 only if own the house, code -1 in Q.B3, all others go to Q.B6.*

B4. You said your household owns this house, can you tell me whether the house is fully paid for or if there is still money owing on it?

- *Read out*
- *Single mention.*

Fully paid for	-1
Owe money	-2
Other (SPECIFY)	-3
.....	
Don't know ( <i>Do not read out</i> )	-4

B5. Which of the following statements apply for this house?

- *Showcard B5.*
- *Single mention.*

It is an extended or renovated RDP house	-1
It is an unchanged RDP house	-2
It is a government subsidised house (government social and rental housing)	-3
It is owned by a company	-4
None of these	-5



B6. Excluding toilets, how many rooms does this house have?

- *Do not prompt.*
- *Single mention.*

B7. How many people live in these rooms?

- *Do not prompt.*
- *Single mention.*

	Q.B6 How many rooms?	Q.B7 How many people?
1. One	-01	-01
2. Two	-02	-02
3. Three	-03	-03
4. Four	-04	-04
5. Five	-05	-05
6. Six	-06	-06
7. Seven	-07	-07
8. Eight	-08	-08
9. Nine	-09	-09
10. Ten	-10	-10
11. Eleven	-11	-11
12. Twelve	-12	-12
13. Thirteen or more	-13	-13
14. Don't know	-14	-14

B8. What is the main way your household gets water for domestic use?

- *Showcard B8.*
- *Single mention.*

*Ask Q.B9 for codes -2-4 in Q.B8. All others go to Q.B10.*

B9. Does your household have sole usage or do you share your water source with people who are not part of your household?

- *Single mention per statement mentioned in B8.*

	Q.B8	Q.B9	
		Sole use	Shared
1. Water inside your house	-1		
2. Water within your compound or plot	-2	-1	-2
3. Water from a communal tap	-3	-1	-2
4. Other (SPECIFY)	-4	-1	-2
.....			
5. No access to water	-5		

*Ask all.*

B10. What is the main type of toilet your household uses?

- *Showcard B10.*
- *Single mention.*

Toilet inside the house	-1
Toilet within compound or plot	-2
Communal toilet (outside compound or plot)	-3
Other(SPECIFY)	-4
.....	
No toilet facilities	-5





B11. What type of energy or fuel does this household MAINLY use for cooking?

- *Do not prompt.*
- *Single mention.*

B12. What type of energy or fuel does this household MAINLY use for lighting?

- *Do not prompt*
- *Single mention.*

	Q.B11 For cooking	Q.B12 For lighting
1. Electricity	-01	-01
2. Gas	-02	-02
3. Paraffin	-03	-03
4. Wood	-04	-04
5. Coal	-05	-05
6. Animal dung	-06	-06
7. Solar	-07	-07
8. Candles	-08	-08
9. Gel fuel	-09	-09
10. Other (SPECIFY)	-10	-10
.....		

B13. Who is the head of the household?

- *Do not prompt.*
- *Single mention only.*

I am	-1
My wife, husband, spouse or partner	-2
My parent	-3
My child	-4
My sister or brother	-5
Another family member	-6
Other (SPECIFY)	-7
.....	



Ask all.

B14. Please tell me about ALL the ways you get money to pay for things?

- Show card B14.
- Multiple mention possible.

If do not get money or buy things (code -16 or -17 in Q.B14), go to Q.B19. All others ask Q.B15.

B15. How frequently do you receive your money from this source?

- Show card B15.
- Single mention per source of income mentioned in Q.B14.

Ask if more than one option was provided in Q.B14, if only one was selected, do not ask - just record from Q.B14

B16. Which one is your main source of getting money/income?

- Single mention.

	Q.B14 Where do you get your money?	Q.B15 Frequency?					Q.B16 Main source? Single mention
		Daily	Weekly	Monthly	Once a year	Irregularly	
1. Child support grant	-01	-1	-2	-3	-4	-5	-01
2. Government old-age pension	-02	-1	-2	-3	-4	-5	-02
3. Government disability grant	-03	-1	-2	-3	-4	-5	-03
4. Unemployment insurance (UIF)	-04	-1	-2	-3	-4	-5	-04
5. Money from family member or friend	-05	-1	-2	-3	-4	-5	-05
6. Money from your own business	-06	-1	-2	-3	-4	-5	-06
7. Money from a job / paid work	-07	-1	-2	-3	-4	-5	-07
8. Money from rent	-08	-1	-2	-3	-4	-5	-08
9. Selling things to neighbours or on the street	-09	-1	-2	-3	-4	-5	-09
10. Money from farming	-10	-1	-2	-3	-4	-5	-10
11. Money from parent	-11	-1	-2	-3	-4	-5	-11
12. Money from husband, wife or partner	-12	-1	-2	-3	-4	-5	-12
13. Piece job	-13	-1	-2	-3	-4	-5	-13
14. Work pension	-14	-1	-2	-3	-4	-5	-14
15. Other (SPECIFY)	-15	-1	-2	-3	-4	-5	-15
16. I do not buy things (Single mention only)	-16						
17. Do not get money (Single mention only)	-17						

Ask Q.B17 - Q.B19 if codes 1-15 in Q.B14. All others go to Q.B20.

B17. How many people other people do you support with this money, whether they stay with you or not?

- Do not read out.
- Single mention.
- Interviewer, please record exact number below.

--	--

B18. Of the money you receive or earn, how much control would you say you have over what this is used for or spent on?

- Read out.
- Single mention only.

You decide how all the money is spent	-1
You help to decide how the money is spent e.g. as part of the family	-2
You have no say in how the money is spent	-3
Don't know (Do not show)	-4

B19. I am going to read a number of statements to you. For each statement that I read, please tell me whether or not you agree with the statement?

- Read out.
- Single mention per statement.

	Agree	Disagree	Don't know
1. You get a fixed regular income	-1	-2	-3
2. Your income changes a lot from month to month	-1	-2	-3



Ask all.

B20. How many other people in your household contribute to the household income?

- Do not read out.
- Single mention.
- Interviewer, please record exact number below.

--	--

SECTION C: EVENTS AND PAYMENTS

Ask all.

We are now going to talk about some things that affect lots of people and maybe affect you as well.

C1. When was the last time you ..... (read out statement)?

- Showcard C1.
- Single mention per statement.

If happened in last year (code -1or -2) for that statement in Q.C1 ask Q.C2 for that statement – i.e. ask the questions running across each row. Otherwise skip to next row and ask Q.C1 for next statement.

C2. How many times have you... (read out statement) in the past year?

- Record number.
- If 0 record and skip to next column.
- If don't know, record -DK and skip to next column.
- If refused, record -RF and skip to next column.

Events	Q.C1				Q.C2
	In the last month	In the last year but not the last month	Longer than in the last 12 months	Never / NA	Number of times in past year
1. Experienced theft or damage to your house or household items	-1	-2	-3	-4	
2. Had an income earner become too sick to earn an income	-1	-2	-3	-4	
3. Stopped getting your government grant	-1	-2	-3	-4	
4. Had a family member in the household stop getting their government grant(s)	-1	-2	-3	-4	
5. Lost your job	-1	-2	-3	-4	
6. Had an income earner lose their job	-1	-2	-3	-4	
7. Experienced the death of an income earner	-1	-2	-3	-4	
<b>Payments</b>					
8. Paid towards costs of engagement or lobola	-1	-2	-3	-4	
9. Paid towards costs of a wedding	-1	-2	-3	-4	
10. Paid towards costs of a funeral	-1	-2	-3	-4	
11. Paid towards costs of a birth in the household	-1	-2	-3	-4	
12. Paid towards costs of other celebrations, like, important birthdays, tombstone or unweiling	-1	-2	-3	-4	
13. Paid for your own or your family's hospital or doctor bills	-1	-2	-3	-4	
14. Paid for children's education	-1	-2	-3	-4	



SECTION D: COMMUNITY ORGANISATIONS AND OTHER SOURCES OF HELP

Ask all.

D1a. Which of the following groups do you belong to or participate in?

- Read out.
- Multiple mentions possible.
- Interviewer please ensure to ask "Are there any other groups I have not mentioned that you belong to or participate in?"

D1b. Which of the following, if any, have you ever turned to for general help (i.e. taking care of children, transportation etc.)?

- Showcard D1b.
- Multiple mention possible.
- Interviewer please ensure to ask "Are there any other groups or places that are not on this list?"

D1c. Which of the following, if any, have you ever turned to for financial help e.g. to borrow money?

- Read out Showcard D1b.
- Multiple mention possible.

D1d. For each group that you participate, please tell me if they have no influence, some influence or a lot of influence when you make decisions with your money?

- Showcard D1d.
- Read out each statement mentioned in Q.D1a.
- Single mention per statement.

Groups	Q.D1.a	Q.D1.b	Q.D1.c	Q.D1.d		
	Belong or participate	General help	Financial help	No influence	Some influence	A lot of influence
1. Church or church group	-01	-01	-01	-1	-2	-3
2. Community indaba	-02	-02	-02	-1	-2	-3
3. Political network or political group	-03	-03	-03	-1	-2	-3
4. Savings group or club	-04	-04	-04	-1	-2	-3
5. Stokvel	-05	-05	-05	-1	-2	-3
6. Burial Society	-06	-06	-06	-1	-2	-3
7. Social Club	-07	-07	-07	-1	-2	-3
8. Labour Union	-08	-08	-08	-1	-2	-3
9. Professional Member Association	-09	-09	-09	-1	-2	-3
<b>People or places</b>						
10. Ward councillor		-10	-10			
11. Chief		-11	-11			
12. Family		-12	-12			
13. A close circle of friends		-13	-13			
14. Neighbour/s and people in the Community		-14	-14			
15. Employer		-15	-15			
16. Bank/Financial Institution		-16	-16			
17. Money lender		-17	-17			
18. Government		-18	-18			
19. NGO		-19	-19			
20. Police (SAP)		-20	-20			
21. Interviewer ask: Are there any other groups I have not mentioned that you belong to or participate in? Other (SPECIFY)	-21	-21	-21	-1	-2	-3
22. None of these (single mention)	-22	-22	-22			



Ask all.

D2. Using the following scale, where 1 means you completely disagree and 5 means you agree completely, please tell me to what extent you agree with the following statements about your community, by community I mean the neighbourhood or area you live in:

- Hand respondent showcard D2.
- Interviewer please read out each statement. Rotate order of asking and mark starting point with an asterisk (\*).
- Single mention per statement.

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know (Do not show)
1. You are involved in your community	-1	-2	-3	-4	-5	-6
2. Women play an important role in your community	-1	-2	-3	-4	-5	-6
3. There are people in your community you can turn to for help	-1	-2	-3	-4	-5	-6
4. There are people in your community you can turn to for advice about money	-1	-2	-3	-4	-5	-6
5. When you join a group it is important that people from your background are in that group	-1	-2	-3	-4	-5	-6

SECTION E: ACCESS TO SERVICES

Ask all.

E1. Which of the following places or services are present in your community or residential area?

- Interviewer please read out each statement.
- Rotate order of asking and mark starting point with an asterisk (\*).
- Multiple mentions possible.

If 'none', code -13 in Q.E1, go to Q.E6.

E2. How often do you use the (read out statement in grid)?

- Read out responses in Q.E1.
- Single mention per statement.

E3. How would you normally get from your home to... ?

- Hand respondent showcard E3.
- Read out responses in Q.E1.
- Single mention per statement mentioned in Q.E1.

For places indicated in Q.E1.

E4. How long does it approximately take you to get to these places by using the transport mode you have selected?

- Hand respondent showcard E1.
- Single mention per statement mentioned in Q.E1.

Interviewer note: Complete Q.E2, Q.E3, Q.E4 before moving on to next facility.

Continued/...



	Q.E1 Present	Q.E2					Q.E3						Q.E4			
		Daily	Weekly	Monthly	Less Often	Never	Walk	Public transport by road (taxis, buses)	Public transport by rail	Private transport (e.g. car)	Don't know	Other (PLEASE SPECIFY)	0-30 min	31-60 min	More than 1 hour	Don't know
1. Library	-01	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
2. Post Office	-02	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
3. Bank branch	-03	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
4. ATM	-04	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
5. Supermarket	-05	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
6. Spaza shop or tuckshop	-06	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
7. Petrol station or garage	-07	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
8. Shopping mall	-08	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
9. Health centre/ clinic/ hospital	-09						-1	-2	-3	-4	-5	.....	-1	-2	-3	-4
10. Public transport	-10									-4	-5	.....	-1	-2	-3	-4
11. Police station	-11											.....				
12. Municipality office	-12											.....				
13. Places to access the internet e.g. schools	-13											.....				
14. Sports complex or sports facilities	-14											.....				
15. Church	-15											.....				
16. Tavern	-16											.....				
17. Public telephones or cellphone container	-17											.....				
18. None of these ( <i>single mention</i> )	-18											.....				

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Ask Q.E5 to those who said they walk, (code-1 in Q.3) and it takes longer than an hour to get to the facilities (code -3 in any statement in Q.E4). All others go to Q.E5.

E5. You indicated that you walk for longer than an hour to the following places, why do you not use public transport to get to these facilities?

- Refer to showcard E2.
- Single mention per statement where walk took longer than one hour.

	It is close/nearby (do not need public transport)	I do not have money to pay for public transport	Public transport is too expensive	Public transport is not safe	There is no frequent public transport available	There is no public transport available	Other (PLEASE SPECIFY)
2. Post Office	-1	-2	-3	-4	-5	-6	-7
3. Bank branch	-1	-2	-3	-4	-5	-6	-7
4. ATM	-1	-2	-3	-4	-5	-6	-7
5. Supermarket	-1	-2	-3	-4	-5	-6	-7



SECTION F: FINANCIAL PROVIDERS

Ask all.

F1. Thinking about all the things you do with money and other activities on a daily, weekly or monthly basis. For each of the services that I read out, please tell me which of these places you would like to see offering this service.

- Hand respondent showcard F1.
- Read out service.
- Wait for respondent to give all places that should offer the service before reading out next service.
- Rotate order of asking statements and mark starting point with an asterisk (\*).
- Multiple mentions possible per service.

	Supermarket counter that offers electricity and rates payments, sending money and computicket services	Post Office	Bank	ATM	Spaza shop or tuck shop	Special place at shopping mall	Garage or petrol station	None of these (Single mention)	Don't know (Single mention)
1. Airtime	-1	-2	-3	-4	-5	-6	-7	-99	-98
2. Bus and sport tickets	-1	-2	-3	-4	-5	-6	-7	-99	-98
3. Lotto tickets	-1	-2	-3	-4	-5	-6	-7	-99	-98
4. Withdraw cash	-1	-2	-3	-4	-5	-6	-7	-99	-98
5. Deposit cash	-1	-2	-3	-4	-5	-6	-7	-99	-98
6. Send or transfer money	-1	-2	-3	-4	-5	-6	-7	-99	-98
7. Pay debts, instalments, municipal accounts	-1	-2	-3	-4	-5	-6	-7	-99	-98
8. Pay stokvels or societies	-1	-2	-3	-4	-5	-6	-7	-99	-98
9. Apply for social grants	-1	-2	-3	-4	-5	-6	-7	-99	-98
10. Collect social grants	-1	-2	-3	-4	-5	-6	-7	-99	-98
11. Collect and post letters	-1	-2	-3	-4	-5	-6	-7	-99	-98
12. Apply / collect driving licences	-1	-2	-3	-4	-5	-6	-7	-99	-98
13. Apply / collect ID books, passports	-1	-2	-3	-4	-5	-6	-7	-99	-98
14. Query municipal accounts	-1	-2	-3	-4	-5	-6	-7	-99	-98

F2. Have you ever heard of PostBank?

- Single mention.

Yes -1  
No -2

F3. Can you do banking at the Post Office?

- Single mention.

Yes -1  
No -2  
Don't know -3

F4. Below are some statements about places that people use or belong to. Thinking about these places, please tell me which places you associate with each statement.

You can choose as many places as you feel are linked with each statement.

- Hand respondent showcard F4.
- Interviewer please read out statements.
- Rotate order of asking statements and mark starting point with an asterisk (\*).
- Multiple mentions possible per statement.



	Banks	Burial societies	Stokvels or savings clubs	Money lenders or mashonisa	Post Office	Supermarket counter that offers electricity and rates payments, sending money and computicket services	None of these (Single mention)	Don't know (Single mention)
1. You use their products or services	-1	-2	-3	-4	-5	-6	-7	-8
2. They speak your own language	-1	-2	-3	-4	-5	-6	-7	-8
3. You have to wait in long queues	-1	-2	-3	-4	-5	-6	-7	-8
4. They treat you well	-1	-2	-3	-4	-5	-6	-7	-8
5. People you trust use them	-1	-2	-3	-4	-5	-6	-7	-8
6. You can depend on them to get things done	-1	-2	-3	-4	-5	-6	-7	-8
7. They are cheap to use	-1	-2	-3	-4	-5	-6	-7	-8
8. You trust them with your money	-1	-2	-3	-4	-5	-6	-7	-8

F5. I am going to read out to you an idea for a place.

**READ OUTCONCEPT**

The Post Office is thinking about offering banking services, government services and other services. The banking services will include things like providing loans, offering credit cards, ATMs, internet banking, withdrawing cash and sending money. Government services will include things like applying for social grants, ID books and passports and to be a place for you to collect social grants, ID books, passports, learners and drivers licenses. Other Services that Post Office will offer will be things like buying airtime, bus tickets, sports tickets and lotto tickets.

I'd like you to rate how you feel about Post Office offering these services. Please use the 5-point scale below where "1" means you think it is "terrible" and "5" means you think it is "perfect"

- Hand respondent scale card F5.
- Single mention.

Terrible			Perfect		
-01	-02	-03	-04	-05	

F6. Using the following scale, where 1 means you completely disagree and 5 means you agree completely, please tell me to what extent you agree with the following statements about the concept we have discussed for banking at the Post Office:

- Hand respondent showcard F6.
- Interviewer please read out each statement. Rotate order of asking and mark starting point with an asterisk (\*).
- Single mention per statement.

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know	Does not apply
1. You do <u>not</u> see people who work at the Post Office as banking people	-1	-2	-3	-4	-5	-6	-7
2. Post Office banking products will be easy to understand	-1	-2	-3	-4	-5	-6	-7
3. You would use the Post Office to do banking because it will offer the services that you need	-1	-2	-3	-4	-5	-6	-7
4. The Post Office will make banking easier	-1	-2	-3	-4	-5	-6	-7
5. It will be good for you to bank through the Post Office	-1	-2	-3	-4	-5	-6	-7
6. You would <u>not</u> use the Post Office to do banking because it does not look like a bank	-1	-2	-3	-4	-5	-6	-7
7. Banking at the Post Office will help you do things you already do but better	-1	-2	-3	-4	-5	-6	-7
8. You would be keen to try banking products offered at Post Office	-1	-2	-3	-4	-5	-6	-7
9. You would <u>not</u> use the Post Office to do banking because it is already offers other services	-1	-2	-3	-4	-5	-6	-7
10. Banking at the Post Office will allow you to do things that you cannot do yet	-1	-2	-3	-4	-5	-6	-7
11. You would trust the Post Office for your banking	-1	-2	-3	-4	-5	-6	-7
12. Banking through the Post Office will be quicker than at other banks	-1	-2	-3	-4	-5	-6	-7
13. Banking through the Post Office will be easy to use	-1	-2	-3	-4	-5	-6	-7





SECTION G: ACCESS AND ATTITUDES TO TECHNOLOGY

Ask all.

G1. Please tell me whether you have access to...?

- Read out.
- Single mention per statement.

		Q.G1 Access	
		Yes	No
1.	Cell phone	-1	-2
2.	Public pay phone including containers and people on the street	-1	-2
3.	Landline telephone at home	-1	-2
4.	Telephone/cell phone at a neighbour nearby	-1	-2
5.	Computer at home	-1	-2
6.	Computer elsewhere	-1	-2
7.	Internet at home	-1	-2
8.	Internet elsewhere	-1	-2
9.	Email at home	-1	-2
10.	Email elsewhere	-1	-2

G2. Which of the following have you ever done or used?

- Showcard G2.
- Multiple mentions possible.

G3. Even if you have not used, which of the following do you or would you feel confident or very comfortable using?

- Showcard G2.
- Multiple mentions possible.

G4. Which of the following would you prefer to use to manage your money e.g. send money, receive money, access your bank account etc.

- Showcard G4.
- Multiple mentions possible.

	Q.G2 Ever done / used	Q.G3 Confident using	Q.G4 Managing money
1. Cell phone	-01	-01	
2. Internet on computer	-02	-02	-02
3. Internet on cellphone	-03	-03	-03
4. Mobile money transfer (sending or receiving money)	-04	-04	
5. ATM	-05	-05	-05
6. Buying airtime at an ATM	-06	-06	
7. Withdrawing cash at a supermarket till using your ATM or bank card	-07	-07	
8. Getting bank notifications via SMS	-08	-08	
9. Cellphone banking	-09	-09	-09
10. None of these ( <i>Do not show</i> )	-10	-10	-10

G5. If you wanted help with using technology like cellphones or ATMs, where would you prefer to receive help from?

- Showcard G5.
- Multiple mentions possible.

Family e.g. children and spouses	-1
Friends and people you work with	-2
People who work in shops	-3
TV or radio shows	-4
People at your church, stokvel or other community group	-5
Bank staff member	-6
None of these ( <i>Do not show</i> )	-7



G6. Using the following scale, where 1 means you completely disagree and 5 means you agree completely, please tell me to what extent you agree with the following statements, if the statement does not apply to you e.g. you have never done it, please tell me

- *Hand respondent showcard G6.*
- *Interviewer please read out each statement. Rotate order of asking and mark starting point with an asterisk (\*).*
- *Single mention per statement.*

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know	Does not apply
1. You are comfortable using technology such as cellphones, ATMs or the internet	-1	-2	-3	-4	-5	-6	-7
2. Technology is too complicated for you to use	-1	-2	-3	-4	-5	-6	-7
3. If you had to use technology like an ATM, a cellphone or the internet to do banking, you would not do banking	-1	-2	-3	-4	-5	-6	-7
4. You prefer to be served by a person rather than a machine	-1	-2	-3	-4	-5	-6	-7
5. You would make use of an ATM or internet banking if there was someone there to help you	-1	-2	-3	-4	-5	-6	-7

SECTION I: DEMOGRAPHICS

*Ask all.*

H1. Could you please tell me your exact age?

- *Interviewer, please record exact age below.*

--	--

- *Interviewer, please record year born (to verify age and support checkback).*

--	--	--	--

- *Interviewer, please record age below:*

Under 18 years	-1
18 to 24 years	-2
25 to 34 years	-3
35 to 44 years	-4
45 to 55 years	-5
Over 55 years	-6
Refused	-7

H2. *Interviewer note: Capture population group without asking?*

Black	-1
Coloured	-2
Indian or Asian	-3
White	-4
Other (SPECIFY)	-5

.....



H3. What is your home language?

- *Do not prompt.*
- *Single mention.*

Afrikaans	-01
English	-02
IsiNdebele	-03
IsiXhosa	-04
IsiZulu	-05
Sepedi	-06
Sesotho	-07
Setswana	-08
SiSwati	-09
Tshivenda	-10
Xitsonga	-11
Other (SPECIFY)	-12

.....

H4. What is your PRESENT marital status?

- *Read out.*
- *Single mention.*

Married or live together	-1
Single/ Never married	-2
Widower/widow	-3
Separated	-4
Divorced	-5
Other (SPECIFY)	-6

.....

H5. What is your highest level of education?

- *Showcard H5.*
- *Single mention.*

No schooling	-1
Primary school	-2
Some high school	-3
Matric	-4
Apprenticeship	-5
Diploma	-6
University degree	-7
Other (SPECIFY)	-8

.....  
Don't know (*Do not show*) -9

H6. I would like you to think again about the concept for Post Office that we discussed earlier.

The Post Office is thinking about offering banking services, government services and other services. The banking services will include things like providing loans, offering credit cards, ATMs, internet banking, withdrawing cash and sending money. Government services will include things like applying for social grants, ID books and passports and to be a place for you to collect social grants, ID books, passports, learners and drivers licenses. Other Services that Post Office will offer will be things like buying airtime, bus tickets, sports tickets and lotto tickets.

Using the following scale, where 1 means you completely disagree and 5 means you agree completely, please tell me to what extent you agree with the following statements about the concept we have discussed for banking at the Post Office:

- *Hand respondent showcard H6.*
- *Interviewer please read out each statement. Rotate order of asking and mark starting point with an asterisk (\*).*
- *Single mention per statement.*

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know	Does not apply
1. Banking at the Post Office will be relaxed	-1	-2	-3	-4	-5	-6	-7
2. You will bank at the Post Office if your family, friends or neighbours do	-1	-2	-3	-4	-5	-6	-7
3. The Post Office is too far away for you to bank there	-1	-2	-3	-4	-5	-6	-7
4. Banking at the Post Office will be enjoyable	-1	-2	-3	-4	-5	-6	-7
5. If you were to do banking you would have to use the Post Office to do your banking because you do <u>not</u> have other choices	-1	-2	-3	-4	-5	-6	-7
6. You feel comfortable enough in a Post Office to try using an ATM	-1	-2	-3	-4	-5	-6	-7
7. Banking at the Post Office will be cheaper than at other banks	-1	-2	-3	-4	-5	-6	-7
8. You would bank at the Post Office if your chief or community elders do	-1	-2	-3	-4	-5	-6	-7
9. Banking at the Post Office will be comfortable	-1	-2	-3	-4	-5	-6	-7
10. The ATM and face-to-face over-the-counter services offered by the Post Office will be as good as the other banks	-1	-2	-3	-4	-5	-6	-7
11. You would bank at the Post Office if someone you respect like your favourite radio show presenter does	-1	-2	-3	-4	-5	-6	-7

H7. Do you *have or use* a bank account?

- *Do not prompt.*
- *Single mention only.*

Yes -1  
No -2  
Don't know -3

H8. Do you have a PostBank account?

- *Single mention.*

Yes -1  
No -2  
Don't know -3

H9. Using the following scale, where 1 means you completely disagree and 5 means you agree completely, please tell me to what extent you agree with the following statements, if the statement does not apply to you e.g. you have never done it, please tell me

- *Hand respondent showcard H9.*
- *Interviewer please read out each statement. Rotate order of asking and mark starting point with an asterisk (\*).*
- *Single mention per statement.*

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know	Does not apply
1. Every month you withdraw all your money in one go	-1	-2	-3	-4	-5	-6	-7
2. You save money at home rather than in the bank	-1	-2	-3	-4	-5	-6	-7



Ask Q.H10 if 'no' or 'don't know' (code 2 or 3) in Q.H7, all others thank respondent and close interview.

H10. Using the following scale, where 1 means you completely disagree and 5 means you agree completely, please tell me to what extent you agree with the following statements.

- Hand respondent showcard H10.
- Interviewer please read out each statement. Rotate order of asking and mark starting point with an asterisk (\*).
- Single mention per statement.

	Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly	Don't know	Does not apply
1. You have enough money to be able to bank	-1	-2	-3	-4	-5	-6	-7

**THANK RESPONDENT AND CLOSE INTERVIEW**

I hereby certify that this interview has been carried out by me in accordance with the instructions I received from TNS Research Surveys and has been checked.

SIGNED \_\_\_\_\_

Please record the approximate duration of the interview on the grid below.

Day of Week (36)	
Monday	-1
Tuesday	-2
Wednesday	-3
Thursday	-4
Friday	-5
Saturday	-6
Sunday	-7

Time of Day (37)	
Morning (before 12:00)	-1
Afternoon (12:01-17:00)	-2
Evening (17:01 or later)	-3

End time (38,39) (PLEASE FILL IN)
..... h .....
Record using 24 hr clock, for example 15h00

BUSINESS MANAGER	SUPPORT MANAGER	DPU

### 8.4. Research questionnaire show cards

#### SHOWCARD P1

Extremely Dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Extremely Satisfied
1	2	3	4	5

#### SHOWCARD P2

Disagree Strongly	Disagree Slightly	Neither agree nor disagree	Agree Slightly	Agree Strongly
1	2	3	4	5

#### SHOWCARD EE2.1

1 = Working Full Time
2 = Working Part Time
3 = Not Working - Housewife / Husband
4 = Not Working – Student
5 = Not Working – Retired
6 = Not Working – Unemployed
7 = Seasonal worker currently employed
8 = Seasonal worker currently unemployed
9 = Retired
10 = Other (please specify)



## SHOWCARD EE3.1

1 = Domestic worker
2 = Gardener
3 = Construction worker
4 = Street vendor
5 = Hair dresser
6 = Data Capturer
7 = Administrator
8 = Clerk
9 = Cashier
10 = HR
11 = Doctor
12 = Attorney
13 = Accountant
14 = Receptionist
15 = Secretary
16 = Statistician
17 = Project Manager
18 = Sales consultant
19 = Shop/Store manager
20 = Farmer
21 = Vehicle driver i.e. truck, bus, taxi
22 = Engineer
23 = Mining worker
24 = Other (please specify)

## SHOWCARD EE4

1 = Informal i.e. domestic worker, gardener, street vendor
2 = Transport
3 = Media i.e. television, radio, magazines, newspaper
4 = Service i.e. supermarkets
5 = Agriculture i.e. farming
6 = Artisan & Engineering related
7 = Mining
8 = Construction
9 = Government
10 = Public sector (Eskom, Post Office, SARS etc)
11 = Healthcare and medical
12 = Hair and beauty
13 = Food and catering
14 = Financial
15 = Other (please specify)



## SHOWCARD EE13.1

	Personal/month	Household/month
A. No income		
B. R1 – R249 per month		
C. R250 – R499 per month		
D. R500 – R749 per month		
E. R750 – R999 per month		
F. R1 000 – R1 249 per month		
G. R1 250 – R1 499 per month		
H. R1 500 – R 1 749 per month		
I. R1 750 – R 1 999 per month		
J. R2 000 – R2 249 per month		
K. R2 250 – R2 499 per month		
L. R2 500 – R2 749 per month		
M. R2 750 – R2 999 per month		
N. R3 000 – R3 999 per month		
O. R4 000 – R4 999 per month		
P. R5 000 – R5 999 per month		
Q. R6 000 – R6 999 per month		
R. R7 000 – R7 499 per month		
S. R7 500 – R7 999 per month		
T. R8 000 – R8 999 per month		
U. R9 000 – R9 999 per month		
V. R10 000 – R10 999 per month		
W. R11 000 – R11 999 per month		
X. R12 000 – R12 999 per month		
Y. R13 000 – R14 499 per month		
Z. R14 500 – R16 999 per month		
AA. R17 000 – R 19 499 per month		
BB. R19 500 - R21 999 per month		
CC. R22 000– R24 999 per month		
DD. R25 000– R29 999 per month		
EE. R30 000 – R34 999 per month		
FF. R35 000 – R41 999 per month		
GG. R42 000 – R49 999 per month		
HH. R50 000 – R61 999 per month		
II. R62 000 per month or more		

## SHOWCARD FD1

1. I make the decisions alone
2. I make the decisions in consultation with my partner or spouse
3. I make the decision in consultation with other family or household members
4. I do not make the decisions but my opinion is asked for



## SHOWCARD BP1

	BP1			
	1. Never had and need	2. Never had and don't need	3. Used to have in the past but don't have now	4. Have now
1. Mzansi account (offered by banks, e.g. ABSA, FNB, Nedbank, Standard Bank and Post Bank)				
2. ATM card				
3. Debit card or Cheque card (i.e. Maestro, Electron, Visa)				
4. Savings book at a bank				
5. Post Office / Post Bank savings or transaction account				
6. Savings or Transaction account (not Mzansi or Post Office / Post Bank)				
7. Current or Cheque account				
8. Credit card e.g. Visa, MasterCard or American Express or Diners Club				
9. Personal garage card or Petrol card				
10. Cellphone transactions (not SMS notifications only AND/OR cash send) but to check balances, transfer money between accounts or pay third parties				
11. Internet banking to check balances, transfer money between accounts or pay third parties				
12. Money market account				
13. Call account				
14. Village bank or co-operative bank account (not loan)				
15. Overdraft facility				
16. Deposit account (fixed term or notice deposit)				
17. Home loan, bond or mortgage to buy, build, extend or improve a house from a big or small bank, bond originator or SA Home Loans				
18. Car or vehicle loan from a bank either directly or via a dealer				
19. Personal loan from the big banks e.g. Post Bank/Post Office, FNB, ABSA, Standard Bank, Nedbank				
20. Electronic wallet ( E-Wallet)				
21. Funeral policy with a bank (including Post Bank)				
22. Sharia compliant bank account				



# SHOWCARD BP2

<b>Big bank and Vehicle Finance</b>	
1. ABSA	2. ABSA Vehicle and Asset Finance
3. First National Bank/FNB	4. Nedbank
5. Post Bank / Post Office	6. Standard Bank
7. Stannic	8. Wesbank
9. Other (specify)	
<b>Smaller bank</b>	
10. African Bank	11. Capitec Bank
12. Ithala Bank	13. Teba Bank
14. Other (specify)	
<b>Insurance and medical aid/hospital insurance company</b>	
15. 1LifeDirect	16. AIG
17. Auto & General	18. Bonitas
19. Budget Insurance	20. Clientele Life
21. Dial Direct	22. Discovery Health
23. Discovery Life	24. FNB Insurance
25. Hollard Life Insurance	26. Hollard short term insurance
27. Legalwise	28. Liberty Life
29. Metropolitan	30. Metropolitan Life
31. Momentum	32. Mutual & Federal
33. Old Mutual	34. Outsurance
35. Sanlam	36. Santam
37. Zurich	38. Other (specify)
<b>Food/clothing Store</b>	
39. Ackermans	40. Edgars
41. Foschini	42. Jet Stores
43. Markham	44. PEP
45. Woolworths	46. Other (specify)
<b>Furniture Store</b>	
47. Bradlows	48. Furniture City
49. Joshua Doore	50. Lewis
51. Other (specify)	
<b>Other places</b>	
52. Local Store (e.g Spaza, Corner Café, Garage)	
53. Mashonisa	
54. Burial society / stokvel / savings club	
55. Employer	
56. Friends or family	
57. Other	
58. None	

## SHOWCARD TC2

	TC2					
	1. More than once a week	2. Weekly	3. Monthly	4. Less often than once a month (but in the past 12 months)	5. Have done it but not in the past 12 months	6. Never
1. Cash withdrawals						
2. Cash deposits						
3. Money transfers between my bank accounts						
4. Money transfers between my bank accounts and someone else's						
5. Pay store accounts						
6. Electronic bank transfer						
7. Get cash at retail store at till						
8. Buy pre-paid electricity, water or telephone						
9. Buy cellphone or Telkom airtime						
10. Pay utility bills (e.g. electricity, water, rates)						
11. Pay cellphone or telephone bill						
12. Purchase items using your debit card (e.g. Maestro, Visa, Electron)						
13. Credit card purchases						
14. Credit card payments						
15. Request balance enquiry						
16. Request mini-statement / normal statement						

## SHOWCARD TC3

	TC3					
	With / in the bank	At an ATM	Via tele-phone or online	At super-market or shop	At the Post office	Some-where else
1. Cash withdrawals						
2. Cash deposits						
3. Money transfers between my bank accounts						
4. Money transfers between my bank accounts and someone else's						
5. Pay store accounts						
6. Electronic bank transfer						
7. Get cash at retail store at till						
8. Buy pre-paid electricity, water or telephone						
9. Buy cellphone or Telkom airtime						
10. Pay utility bills (e.g. electricity, water, rates)						
11. Pay cellphone or telephone bill						
12. Purchase items using your debit card (e.g. Maestro, Visa, Electron)						
13. Credit card purchases						
14. Credit card payments						
15. Request balance enquiry						
16. Request mini-statement / normal statement						



## SHOWCARD MZ1

- |  |
|--|
| 1. I have never heard of it  |
| 2. I have heard of it but I have not thought about opening an Mzansi account |
| 3. I have heard of it and I have thought about opening an Mzansi account     |

## SHOWCARD MZ2

- |  |
|--|
| 1. My bank changed my account to an Mzansi account   |
| 2. Mzansi is the first bank account I have ever opened   |
| 3. I opened an Mzansi account in addition to having another bank account (kept other account open) |
| 4. I opened an Mzansi account to replace another bank account (closed the other account)           |
| 5. I opened an Mzansi account first then opened another bank account later                         |

## SHOWCARD MZ4

- |  |
|--|
| 1. Mzansi is a product for all South Africans  |
| 2. Mzansi has the same costs or benefits no matter which bank you get it from  |
| 3. Mzansi makes banking more understandable for you  |
| 4. Even with Mzansi, you still can't afford the bank charges   |
| 5. You do not know enough about the Mzansi account   |
| 6. Mzansi has the cheapest fees in the market  |
| 7. Mzansi is seen as a "poor person's" bank account  |
| 8. You would open an Mzansi account at the bank which offers the best Mzansi services, features, functions or price    |
| 9. You tried to open an Mzansi account but the bank or Post Office persuaded you not to or said you could not open one |
| 10. You were encouraged to open a Mzansi account by staff at the bank or Post Office                                   |



## SHOWCARD CL1

1. Money for me or someone else in my family for tertiary studies
2. To pay a child's school fees
3. To buy food
4. For clothing
5. To pay for water or electricity
6. For a funeral
7. To buy a car
8. To buy a house
9. To build a house
10. To extend/renovate/repair/paint your house
11. To pay for furniture or other household items
12. To start, invest or run a business (yourself, your family or someone else in your household)
13. For lobola/dowry
14. For the birth of a child/for a new baby (Paying for the birth, travel accessories etc.)
15. For a celebration/cultural event e.g. wedding
16. For medical expenses
17. Other (SPECIFY).....
18. None, I haven't borrowed money in the past 12 months

## SHOWCARD CL2

1. I am currently borrowing money that has to be repaid
2. I am currently owing money that has to be repaid
3. I am not currently borrowing



## SHOWCARD CL3

	1. Never borrowed from	2. Borrowed in the past but not now	3. Borrowing now
<b>Informal borrowing</b>			
1. Borrowing from friends, family or colleagues			
2. Borrowing from an employer or getting an advance on your salary			
3. Borrowing from a mashonisa or loan shark			
4. Borrowing from a stokvel society, burial society, umgalelo or savings club			
5. Borrowing from or arrangement with a pawn shop			
6. Borrowing, taking goods (e.g. sugar, bread, milk, candles etc.) or paying over time for things (on the book) from a local spaza, general dealer, corner cafe or shop			
<b>Formal borrowing</b>			
7. Personal loan from the big banks e.g. Post Bank/Post Office, FNB, ABSA, Standard Bank, Nedbank			
8. Personal loan from a smaller bank or money lending company e.g. African Bank, Capitec Bank, Teba Bank, Ithala, Credit U, SACCO			
9. Borrowing money from a village bank or co-operative bank (e.g. Yebo, Iemas), development bank, NGO or government			
10. Personal loan, borrowing money from a formal retail store e.g. Edgars, Woolworths, Ellerines, Joshua Doore ( <b>not a store card</b> )			
11. Borrowing money from an insurance company or against your pension or policy			
11. Car or vehicle loan from a bank either directly or via a dealer			
13. Home loan, bond or mortgage to buy, build, extend or improve a house from a big or small bank, bond originator or SA Home Loans			
14. Overdraft facility			
15. Educational or student loan			
17. Store cards or accounts where you can take goods and pay later for e.g. Edgars, Woolworths			
18. Credit cards e.g. VISA, Mastercard, American Express, Diners Club			
19. Borrowing from anywhere else (SPECIFY)			



# SHOWCARD CL4

<b>Big bank and Vehicle Finance</b>	
1. ABSA	2. ABSA Vehicle and Asset Finance
3. First National Bank/FNB	4. Nedbank
5. Post Bank / Post Office	6. Standard Bank
7. Stannic	8. Wesbank
9. Other (specify)	
<b>Smaller bank</b>	
10. African Bank	11. Capitec Bank
12. Ithala Bank	13. Teba Bank
14. Other (specify)	
<b>Insurance and medical aid/hospital insurance company</b>	
15. 1LifeDirect	16. AIG
17. Auto & General	18. Bonitas
19. Budget Insurance	20. Clientele Life
21. Dial Direct	22. Discovery Health
23. Discovery Life	24. FNB Insurance
25. Hollard Life Insurance	26. Hollard short term insurance
27. Legalwise	28. Liberty Life
29. Metropolitan	30. Metropolitan Life
31. Momentum	32. Mutual & Federal
33. Old Mutual	34. Outsurance
35. Sanlam	36. Santam
37. Zurich	38. Other (specify)
<b>Food/clothing Store</b>	
39. Ackermans	40. Edgars
41. Foschini	42. Jet Stores
43. Markham	44. PEP
45. Woolworths	46. Other (specify)
<b>Furniture Store</b>	
47. Bradlows	48. Furniture City
49. Joshua Doore	50. Lewis
52. Other (specify)	
<b>Other places</b>	
52. Local Store (e.g Spaza, Corner Café, Garage)	
53. Mashonisa	
54. Burial society / stokvel / savings club	
55. Employer	
56. Friends or family	
57. Other	
58. None	





## SHOWCARD CL6

	Yes	No	Don't know/Can't remember
1. An explanation of the costs involved, for example fees and interest			
2. What your instalment and repayment amount is			
3. An agreement or contract to take home with you			
4. A verbal explanation of your obligations and rights in terms of the agreement			
5. Where or who you could go to if you were unhappy with the contract or had a complaint			
6. What you need to do if you cannot make the repayments			
7. A quote for the loan			
8. How long the loan would take to pay back			
9. You got at least 3 quotes from providers before deciding where to take out the loan			



# SHOWCARD ST1

2.4.2.	ST1		
2.4.3.	1. Never had	2. Used to have in the past but don't have now	3. Have now
1. Vehicle or car insurance			
2. Household contents or possessions insurance (e.g. furniture and appliances)			
3. Building or property insurance on your house structure (often sold with your bond)			
4. Insurance for hand tools or agricultural equipment			
5. Cellphone insurance			
6. Travel insurance for holiday or business travel (excluding taxi commuter insurance)			
7. Taxi commuter insurance (covers you when you travel in a taxi)			
8. Disability insurance or cover			
9. Accidental death and disability cover			
10. Dreaded disease insurance			
11. Personal accident insurance or cover			
12. Loss of earnings insurance (in addition to UIF)			
13. Life insurance or life cover			
14. Medical aid or medical scheme			
15. Hospital cash plan which pays you cash if you are hospitalised			
16. Professional indemnity cover			
17. Insurance that pays your loan or borrowing when you die, lose your job, are disabled (not life insurance)			
18. Insurance that pays for any legal fees, expenses or legal advice e.g. Legal Aid, Legalwise, Scorpion			



# SHOWCARD ST2

<b>Big bank and Vehicle Finance</b>	
1. ABSA	2. ABSA Vehicle and Asset Finance
3. First National Bank/FNB	4. Nedbank
5. Post Bank / Post Office	6. Standard Bank
7. Stannic	8. Wesbank
9. Other (specify)	
<b>Smaller bank</b>	
10. African Bank	11. Capitec Bank
12. Ithala Bank	13. Teba Bank
14. Other (specify)	
<b>Insurance and medical aid/hospital insurance company</b>	
15. 1LifeDirect	16. AIG
17. Auto & General	18. Bonitas
19. Budget Insurance	20. Clientele Life
21. Dial Direct	22. Discovery Health
23. Discovery Life	24. FNB Insurance
25. Hollard Life Insurance	26. Hollard short term insurance
27. Legalwise	28. Liberty Life
29. Metropolitan	30. Metropolitan Life
31. Momentum	32. Mutual & Federal
33. Old Mutual	34. Outsurance
35. Sanlam	36. Santam
37. Zurich	38. Other (specify)
<b>Food/clothing Store</b>	
39. Ackermans	40. Edgars
41. Foschini	42. Jet Stores
43. Markham	44. PEP
45. Woolworths	46. Other (specify)
<b>Furniture Store</b>	
47. Bradlows	48. Furniture City
49. Joshua Doore	50. Lewis
53. Other (specify)	
<b>Other places</b>	
52. Local Store (e.g Spaza, Corner Café, Garage)	
53. Mashonisa	
54. Burial society / stokvel / savings club	
55. Employer	
56. Friends or family	
57. Other	
58. None	



# SHOWCARD FC1

	FC1			
	1. Never had and need	2. Never had and don't need	3. Used to have in the past but don't have now	4. Have now
1. Funeral cover from a shop or store (e.g. Edgars, Jet, Pep)				
2. Funeral cover from a cell phone provider, with an administrator (e.g. The Best Funeral Practice) or with an intermediary (e.g. broker)				
3. Funeral cover through an undertaker or funeral parlour				
4. Funeral cover or insurance from your current employer or a union (e.g. SADTU)				
5. Funeral policy with an insurance company				
6. Funeral policy with a bank (including Post Bank)				
7. Funeral cover from a funeral home (including AVBOB)				
8. Funeral cover from any other (e.g. church, spaza, stokvel, neighbourhood, etc.)				
9. Belong to a burial society (not AVBOB)				



## SHOWCARD FC2

1. ABSA	2. ABSA Vehicle and Asset Finance
3. First National Bank/FNB	4. Nedbank
5. Post Bank / Post Office	6. Standard Bank
7. Stannic	8. Wesbank
9. Other (specify)	
<b>Smaller bank</b>	
10. African Bank	11. Capitec Bank
12. Ithala Bank	13. Teba Bank
14. Other (specify)	
<b>Insurance and medical aid/hospital insurance company</b>	
15. 1LifeDirect	16. AIG
17. Auto & General	18. Bonitas
19. Budget Insurance	20. Clientele Life
21. Dial Direct	22. Discovery Health
23. Discovery Life	24. FNB Insurance
25. Hollard Life Insurance	26. Hollard short term insurance
27. Legalwise	28. Liberty Life
29. Metropolitan	30. Metropolitan Life
31. Momentum	32. Mutual & Federal
33. Old Mutual	34. Outsurance
35. Sanlam	36. Santam
37. Zurich	38. Other (specify)
<b>Food/clothing Store</b>	
39. Ackermans	40. Edgars
41. Foschini	42. Jet Stores
43. Markham	44. PEP
45. Woolworths	46. Other (specify)
<b>Furniture Store</b>	
47. Bradlows	48. Furniture City
49. Joshua Doore	50. Lewis
54. Other (specify)	
<b>Other places</b>	
52. Local Store (e.g Spaza, Corner Café, Garage)	
53. Mashonisa	
54. Burial society / stokvel / savings club	
55. Employer	
56. Friends or family	
57. Other	
58. None	

## SHOWCARD FC3

1. <b>I personally have funeral cover or funeral policy</b>
2. <b>I am covered by a funeral cover or policy that someone else pays the premium for</b>
3. I will benefit or receive the pay-out from someone else's burial society
4. I do not have any funeral cover at all



## SHOWCARD SA1

	SA1		
	1. Never had	2. Used to have in the past but don't have now	3. Have now
<b><i>Investments/Savings</i></b>			
1. Unit trusts			
2. Education policy or plan			
3. Investment or savings policy			
4. Endowment policy			
5. Deposit account (fixed or notice deposit)			
6. Shares on the stock exchange			
7. Government bonds			
8. +Off-shore investments			
9. Co-operative or village bank savings			
<b><i>Informal savings</i></b>			
10. Stokvel or umgalelo or savings club (incl. Church club)			
11. Giving money to someone who will guard it for you, to keep it safe			
12. Keep cash or savings at home			



# SHOWCARD SA2

<b>Big bank and Vehicle Finance</b>	
1. ABSA	2. ABSA Vehicle and Asset Finance
3. First National Bank/FNB	4. Nedbank
5. Post Bank / Post Office	6. Standard Bank
7. Stannic	8. Wesbank
9. Other (specify)	
<b>Smaller bank</b>	
10. African Bank	11. Capitec Bank
12. Ithala Bank	13. Teba Bank
14. Other (specify)	
<b>Insurance and medical aid/hospital insurance company</b>	
15. 1LifeDirect	16. AIG
17. Auto & General	18. Bonitas
19. Budget Insurance	20. Clientele Life
21. Dial Direct	22. Discovery Health
23. Discovery Life	24. FNB Insurance
25. Hollard Life Insurance	26. Hollard short term insurance
27. Legalwise	28. Liberty Life
29. Metropolitan	30. Metropolitan Life
31. Momentum	32. Mutual & Federal
33. Old Mutual	34. Outsurance
35. Sanlam	36. Santam
37. Zurich	38. Other (specify)
<b>Food/clothing Store</b>	
39. Ackermans	40. Edgars
41. Foschini	42. Jet Stores
43. Markham	44. PEP
45. Woolworths	46. Other (specify)
<b>Furniture Store</b>	
47. Bradlows	48. Furniture City
49. Joshua Doore	50. Lewis
4. Other (specify)	
<b>Other places</b>	
52. Local Store (e.g Spaza, Corner Café, Garage)	
53. Mashonisa	
54. Burial society / stokvel / savings club	
55. Employer	
56. Friends or family	
57. Other	
58. None	



## SHOWCARD SA9

1. Been on an overseas holiday	
2. Stayed in a 2 or 3 star hotel	
3. Member of a golf or country club	
4. Travelled first class or business class by plane	
5. Eaten out at a branded family restaurant such as Spur, Saddles, Panarotti's etc.	
6. Hired self-catering accommodation when holidaying	
7. Own an exotic, sports or luxury car or 4X4	
8. Attended a live performance at the theatre	
9. Stayed in a 4 or 5 star hotel	
10. Made use of public transport such as bus, train, minibus taxi	
11. Visited a private game or safari lodge	
12. Have children who attend a government school	
13. Part of your wealth is invested overseas	
14. Own a pre-owned vehicle	
15. Purchased or commissioned an original artwork	
16. Stayed in a caravan park or camping site when holidaying	
17. Was involved in fundraising	
18. Attended a society event such as a gala dinner, opening etc.	
19. Eaten out at an exclusive restaurant	
20. Have children who attend a private school	
21. Member of a boat club or yacht club	
22. Have travelled on a private plane, jet or helicopter	
23. Own two or more properties	
24. Stayed in family holiday home or flat when holidaying	
25. None of these	





## SHOWCARD MT3

How often do you send money to this person?					
1. Weekly	2. Monthly	3. Seasonally	4. Only once a year	5. Occasionally	6. When there is a need

## SHOWCARD MT4

Do you mostly send by.....				
1. Paying into a bank account	2. Post Office, Money-gram or Western Union	3. Cash with a relative or friend	4. Taxi, bus, other vehicle for a fee	5. Other

## SHOWCARD MT7

How often do you receive money from this person?					
1. Weekly	2. Monthly	3. Seasonally	4. Only once a year	5. Occasionally	6. When there is a need

## SHOWCARD MT8

Do you mostly receive money .....				
1. Paying into a bank account	2. Post Office, Money-gram or Western Union	3. Cash with a relative or friend	4. Taxi, bus, other vehicle for a fee	5. Other



## SHOWCARD PH3.1

	PH3.1	PH3.2	
	Yes	Own	Share
1 = No access to water inside the dwelling			
2 = Access to tap water inside dwelling			
3 = Tap water inside yard			
4 = Access to tap water on community stand			
5 = Other (please specify)			

## SHOWCARD PH6

1. Nearest health centre/ clinic/ hospital
2. Nearest place to do shopping for groceries
3. Nearest point of access to public transport
4. Nearest formal financial institution (e.g. bank)
5. Nearest ATM
6. Nearest Post Office
7. <If mentioned that respondent do have child/children> Nearest School
8. <If mentioned that respondent do have child/children> Nearest University/College
9. Nearest church

## SHOWCARD PH9.1

1 = Cell phone
2 = Public pay phone
3 = Cellular container phones
4 = Landline telephone at home
5 = Telephone/cell phone at a neighbour nearby
6 = Computer at home
7 = Computer elsewhere
8 = Internet at home
9 = Internet elsewhere
10 = Email at home
11 = Email elsewhere

# SHOWCARD V1.1

	V1.1 What do you regard as your 5 main threat/s to your income/livelihood? (show card V1.1)
<b>Natural</b>	
1. Drought or loss of access to water for farming	
2. Flooding	
3. Hail	
4. Frost	
5. Loss of your land or access to land you use	
6. Loss of natural resources or loss of access to them e.g. forest, rivers	
7. Harvest failure or losses of crop after harvest	
8. Death or illness of livestock	
9. Seasonality of produce	
10. Fire	
11. Insecurity/ non stability of resources	
<b>Social</b>	
12. Death of or loss of income from main income earner	
13. Death of other family member/s excluding main income earner	
14. Illness within your household or family	
15. Increase in household size(more dependents on household income)	
16. Separation or divorce	
17. Crime	
18. Theft	
19. Birth of a child	
20. Engagement	
21. Wedding	
22. Paying Lobola	
23. Xenophobia	
<b>Physical</b>	
24. Fuel shortages or fuel price increases	
25. Loss of your home	
26. Loss of car	
<b>Financial</b>	
27. Rise in prices	
28. Rise in interest rates	
29. Loss of your employment	
30. Loss of your business	
31. Loss of your savings	
32. Losing Government grant	
33. Loss of Social Grant	
34. Too much debt	
<b>Personal</b>	
35. Jealousy of others towards you	
36. Your own insecurity	
<b>Human</b>	
37. Loss of expertise	
38. Corruption by someone else	
39. Becoming disabled	
40. Competition for employment	
41. Competition for resources	
42. You do not see any risks to your household finances	
43. Other (please specify)	



## SHOWCARD V1.2

1 = Sell asset e.g. land, livestock	
2 = Take a loan from a formal financial institution	
3 = Take a loan from an informal financial organisation	
4 = Take loan from a friend or family	
5 = Take a loan from employer	
6 = Take a salary advancement from employer	
7 = Use your house or other property as collateral or security	
8 = Ask neighbours or friend or relatives for a donation	
9 = Claim from your insurance company	
10 = Apply for credit	
11 = Withdraw savings you have kept aside	
12 = Reduce consumption	
13 = Look for more work to supplement income	
14 = Ask for Government assistance	
15 = Don't know what I need to do	
16 = Nothing	
17 = Other (please specify)	

## SHOWCARD V2

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>	<i>D/K</i>	<i>N/A</i>
<b>1. It is important to have insurance just in case these threats happen</b>							
<b>2. It is important to have a lump sum saved up in case these threats happen</b>							
<b>3. It is better not to worry about risks that could happen</b>							
<b>4. You do not know what you would do if these risks happen</b>							
<b>5. You would have no one to support you if these risks happen</b>							



## SHOWCARD L1

	Often	Sometimes	Rarely	Never
1. Gone without enough food to eat				
2. Felt unsafe from crime in your home				
3. Gone without medicine or medical treatment that was needed				
4. Gone without cash income				
5. Gone without clean water to drink or cook with				
6. Gone without shelter				
7. Gone without electricity in your home (apart from power cuts)				
8. Gone without fuel to heat your home or cook food (apart from fuel shortages)				

## SHOWCARD D1.2

1. Age 16 – 17	
2. Age 18 – 29	
3. Age 30 – 44	
4. Age 45 – 59	
5. Age 60+	
6. Refuse	

## SHOWCARD D10

1. No formal education	
2. Some primary school	
3. Primary school completed	
4. Some high school	
5. Standard 8 or Grade 10 leavers	
6. Matriculated	
7. Some university	
8. University completed	
9. Any post-graduate qualification completed	
10. Any other post-matric qualification	
11. Some technical training, e.g. carpentry, motor mechanics	
12. Credits from a technikon or other tertiary education	
13. Completed apprenticeship/technical training, e.g. carpentry, motor mechanics	

### 8.5. Frequency distribution of key variables

Variable	Values	Freq.	%	Valid %	Cum. %
Age	<24 years	73	10.5	10.5	10.5
	25-34 years	200	28.9	28.9	39.4
	35-44 years	151	21.8	21.8	61.2
	45-54 years	100	14.4	14.4	75.6
	55-64 years	83	12.0	12.0	87.6
	65-74 years	57	8.2	8.2	95.8
	>75 years	29	4.2	4.2	100.0
	Total	693	100.0	100.0	
Gender	Female	424	61.2	61.2	61.2
	Male	269	38.8	38.8	100.0
	Total	693	100.0	100.0	
Area	Metro	143	20.6	20.6	20.6
	Non Metro	550	79.4	79.4	100.0
	Total	693	100.0	100.0	
Home Ownership	Own home or bonded	506	73.0	73.0	73.0
	Renting	48	6.9	6.9	79.9
	Does not own and not paying rent	137	19.8	19.8	99.7
	Don't know	2	.3	.3	100.0
	Total	693	100.0	100.0	
Primary source of Income	Formal employment	130	18.8	21.1	21.1
	Money from others	118	17.0	19.2	40.3
	Government grants	247	35.6	40.1	80.4
	Informal employment	84	12.1	13.6	94.0
	Self-employment	28	4.0	4.5	98.5

	Other	9	1.3	1.5	100.0
	Total	616	88.9	100.0	
	Missing	77	11.1		
	Total	693	100.0		
Number of Dependents	0	53	7.6	8.6	8.6
	1	151	21.8	24.5	33.1
	2	113	16.3	18.3	51.5
	3	108	15.6	17.5	69.0
	4	75	10.8	12.2	81.2
	5	48	6.9	7.8	89.0
	6+	68	9.8	11.0	100.0
	Total	616	88.9	100.0	
	Missing	77	11.1		
	Total	693	100.0		
Language	Afrikaans	46	6.6	6.6	6.6
	English	2	0.3	0.3	6.9
	IsiNdebele	12	1.7	1.7	8.7
	IsiXhosa	157	22.7	22.7	31.3
	IsiZulu	179	25.8	25.8	57.1
	Sepedi	82	11.8	11.8	69.0
	Sesotho	57	8.2	8.2	77.2
	Setswana	70	10.1	10.1	87.3
	SiSwati	27	3.9	3.9	91.2
	Tshivenda	27	3.9	3.9	95.1
	Xitsonga	34	4.9	4.9	100
	Total	693	100	100	
Relationship Status	Married or living together	207	29.9	29.9	29.9
	Single or never married	389	56.1	56.1	86.0

	Widowed / Separated / Divorced	96	13.9	13.9	99.9
	Other	1	.1	.1	100.0
	Total	693	100.0	100.0	
Education	No schooling	42	6.1	6.1	6.1
	Primary schooling	150	21.6	21.6	27.7
	Some high schooling	348	50.2	50.2	77.9
	Completed high schooling	133	19.2	19.2	97.1
	Post high school qualification	20	2.9	2.9	100.0
	Total	693	100.0	100.0	



### 8.6. Results of the logistic regression

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
Age (A)			13.522	6	0.035			
	-1.845	0.676	7.449	1	0.006	0.158	0.042	0.595
	-1.223	0.567	4.654	1	0.031	0.294	0.097	0.894
	-0.866	0.551	2.47	1	0.116	0.421	0.143	1.239
	-0.447	0.548	0.664	1	0.415	0.64	0.218	1.874
	-0.32	0.533	0.361	1	0.548	0.726	0.255	2.063
	-0.193	0.516	0.14	1	0.708	0.824	0.3	2.268
Gender (G)	0.31	0.228	1.846	1	0.174	1.364	0.872	2.134
Area (R)	0.423	0.251	2.836	1	0.092	1.526	0.933	2.497
Home ownership (H)			1.634	3	0.652			
	23.562	40192.728	0	1	1	1.71e10	0	.
	24.093	40192.728	0	1	1	2.91e10	0	.
	23.637	40192.728	0	1	1	1.84e10	0	.
Source of Income (I)			41.075	5	0			
	1.121	0.889	1.591	1	0.207	3.067	0.537	17.507
	-0.671	0.889	0.569	1	0.451	0.511	0.089	2.921
	-0.048	0.87	0.003	1	0.956	0.953	0.173	5.246
	-0.769	0.892	0.742	1	0.389	0.464	0.081	2.664
	1.049	1.007	1.085	1	0.298	2.855	0.396	20.564
Number of dependents (D)			12.867	6	0.045			
	-0.766	0.462	2.754	1	0.097	0.465	0.188	1.149
	-0.324	0.352	0.846	1	0.358	0.724	0.363	1.442
	-0.809	0.362	5.006	1	0.025	0.445	0.219	0.905

	-0.193	0.371	0.271	1	0.602	0.824	0.398	1.706
	0.288	0.401	0.514	1	0.473	1.333	0.608	2.925
	-0.523	0.437	1.433	1	0.231	0.593	0.252	1.396
Language (L)			24.317	10	0.007			
	-1.004	0.561	3.197	1	0.074	0.367	0.122	1.101
	-1.274	1.59	0.642	1	0.423	0.28	0.012	6.314
	-1.184	0.839	1.992	1	0.158	0.306	0.059	1.584
	0.292	0.461	0.403	1	0.526	1.339	0.543	3.303
	-0.615	0.456	1.82	1	0.177	0.541	0.221	1.321
	-0.364	0.483	0.568	1	0.451	0.695	0.27	1.79
	-0.923	0.533	3.004	1	0.083	0.397	0.14	1.128
	-0.522	0.523	0.996	1	0.318	0.593	0.213	1.654
	0.786	0.664	1.401	1	0.237	2.194	0.597	8.055
	-0.495	0.641	0.596	1	0.44	0.61	0.174	2.141
Marital Status (M)			0.227	3	0.973			
	-							
	18.397	40195.082	0	1	1	0	0	.
	-							
	18.493	40195.082	0	1	1	0	0	.
	-							
	18.516	40195.082	0	1	1	0	0	.
Educational level (E)			48.955	4	0			
	-3.818	0.84	20.644	1	0	0.022	0.004	0.114
	-2.897	0.769	14.206	1	0	0.055	0.012	0.249
	-1.851	0.732	6.39	1	0.011	0.157	0.037	0.66
	-0.823	0.751	1.2	1	0.273	0.439	0.101	1.914
	-1.731	56842.243	0	1	1	0.177		

### 8.7. Results of the logistic regression with significant variables

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
Age (A)			15.873	6	0.014			
	-1.808	0.631	8.195	1	0.004	0.164	0.048	0.566
	-1.096	0.519	4.455	1	0.035	0.334	0.121	0.925
	-0.789	0.519	2.313	1	0.128	0.454	0.164	1.256
	-0.33	0.522	0.398	1	0.528	0.719	0.258	2.002
	-0.278	0.518	0.287	1	0.592	0.757	0.274	2.092
	-0.174	0.51	0.116	1	0.733	0.84	0.309	2.285
Income (I)			38.544	5	0			
	0.845	0.855	0.977	1	0.323	2.327	0.436	12.43
	-0.756	0.86	0.774	1	0.379	0.469	0.087	2.53
	-0.228	0.842	0.074	1	0.786	0.796	0.153	4.144
	-0.976	0.862	1.281	1	0.258	0.377	0.07	2.042
	0.839	0.98	0.734	1	0.392	2.314	0.339	15.791
Dependents (D)			13.319	6	0.038			
	-0.808	0.45	3.223	1	0.073	0.446	0.184	1.077
	-0.339	0.344	0.969	1	0.325	0.713	0.363	1.399
	-0.687	0.355	3.741	1	0.053	0.503	0.251	1.009
	-0.172	0.367	0.221	1	0.639	0.842	0.41	1.728
	0.41	0.394	1.081	1	0.299	1.507	0.696	3.262
	-0.44	0.43	1.047	1	0.306	0.644	0.277	1.496
Language (L)			23.601	10	0.009			
	-0.92	0.553	2.769	1	0.096	0.398	0.135	1.178
	-1.341	1.563	0.736	1	0.391	0.262	0.012	5.597

	-1.134	0.83	1.864	1	0.172	0.322	0.063	1.639
	0.363	0.45	0.651	1	0.42	1.438	0.595	3.473
	-0.444	0.442	1.009	1	0.315	0.642	0.27	1.525
	-0.316	0.474	0.445	1	0.505	0.729	0.288	1.845
	-0.843	0.522	2.609	1	0.106	0.43	0.155	1.197
	-0.531	0.511	1.076	1	0.3	0.588	0.216	1.603
	0.808	0.657	1.514	1	0.219	2.244	0.619	8.135
	-0.487	0.634	0.59	1	0.442	0.615	0.177	2.129
Educational level (E)			50.202	4	0			
	-3.866	0.82	22.213	1	0	0.021	0.004	0.105
	-2.955	0.751	15.49	1	0	0.052	0.012	0.227
	-1.915	0.711	7.248	1	0.007	0.147	0.037	0.594
	-0.92	0.73	1.59	1	0.207	0.398	0.095	1.666
Constant	3.74	1.273	8.635	1	0.003	42.077		

		Predicted		
		Banking Status		Percentage
Observed		No	Yes	Correct
Banking status	No	179	98	64.6
	Yes	83	256	75.5
Overall percentage				70.6

Hosmer and Lemershow Test			
Step	Chi-square	df	Sig.
1	6.832	8	0.555



## 8.8. Results of the Cochran Q test

Q: You trust them with your money

		Value	
		No	Yes
QF2.Channel attributes - You trust them with your money - Banks		284	57
QF2.Channel attributes - You trust them with your money - Post Office		280	61
QF2.Channel attributes - You trust them with your money - Supermarket counters		256	85
N	341		
Cochran's Q	8.240		
df	2		
Asymp. Sig.	.016		

Q: They are cheap to use

		Value	
		No	Yes
QF2.Channel attributes - They are cheap to use - Banks		331	10
QF2.Channel attributes - They are cheap to use - Post Office		265	76
QF2.Channel attributes - They are cheap to use - Supermarket counters		234	107
N	341		
Cochran's Q	88.180		
df	2		
Asymp. Sig.	.000		

Q: They speak your language

		Value	
		0	1
QF2.Channel attributes - They speak your own language - Banks		300	41
QF2.Channel attributes - They speak your own language - Post Office		234	107
QF2.Channel attributes - They speak your own language - Supermarket counters		170	171
N	341		
Cochran's Q	124.275		
df	2		
Asymp. Sig.	.000		

Q: They treat you well

		Value	
		0	1
QF2.Channel attributes - They treat you well - Banks		311	30
QF2.Channel attributes - They treat you well - Post Office		265	76
QF2.Channel attributes - They treat you well - Supermarket counters		210	131
N	341		
Cochran's Q	78.677		
df	2		
Asymp. Sig.	.000		

### 8.9. Results of the McNemar test

McNemar test for: You trust them with your money

Q: Channel attributes - You trust them with your money - Banks \* Post Office

		QF2.Channel attributes - You trust them with your money - Post Office		Total
		NO	YES	
QF2.Channel attributes - You trust them with your money - Banks	NO	237	47	284
	YES	43	14	57
Total		280	61	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	.078	.150	
	Cramer's V	.078	.150	
N of Valid Cases		341		
Chi-square tests		Value	Exact Sig.	
McNemar Test			.752 <sup>a</sup>	
N of Valid Cases		341		

Q: Channel attributes - You trust them with your money - Banks \* Supermarkets

		QF2.Channel attributes - You trust them with your money - Supermarket		Total
		NO	YES	
QF2.Channel attributes - You trust them with your money - Banks	NO	204	80	284
	YES	52	5	57
Total		256	85	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	-.167	.002	
	Cramer's V	.167	.002	
N of Valid Cases		341		
	Test	Chi-Square	Sig.	
1	Uncorrected	5.939	.0148	
2	Corrected*	5.523	.0188	

95%CI for difference in proportions (paired) (\*)

	Percent A	Percent B	Difference	Lower.CI	Upper.CI
YES	16.72%	24.93%	-8.21%	-14.71%	-1.62%

(\*) A = Banks. B = Supermarkets

McNemar test for: They are cheap to use

Q: Channel attributes – They are cheap to use - Banks \* Post Office

		QF2.Channel attributes - They are cheap to use – Post Office		Total
		NO	YES	
QF2.Channel attributes -	NO	259	72	331
They are cheap to use -	YES	6	4	10
Banks				
Total		265	76	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	.074	.172	
	Cramer's V	.074	.172	
N of Valid Cases		341		
	Test	Chi-Square	Sig.	
1	Uncorrected	55.846	.0000	
2	Corrected*	54.167	.0000	

95%CI for difference in proportions (paired) (\*)

	Percent A	Percent B	Difference	Lower.CI	Upper.CI
YES	2.93%	22.29%	-19.35%	-24.18%	-14.73%

(\*) A = Banks. B = Post Office

Q: Channel attributes – They are cheap to use – Post Office \* Supermarkets

		QF2.Channel attributes - They are cheap to use – Supermarkets		Total
		NO	YES	
QF2.Channel attributes -	NO	175	90	265
They are cheap to use –	YES	59	17	76
Post Office				
Total		265	234	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	-.104	.055	
	Cramer's V	.104	.055	
N of Valid Cases		341		
	Test	Chi-Square	Sig.	
1	Uncorrected	6.450	.0111	
2	Corrected*	6.040	.0140	

95%CI for difference in proportions (paired) (\*)

	Percent A	Percent B	Difference	Lower.CI	Upper.CI
YES	22.29%	31.38%	-9.09%	-15.96%	-2.10%

(\*) A = Post Office. B = Supermarkets



McNemar test for: They speak your language

Q: Channel attributes – They speak your language - Banks \* Post Office

		QF2.Channel attributes - They speak your language – Post Office		Total
		NO	YES	
QF2.Channel attributes -	NO	222	78	300
They speak your language -	YES	12	29	41
Banks				
Total		265	234	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	.314	.000	
	Cramer's V	.314	.000	
N of Valid Cases		341		
	Test	Chi-Square	Sig.	
1	Uncorrected	55.846	.0000	
2	Corrected*	54.167	.0000	

95%CI for difference in proportions (paired) (\*)

	Percent A	Percent B	Difference	Lower.CI	Upper.CI
YES	12.02%	31.38%	-19.35%	-24.44%	-14.25%

(\*) A = Banks. B = Post Office

Q: Channel attributes – They speak your language – Post Office \* Supermarkets

		QF2.Channel attributes - They speak your language – Supermarkets		Total
		NO	YES	
QF2.Channel attributes -	NO	122	112	234
They speak your language –	YES	48	59	107
Post Office				
Total		265	170	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	.068	.212	
	Cramer's V	.068	.212	
N of Valid Cases		341		
	Test	Chi-Square	Sig.	
1	Uncorrected	25.600	.0000	
2	Corrected*	24.806	.0000	

95%CI for difference in proportions (paired) (\*)

	Percent A	Percent B	Difference	Lower.CI	Upper.CI
YES	31.38%	50.15%	-18.77%	-25.61%	-11.65%

(\*) A = Post Office. B = Supermarkets





Total	341	100.0		
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McNemar test for: They treat you well

Q: Channel attributes – They treat you well - Banks \* Post Office

		QF2.Channel attributes - They treat you well – Post Office		Total
		NO	YES	
QF2.Channel attributes -	NO	245	66	311
They treat you well - Banks	YES	20	10	30
Total		265	265	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	.082	.128	
	Cramer's V	.082	.128	
N of Valid Cases		341		
	Test	Chi-Square	Sig.	
1	Uncorrected	24.605	.0000	
2	Corrected*	23.547	.0000	

95%CI for difference in proportions (paired) (\*)

	Percent A	Percent B	Difference	Lower.CI	Upper.CI
YES	8.80%	22.29%	-13.49%	-18.69%	-8.30%

(\*) A = Banks. B = Post Office

Q: Channel attributes – They treat you well – Post Office \* Supermarkets

		QF2.Channel attributes - They treat you well – Supermarkets		Total
		NO	YES	
QF2.Channel attributes -	NO	160	105	265
They treat you well – Post Office	YES	50	26	76
Total		265	210	341
		Value	Approx. Sig.	
Nominal by Nominal	Phi	-.046	.392	
	Cramer's V	.046	.392	
N of Valid Cases		341		
	Test	Chi-Square	Sig.	
1	Uncorrected	19.516	.0000	
2	Corrected*	18.813	.0000	

95%CI for difference in proportions (paired) (\*)

	Percent A	Percent B	Difference	Lower.CI	Upper.CI
YES	22.29%	38.42%	-16.13%	-22.95%	-9.10%

(\*) A = Post Office. B = Supermarkets

### 8.10. Channel availability

QE1.Channels available in community					
Post Office		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	150	44.0	44.0	44.0
	YES	191	56.0	56.0	100.0
	Total	341	100.0	100.0	
Bank branch		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	226	66.3	66.3	66.3
	YES	115	33.7	33.7	100.0
	Total	341	100.0	100.0	
Supermarket		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	145	42.5	42.5	42.5
	YES	196	57.5	57.5	100.0
	Total	341	100.0	100.0	

QE2.Places in community by main mode of access					
Post Office		Freq.	%	Valid %	Cum. %
Valid	Walk	103	30.2	53.9	53.9
	Taxi	75	22.0	39.3	93.2
	Public transport	11	3.2	5.8	99.0
	A lift with someone	1	.3	.5	99.5
	Dont know	1	.3	.5	100.0
	Total	191	56.0	100.0	
Missing	System	150	44.0		
Total		341	100.0		
Bank branch		Freq.	%	Valid %	Cum. %
Valid	Walk	28	8.2	24.3	24.3
	My own car	1	.3	.9	25.2
	Taxi	75	22.0	65.2	90.4
	Public transport	8	2.3	7.0	97.4
	Dont know	3	.9	2.6	100.0
	Total	115	33.7	100.0	
Missing	System	226	66.3		
Total		341	100.0		
Supermarket		Freq.	%	Valid %	Cum. %
Valid	Walk	124	36.4	63.3	63.3
	My own car	1	.3	.5	63.8
	Taxi	59	17.3	30.1	93.9
	Public transport	8	2.3	4.1	98.0
	A lift with someone	4	1.2	2.0	100.0
	Total	196	57.5	100.0	
Missing	System	145	42.5		



### 8.11. Matrix of implied correlations

	Q147 K	Q152 C	Q152 E	Q152 H	Q135 BA	Q135 AS	Q135 AC	Q135 M	Q145	Q144	Q143	Q142	Q147 L	Q147 M	Q147 D	Q147 B	Q147J	Q147 G	Q147 C	Q152 A	Q152 G	Q152J	Q156 H	Q156 G	Q156 E	Q156 D	Q152 D	Q147 H	Q147 E					
Q147 K	1.00																																	
Q152 C	0.40	1.00																																
Q152 E	0.32	0.44	1.00																															
Q152 H	0.36	0.50	0.40	1.00																														
Q135 BA	-0.03	0.00	0.00	0.00	1.00																													
Q135 AS	-0.04	0.00	0.00	0.00	0.51	1.00																												
Q135 AC	-0.04	0.00	0.00	0.00	0.51	0.60	1.00																											
Q135 M	-0.04	0.00	0.00	0.00	0.51	0.61	0.61	1.00																										
Q145	0.07	0.14	0.11	0.13	0.18	0.21	0.21	0.21	1.00																									
Q144	0.07	0.14	0.11	0.13	0.18	0.21	0.21	0.21	0.83	1.00																								
Q143	0.07	0.14	0.11	0.12	0.17	0.21	0.21	0.21	0.81	0.81	1.00																							
Q142	0.07	0.14	0.11	0.12	0.17	0.21	0.21	0.21	0.82	0.81	0.79	1.00																						
Q147 L	0.49	0.38	0.31	0.35	-0.03	-0.04	-0.04	-0.04	0.07	0.07	0.07	0.07	1.00																					
Q147 M	0.55	0.43	0.34	0.39	-0.04	-0.04	-0.05	-0.05	0.08	0.08	0.07	0.07	0.53	1.00																				
Q147 D	0.52	0.41	0.32	0.37	-0.04	-0.04	-0.04	-0.04	0.07	0.07	0.07	0.07	0.50	0.56	1.00																			
Q147 B	0.40	0.31	0.25	0.28	-0.03	-0.03	-0.03	-0.03	0.06	0.06	0.05	0.05	0.38	0.43	0.41	1.00																		
Q147J	0.44	0.38	0.30	0.34	-0.02	-0.02	-0.02	-0.02	0.12	0.12	0.11	0.11	0.42	0.47	0.45	0.34	1.00																	
Q147 G	0.45	0.39	0.31	0.35	-0.02	-0.02	-0.02	-0.02	0.12	0.12	0.12	0.12	0.44	0.49	0.47	0.36	0.41	1.00																
Q147 C	0.45	0.39	0.31	0.35	-0.02	-0.02	-0.02	-0.02	0.12	0.12	0.12	0.12	0.43	0.48	0.46	0.35	0.41	0.42	1.00															
Q152 A	0.20	0.28	0.23	0.26	0.03	0.03	0.03	0.03	0.11	0.11	0.11	0.11	0.19	0.21	0.20	0.15	0.16	0.16	0.16	1.00														
Q152 G	0.22	0.32	0.25	0.29	0.03	0.04	0.04	0.04	0.12	0.12	0.12	0.12	0.21	0.24	0.23	0.17	0.18	0.18	0.18	0.54	1.00													
Q152J	0.23	0.33	0.26	0.30	0.03	0.04	0.04	0.04	0.13	0.13	0.12	0.12	0.22	0.25	0.23	0.18	0.18	0.19	0.19	0.56	0.63	1.00												
Q156 H	-0.01	0.01	0.01	0.01	0.03	0.04	0.04	0.04	-0.04	-0.04	-0.04	-0.04	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.08	-0.09	-0.10	1.00											
Q156 G	-0.01	0.01	0.01	0.01	0.03	0.04	0.04	0.04	-0.04	-0.04	-0.04	-0.04	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.09	-0.10	-0.10	0.56	1.00										
Q156 E	-0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	-0.04	-0.04	-0.03	-0.03	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.07	-0.08	-0.09	0.49	0.50	1.00									
Q156 D	-0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	-0.03	-0.03	-0.03	-0.03	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	-0.05	-0.06	-0.06	0.35	0.36	0.32	1.00								
Q152 D	0.40	0.39	0.31	0.36	-0.01	-0.02	-0.02	-0.02	0.11	0.11	0.10	0.10	0.38	0.43	0.41	0.31	0.35	0.37	0.36	0.23	0.26	0.27	0.01	0.01	0.01	0.01	1.00							
Q147 H	0.43	0.43	0.34	0.38	-0.02	-0.02	-0.02	-0.02	0.12	0.12	0.11	0.11	0.41	0.46	0.44	0.34	0.38	0.40	0.39	0.25	0.28	0.29	0.01	0.01	0.01	0.01	0.41	1.00						
Q147 E	0.45	0.45	0.36	0.41	-0.02	-0.02	-0.02	-0.02	0.12	0.12	0.12	0.12	0.44	0.49	0.46	0.36	0.40	0.42	0.41	0.26	0.30	0.31	0.01	0.01	0.01	0.01	0.43	0.46	1.00					

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## 8.12. CFA fit indices

### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	115	531.611	349	.000	1.523
Saturated model	464	.000	0		
Independence model	58	4894.558	406	.000	12.056

### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.891	.874	.960	.953	.959
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.860	.766	.825
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### NCP

Model	NCP	LO 90	HI 90
Default model	182.611	124.392	248.791
Saturated model	.000	.000	.000
Independence model	4488.558	4266.780	4717.617

### FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.564	.537	.366	.732
Saturated model	.000	.000	.000	.000
Independence model	14.396	13.202	12.549	13.875

### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.039	.032	.046	.997
Independence model	.180	.176	.185	.000



AIC

Model	AIC	BCC	BIC	CAIC
Default model	761.611	783.869		
Saturated model	928.000	1017.806		
Independence model	5010.558	5021.784		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.240	2.069	2.435	2.305
Saturated model	2.729	2.729	2.729	2.994
Independence model	14.737	14.085	15.411	14.770



### 8.13. CFA Standardised residual covariance

	Q147 K	Q152 C	Q152 E	Q152 H	Q135 BA	Q135 AS	Q135 AC	Q135 M	Q145	Q144	Q143	Q142	Q147 L	Q147 M	Q147 D	Q147 B	Q147J	Q147 G	Q147 C	Q152 A	Q152 G	Q152J	Q156 H	Q156 G	Q156 E	Q156 D	Q152 D	Q147 H	Q147 E	
Q147 K	0.00																													
Q152 C	-0.01	0.00																												
Q152 E	0.11	0.00	0.00																											
Q152 H	-0.05	0.01	-0.02	0.00																										
Q135 BA	0.03	0.00	-0.02	-0.03	0.00																									
Q135 AS	0.04	0.02	0.02	-0.01	0.00	0.00																								
Q135 AC	0.04	0.01	-0.01	-0.01	0.00	0.00	0.00																							
Q135 M	0.04	0.04	-0.01	-0.04	0.00	0.00	0.00	0.00																						
Q145	0.03	0.03	0.01	-0.05	0.00	0.02	0.01	0.00	0.00																					
Q144	0.14	0.08	0.13	-0.07	-0.01	0.03	0.01	-0.04	-0.02	0.00																				
Q143	0.03	-0.03	-0.02	-0.11	-0.02	0.00	-0.02	-0.06	-0.03	0.05	0.00																			
Q142	0.10	0.03	0.12	-0.10	0.02	0.03	0.00	0.02	0.04	-0.04	-0.02	0.00																		
Q147 L	0.04	-0.02	0.07	-0.03	-0.01	-0.03	0.01	-0.01	-0.06	0.04	-0.02	-0.02	0.00																	
Q147 M	0.05	-0.02	-0.07	0.05	-0.01	-0.03	0.00	-0.02	0.02	0.04	0.07	0.03	-0.02	0.00																
Q147 D	-0.04	-0.01	0.04	-0.03	0.00	0.01	0.03	0.00	-0.10	0.01	-0.05	-0.08	-0.02	-0.02	0.00															
Q147 B	-0.06	-0.01	-0.03	0.12	-0.01	-0.04	-0.03	-0.05	-0.15	-0.09	-0.07	-0.02	0.01	0.04	0.01	0.00														
Q147J	-0.02	-0.02	-0.04	-0.14	0.02	0.00	0.00	0.02	-0.08	-0.13	-0.15	-0.26	0.14	-0.03	0.07	0.02	0.00													
Q147 G	0.01	0.03	0.09	-0.03	-0.02	-0.01	0.00	-0.03	0.06	0.19	0.16	0.20	0.04	-0.07	-0.09	0.03	0.03	0.00												
Q147 C	-0.05	0.07	-0.05	0.04	0.00	0.01	0.01	0.00	-0.03	0.02	0.03	0.01	-0.01	0.00	0.04	0.03	0.04	-0.06	0.00											
Q152 A	0.14	0.06	0.20	0.10	-0.05	0.00	0.03	0.04	0.27	0.17	0.05	0.15	-0.04	-0.05	0.13	-0.03	0.06	0.06	0.04	0.00										
Q152 G	0.02	-0.10	-0.01	0.05	-0.06	-0.01	0.03	0.01	-0.17	-0.04	-0.18	-0.18	-0.04	-0.06	-0.01	-0.15	-0.05	-0.13	0.01	-0.03	0.00									
Q152J	0.06	-0.16	0.00	0.08	-0.02	-0.04	0.01	0.02	-0.01	0.11	-0.05	-0.05	0.00	-0.05	0.05	-0.01	-0.01	0.01	0.03	-0.01	0.03	0.00								
Q156 H	0.00	0.02	0.00	-0.02	0.01	-0.01	-0.01	0.00	-0.02	-0.01	0.00	-0.03	-0.02	0.00	0.00	0.01	0.00	-0.03	0.01	0.02	0.02	0.00	0.00							
Q156 G	0.01	0.02	0.01	-0.02	0.01	-0.01	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00	-0.01	0.00	0.02	-0.01	0.02	-0.02	0.01	-0.03	0.00	0.00						
Q156 E	0.03	0.02	-0.01	-0.01	0.00	-0.01	-0.01	0.01	0.00	0.02	0.01	0.00	-0.03	0.02	-0.01	0.00	-0.02	-0.03	0.03	0.00	0.03	-0.02	0.00	0.00	0.00					
Q156 D	0.02	0.00	-0.01	-0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.02	0.01	-0.01	-0.01	-0.01	0.02	0.01	-0.01	-0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00				
Q152 D	0.00	0.11	0.20	0.20	0.03	0.06	0.04	-0.01	0.10	0.21	0.07	0.10	-0.20	-0.04	-0.05	-0.09	-0.18	-0.06	-0.08	0.17	0.18	0.17	0.00	-0.02	0.00	0.00	0.00			
Q147 H	0.10	-0.02	-0.14	-0.05	0.01	-0.01	0.00	-0.04	0.04	0.09	0.05	0.04	-0.09	0.02	0.02	-0.05	-0.07	0.20	-0.02	-0.16	-0.01	-0.16	0.00	0.01	0.03	-0.01	0.02	0.00		
Q147 E	-0.02	-0.05	-0.11	-0.09	-0.01	-0.02	0.00	-0.01	-0.18	-0.09	-0.09	-0.18	0.03	0.06	0.12	-0.06	0.07	0.04	0.05	-0.01	0.01	-0.12	-0.01	0.01	0.00	-0.01	-0.06	0.05	0.00	

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### 8.14. Modification Indices for CFA model

#### Covariances

			M.I.	Par Change
e29	<-->	TASKm	4.830	.038
e27	<-->	e29	5.038	.117
e24	<-->	SOC	4.746	-.048
e24	<-->	TSEm	7.449	-.006
e22	<-->	SOC	5.321	.055
e22	<-->	TSEm	6.788	.006
e22	<-->	BI	4.431	-.024
e22	<-->	e26	4.423	.035
e18	<-->	e22	5.418	.042
e17	<-->	BI	6.813	-.089
e16	<-->	e28	4.414	.084
e14	<-->	BI	5.452	-.076
e14	<-->	e28	8.338	.145
e13	<-->	e28	5.488	-.125
e13	<-->	e21	6.687	.134
e13	<-->	e18	7.937	-.156
e13	<-->	e17	6.455	.143
e12	<-->	BI	4.134	.079
e10	<-->	HED	5.268	.094
e10	<-->	e27	5.185	.154
e10	<-->	e25	4.279	-.041
e10	<-->	e21	9.436	.170
e9	<-->	BI	8.683	.121
e8	<-->	e24	4.575	-.043
e7	<-->	e23	5.437	-.007

e6	<-->	e24	9.501	-.011
e6	<-->	e17	4.214	.024
e4	<-->	TASKm	4.460	.009
e4	<-->	e29	5.009	.022
e4	<-->	e23	4.189	.007
e4	<-->	e20	6.149	.027
e3	<-->	PU	8.453	-.084
e3	<-->	HED	27.290	.173
e3	<-->	e27	8.085	.156
e3	<-->	e28	12.837	.167
e3	<-->	e24	8.886	.044
e3	<-->	e22	7.404	-.044
e3	<-->	e17	8.996	-.147
e3	<-->	e13	9.358	-.153
e2	<-->	e29	4.661	.098
e2	<-->	e27	5.431	-.141
e2	<-->	e12	11.020	.205
e2	<-->	e10	7.997	-.166
e2	<-->	e9	4.428	.137
e1	<-->	HED	7.333	-.088
e1	<-->	e15	8.264	.107

Regression Weights

			M.I.	Par Change
Q147K	<---	TASKm	6.580	.352
Q147K	<---	Q135AS	4.531	.202
Q147K	<---	Q156D	5.386	.441
Q152C	<---	TSEm	4.003	.999
Q152H	<---	TSEm	4.684	-1.132
Q135AS	<---	TSEm	5.323	-.385
Q135AS	<---	Q156G	9.728	-.184
Q135AC	<---	Q156H	4.307	-.129
Q135M	<---	TSEm	4.874	.399
Q135M	<---	Q156G	4.899	.141
Q135M	<---	Q156E	5.451	.094
Q144	<---	Q156D	6.459	.526
Q147B	<---	TASKm	4.159	-.318
Q156D	<---	TASKm	5.468	.081
Q156D	<---	Q135AC	6.075	.060
Q152D	<---	SOC	8.526	.114
Q152D	<---	Q135AS	6.751	.260

### 8.15. SEM fit indices

#### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	102	544.344	362	.000	1.504
Saturated model	464	.000	0		
Independence model	58	4894.558	406	.000	12.056

#### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.889	.875	.960	.954	.959
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

#### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.892	.792	.855
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

#### NCP

Model	NCP	LO 90	HI 90
Default model	182.344	123.590	249.069
Saturated model	.000	.000	.000
Independence model	4488.558	4266.780	4717.617

#### FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.601	.536	.363	.733
Saturated model	.000	.000	.000	.000
Independence model	14.396	13.202	12.549	13.875

#### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.038	.032	.045	.999

Independence model	.180	.176	.185	.000
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AIC

Model	AIC	BCC	BIC	CAIC
Default model	748.344	768.086		
Saturated model	928.000	1017.806		
Independence model	5010.558	5021.784		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.201	2.028	2.397	2.259
Saturated model	2.729	2.729	2.729	2.994
Independence model	14.737	14.085	15.411	14.770

## 8.16. Modification indices structural model

### Covariances

			M.I.	Par Change
TSE	<-->	SOC	7.113	-.025
e32	<-->	SOC	5.062	.148
e32	<-->	resPEOU	27.793	-.142
e32	<-->	resPU	10.499	-.078
e29	<-->	TASK	6.715	.047
e26	<-->	TSE	5.880	.015
e27	<-->	e32	9.004	.166
e27	<-->	e29	5.361	.120
e28	<-->	e32	14.092	.176
e24	<-->	e32	8.522	.044
e22	<-->	TSE	6.410	.006
e22	<-->	e32	6.897	-.043
e18	<-->	e22	5.291	.041
e17	<-->	resBI	7.386	-.094
e17	<-->	e32	9.044	-.149
e14	<-->	resBI	5.375	-.077
e14	<-->	e28	8.199	.144
e13	<-->	e32	10.507	-.164
e13	<-->	e28	6.472	-.137
e13	<-->	e21	6.407	.131
e13	<-->	e18	7.858	-.156
e13	<-->	e17	6.944	.149
e10	<-->	e21	9.706	.173
e9	<-->	resBI	8.467	.121
e8	<-->	TSE	6.923	-.022



e7	<-->	e23	5.396	-.007
e6	<-->	SOC	6.230	-.038
e6	<-->	e24	8.471	-.010
e4	<-->	TASK	6.106	.011
e4	<-->	e20	6.051	.026
e2	<-->	e12	10.291	.197
e2	<-->	e10	8.204	-.169
e1	<-->	e15	7.644	.102

Regression Weights

			M.I.	Par Change
Q152D	<---	SOC	9.310	.121
Q152D	<---	HED	5.752	.161
Q152D	<---	Q135AS	6.382	.255
Q147K	<---	TASK	6.715	.357
Q152C	<---	TSE	5.880	1.213
Q135AS	<---	Q156G	8.814	-.174
Q135M	<---	TSE	6.410	.459
Q135M	<---	Q156G	5.715	.153
Q135M	<---	Q156E	6.146	.100
Q144	<---	Q156D	6.426	.525
Q152J	<---	TSE	6.923	-1.740
Q152J	<---	Q156G	6.837	-.612
Q156D	<---	TASK	6.106	.086
Q156D	<---	Q135AC	6.540	.063



### 8.18. Multi-group fit indices – gender

#### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Unrestricted loadings	146	1033.326	724	.000	1.427
Equal loadings	139	1036.975	731	.000	1.419
Saturated model	870	.000	0		
Independence model	58	5367.668	812	.000	6.610

#### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	.807	.784	.933	.924	.932
Equal loadings	.807	.785	.934	.925	.933
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

#### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Unrestricted loadings	.892	.720	.831
Equal loadings	.900	.726	.840
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

#### NCP

Model	NCP	LO 90	HI 90
Unrestricted loadings	309.326	228.070	398.595
Equal loadings	305.975	224.711	395.255
Saturated model	.000	.000	.000
Independence model	4555.668	4327.265	4790.688

FMIN

Model	FMIN	F0	LO 90	HI 90
Unrestricted loadings	3.048	.912	.673	1.176
Equal loadings	3.059	.903	.663	1.166
Saturated model	.000	.000	.000	.000
Independence model	15.834	13.439	12.765	14.132

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Unrestricted loadings	.036	.030	.040	1.000
Equal loadings	.035	.030	.040	1.000
Independence model	.129	.125	.132	.000

AIC

Model	AIC	BCC	BIC	CAIC
Unrestricted loadings	1325.326	1392.070		
Equal loadings	1314.975	1378.518		
Saturated model	1740.000	2137.718		
Independence model	5483.668	5510.182		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Unrestricted loadings	3.910	3.670	4.173	4.106
Equal loadings	3.879	3.639	4.142	4.066
Saturated model	5.133	5.133	5.133	6.306
Independence model	16.176	15.502	16.869	16.254

### 8.19. Multi-group critical ratios – gender

	EM	AM	FM	GM	BM	DM	CM	EF	AF	FF	GF	BF	DF	CF
EM	0.000													
AM	0.583	0.000												
FM	-	-	0.000											
GM	5.376	4.693	2.275	0.000										
BM	-	-	-	-	0.000									
DM	2.117	2.338	1.890	1.124	1.160	0.000								
CM	-	-	-	-	-	-	0.000							
EF	0.195	0.489	6.434	5.267	1.689	2.172	3.734	0.000						
AF	-	-	-	-	-	-	-	-	0.000					
FF	7.131	5.706	1.260	3.082	6.296	2.286	2.492	7.391	4.845	0.000				
GF	-	-	-	-	-	-	-	-	-	-	0.000			
BF	1.764	2.021	4.507	3.241	0.361	0.817	1.991	1.813	1.071	4.711	2.253	0.000		
DF	-	-	-	-	-	-	-	-	-	-	-	-	0.000	
CF	2.337	2.491	2.935	1.877	1.118	0.222	1.073	2.140	1.550	2.810	1.133	0.797	0.619	0.000

## 8.20. Multi-group fit indices – age

### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Unrestricted loadings	146	994.222	724	.000	1.373
Equal loadings	139	1006.775	731	.000	1.377
Saturated model	870	.000	0		
Independence model	58	5421.545	812	.000	6.677

### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	.817	.794	.942	.934	.941
Equal loadings	.814	.794	.941	.934	.940
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Unrestricted loadings	.892	.728	.839
Equal loadings	.900	.733	.846
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### NCP

Model	NCP	LO 90	HI 90
Unrestricted loadings	270.222	191.507	356.990
Equal loadings	275.775	196.466	363.131
Saturated model	.000	.000	.000
Independence model	4609.545	4379.886	4845.819



FMIN

Model	FMIN	F0	LO 90	HI 90
Unrestricted loadings	2.933	.797	.565	1.053
Equal loadings	2.970	.813	.580	1.071
Saturated model	.000	.000	.000	.000
Independence model	15.993	13.597	12.920	14.294

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Unrestricted loadings	.033	.028	.038	1.000
Equal loadings	.033	.028	.038	1.000
Independence model	.129	.126	.133	.000

AIC

Model	AIC	BCC	BIC	CAIC
Unrestricted loadings	1286.222	1349.318		
Equal loadings	1284.775	1344.846		
Saturated model	1740.000	2115.985		
Independence model	5537.545	5562.611		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Unrestricted loadings	3.794	3.562	4.050	3.980
Equal loadings	3.790	3.556	4.048	3.967
Saturated model	5.133	5.133	5.133	6.242
Independence model	16.335	15.657	17.032	16.409



### 8.21. Multi-group critical ratios – age

	EM	AM	FM	GM	BM	DM	CM	EF	AF	FF	GF	BF	DF	CF
EM	0.000													
AM	1.341	0.000												
FM	-	-	0.000											
GM	-	-	1.908	0.000										
BM	-	-	6.246	4.869	0.000									
DM	-	-	0.920	0.054	2.749	0.000								
CM	-	-	0.327	0.468	2.944	0.394	0.000							
EF	-	-	7.004	5.989	2.210	4.141	4.432	0.000						
AF	-	-	5.239	4.334	1.061	3.131	3.440	0.725	0.000					
FF	-	-	0.100	2.020	6.081	0.866	0.308	7.553	5.076	0.000				
GF	-	-	3.597	1.511	3.661	0.597	1.081	4.788	3.725	2.639	0.000			
BF	-	-	5.539	4.218	0.220	2.487	2.854	2.314	1.015	5.313	3.139	0.000		
DF	-	-	2.413	1.890	0.015	1.624	1.885	1.219	0.605	2.366	1.479	0.125	0.000	
CF	-	-	3.451	2.236	1.655	1.346	1.747	3.069	2.020	2.855	1.322	1.524	0.885	0.000

## 8.22. Multi-group fit indices – location

### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Unrestricted loadings	146	1171.943	724	.000	1.619
Equal loadings	139	1196.990	731	.000	1.637
Saturated model	870	.000	0		
Independence model	58	5672.017	812	.000	6.985

### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	.793	.768	.909	.897	.908
Equal loadings	.789	.766	.906	.893	.904
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Unrestricted loadings	.892	.707	.809
Equal loadings	.900	.710	.814
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### NCP

Model	NCP	LO 90	HI 90
Unrestricted loadings	447.943	358.242	545.546
Equal loadings	465.990	375.047	564.826
Saturated model	.000	.000	.000
Independence model	4860.017	4624.603	5102.030



FMIN

Model	FMIN	F0	LO 90	HI 90
Unrestricted loadings	3.457	1.321	1.057	1.609
Equal loadings	3.531	1.375	1.106	1.666
Saturated model	.000	.000	.000	.000
Independence model	16.732	14.336	13.642	15.050

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Unrestricted loadings	.043	.038	.047	.997
Equal loadings	.043	.039	.048	.994
Independence model	.133	.130	.136	.000

AIC

Model	AIC	BCC	BIC	CAIC
Unrestricted loadings	1463.943	1667.353		
Equal loadings	1474.990	1668.648		
Saturated model	1740.000	2952.098		
Independence model	5788.017	5868.823		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Unrestricted loadings	4.318	4.054	4.606	4.918
Equal loadings	4.351	4.083	4.643	4.922
Saturated model	5.133	5.133	5.133	8.708
Independence model	17.074	16.379	17.788	17.312

### 8.23. Multi-group critical ratios – location

	EM	AM	FM	GM	BM	DM	CM	EF	AF	FF	GF	BF	DF	CF
EM	0.000													
AM	0.882	0.000												
FM	11.177	6.562	0.000											
GM	-6.852	5.232	3.447	0.000										
BM	-1.516	1.693	7.766	5.400	0.000									
DM	-2.511	2.762	2.070	0.903	1.663	0.000								
CM	-3.719	2.920	2.299	0.841	2.760	0.294	0.000							
EF	0.582	0.540	0.789	0.738	0.623	0.698	0.713	0.000						
AF	-1.776	2.312	1.007	0.313	1.227	0.195	0.023	0.670	0.000					
FF	-9.319	5.971	2.066	2.652	7.037	1.584	1.853	0.764	0.752	0.000				
GF	-7.217	5.513	1.007	1.552	5.534	1.520	1.665	0.769	0.722	0.089	0.000			
BF	-6.638	5.093	2.095	0.597	4.918	1.106	1.096	0.750	0.449	0.975	0.797	0.000		
DF	-1.380	1.841	2.744	1.711	0.588	0.698	1.064	0.653	0.704	2.315	2.231	1.909	0.000	
CF	-8.706	5.802	2.019	2.028	6.560	1.493	1.700	0.758	0.747	0.420	0.260	0.729	2.249	0.000

## 8.24. Multi-group fit indices – financial dependency

### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Unrestricted loadings	146	1086.935	724	.000	1.501
Equal loadings	139	1091.340	731	.000	1.493
Saturated model	870	.000	0		
Independence model	58	4620.669	812	.000	5.690

### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unrestricted loadings	.765	.736	.907	.893	.905
Equal loadings	.764	.738	.907	.895	.905
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Unrestricted loadings	.892	.682	.807
Equal loadings	.900	.688	.815
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### NCP

Model	NCP	LO 90	HI 90
Unrestricted loadings	362.935	278.316	455.518
Equal loadings	360.340	275.668	452.981
Saturated model	.000	.000	.000
Independence model	3808.669	3598.700	4026.000

FMIN

Model	FMIN	F0	LO 90	HI 90
Unrestricted loadings	3.952	1.320	1.012	1.656
Equal loadings	3.969	1.310	1.002	1.647
Saturated model	.000	.000	.000	.000
Independence model	16.802	13.850	13.086	14.640

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Unrestricted loadings	.043	.037	.048	.991
Equal loadings	.042	.037	.047	.994
Independence model	.131	.127	.134	.000

AIC

Model	AIC	BCC	BIC	CAIC
Unrestricted loadings	1378.935	1463.578		
Equal loadings	1369.340	1449.925		
Saturated model	1740.000	2244.380		
Independence model	4736.669	4770.294		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Unrestricted loadings	5.014	4.707	5.351	5.322
Equal loadings	4.979	4.672	5.316	5.272
Saturated model	6.327	6.327	6.327	8.161
Independence model	17.224	16.461	18.015	17.347

### 8.25. Multi-group critical ratios – financial dependency

	EM	AM	FM	GM	BM	DM	CM	EF	AF	FF	GF	BF	DF	CF
EM	0.000													
AM	- 0.260	0.000												
FM	- 6.415	- 4.514	0.000											
GM	- 4.053	- 3.210	2.875	0.000										
BM	- 2.096	- 1.276	4.521	2.367	0.000									
DM	- 1.482	- 1.184	1.597	0.704	0.294	0.000								
CM	- 2.886	- 2.144	1.947	0.409	1.491	0.487	0.000							
EF	- 0.848	- 0.395	6.367	4.175	1.481	1.041	2.720	0.000						
AF	- 0.540	- 0.176	5.099	3.459	1.457	1.117	2.531	0.197	0.000					
FF	- 6.109	- 4.663	0.293	3.851	4.800	1.676	2.444	7.400	5.171	0.000				
GF	- 4.787	- 3.576	2.657	1.002	3.052	0.965	0.949	4.696	4.074	2.427	0.000			
BF	- 1.556	- 0.996	5.655	3.348	0.700	0.634	2.042	0.822	0.786	5.874	4.097	0.000		
DF	- 3.465	- 2.893	0.506	0.801	2.049	1.062	0.939	3.107	2.933	0.616	0.432	2.566	0.000	
CF	- 3.181	- 2.415	2.875	0.721	1.300	0.378	0.188	2.554	2.081	2.758	1.381	2.121	1.134	0.000

## REFERENCES

- Adams, D., Nelson, R. and Todd, P. (1992). Perceived Usefulness, Ease of Use and Usage of Information Technology: A Replication. *MIS Quarterly*, 16(2), 227-247.
- Agarwal, R. and Karahanna, E. (2000). Time Flies When You're Having Fun: Cognitive Absorption and Beliefs About Information Technology Usage. *MIS Quarterly*, 24(4), 665-694.
- Agresti, A. (2002). *Categorical Data Analysis*: John Wiley and Sons.
- Agresti, A. (2007). *An Introduction to Categorical Data Analysis*. Hoboken, New Jersey: Wiley.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organisational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall.
- Alexandre, C. (2011). What Can Branchless Banking Do to Advance the Field and What Can it Not Do? From Mobile Banking to Point of Service. *Microcredit Summit 2011*.
- Amin, H. (2009). An Analysis of Online Banking Usage Intentions: An Extension of the Technology Acceptance Model. *International Journal Business and Society*, 10(1), 27-40.
- Amin, H. (2010). Factors Affecting the Decisions of Tabung Haji Customers in Malaysia to Use ATM Banking: An Empirical Investigation. *Journal of Internet Banking and Commerce* (Vol. 15).  
<http://www.arraydev.com/commerce/jibc/>.



- Anderson, J. and Billou, N. (2007). Serving the World's Poor: Innovation at the Base of the Economic Pyramid. *Journal of Business Strategy*, 28(2), 14-21.
- Anderson, J., Kupp, M. and Van der Merwe, S. (2010). Strategy - the Bottom of the Pyramid. *Business Strategy Review*, 21(4), 46-51.
- Andrews, F. (1984). Construct Validity and Error Components of Survey Measures: A Structural Modeling Approach. *Public Opinion Quarterly*, 48(2), 409-442.
- Arcs, G. and Razali, R. (2009). Cognitive Dimensions and Grounded Theory in Learning Software Modeling. *Procedia - Social and Behavioral Sciences*, 1(1), 1884-1888.
- Bagozzi, R. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. *Journal of the Association for Information Systems*, 8(4), 244-254.
- Baker, M. (2003). Data Collection – Questionnaire Design. *Marketing Review*, 3(3), 343-370.
- Bandalos, D. (2002). The Effects of Item Parceling on Goodness-of-fit and Parameter Estimate Bias in Structural Equation Modeling. *Structural Equation Modeling*, 9(1), 78-102.
- Bandyopadhyay, K. (2007). The Effect of Culture on User Acceptance of Information Technology. *Communications of the Association for Information Systems*, 19, 522-543.
- Barclay, D., Higgins, C. and Thompson, R. (1995). The Partial Least Squares (PLS) Approach to Causal Modeling: Personal Computer Adaptation and Use as an Illustration. *Technology Studies*, 2(2), 285-309.

- Baron, R. and Kenny, D. (1986). The Moderator-mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic and Statistical Considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Baskerville, R. and Pries-Heje, J. (1999). Grounded Action Research: A Method for Understanding IT in Practice. *Accounting, Management and Information Technologies*, 9(1), 1-23.
- Beck, T. and de la Torre, A. (2006). The Basic Analytics of Access to Financial Services. *World Bank Policy Research Working Paper*. World Bank.
- Beck, T., Demirguc-Kunt, A. and Levine, R. (2004). Finance, Inequality and Poverty: Cross-Country Evidence. *World Bank Policy Research Working Paper*. World Bank.
- Beck, T., Demirguc-Kunt, A. and Martinez-Peria, M. (2007). Reaching out: Access to and Use of Banking Services Across Countries. *Journal of Financial Economics*, 85, 234-266.
- Belson, W. (1981). *The Design and Understanding of Survey Questions*. Aldershot, UK: Gower.
- Bentler, P. (1990). Comparative Fit Indexes in Structural Models. *Psychological Bulletin*, 107(2), 238-246.
- Bhandari, A. and Wagner, T. (2006). Self-reported Utilization of Health Care Services: Measurement and Accuracy. *Medical Care Research and Review*, 63(2), 135-217.
- Bhatti, T. (2007). Exploring Factors Influencing the Adoption of Mobile Commerce. *Journal of Internet Banking and Commerce*, 12, 1-13.

- Blair, E., Sudman, S., Bradburn, N. and Stocking, C. (1977). How to Ask Questions About Drinking and Sex: Response Effects in Measuring Consumer Behavior. *Journal of Marketing Research*, 14, 316-321.
- Bollen, K. (1989). *Structural Equations with Latent Variables*. New York: Wiley.
- Bollen, K. and Stine, R. (1992). Bootstrapping Goodness-of-fit Measures in Structural Equation Models. *Sociological Methods and Research*, 21, 205-229.
- Bowling, A. (2005). Mode of Questionnaire Administration Can Have Serious Effects on Data Quality. *Journal of Public Health*, 27(3), 281-291.
- Brace, I. (2008). *Questionnaire Design: How to Plan, Structure and Write Survey Material for Effective Market Research* (2nd ed.). London, United Kingdom: Kogan Page.
- Brislin, R. (1986). The Wording and Translation of Research Instruments. W. Lonner and J. Berry (Eds.), *Field Methods in Cross-Cultural Research* (pp. 137-164). Newbury Park, California: Sage.
- Brown, I., Cajee, Z., Davies, D. and Stroebel, S. (2003). Cell Phone Banking: Predictors of Adoption in South Africa—An Exploratory Study. *International Journal of Information Management*, 23, 381-394.
- Brown, T.A. (2006). *Confirmatory Factor Analysis for Applied Research*: Guilford Publications.
- Browne, M. (1984). Asymptotically Distribution-free Methods for Analysis of Covariance Structures. *British Journal of Mathematical and Statistical Psychology*, 37, 62-83.
- Browne, M. (1984). Generalized Least-squares Estimators in the Analysis of Covariance Structures. *South African Statistical Journal*, 8, 1-24.

- Bryant, A. and Charmaz, K. (2007). *The SAGE Handbook of Grounded Theory*: SAGE.
- Byrne, B. (1998). *Structural Equation Modeling with LISREL, PRELIS and SIMPLIS: Basic Concepts, Applications and Programming*. Mahwah, N.J.: Lawrence Erlbaum Associates.
- Byrne, B. (2006). *Structural Equation Modeling with EQS: Basic Concepts, Applications and Programming* (2nd ed.). Mahwah, N.J. : Erlbaum.
- Carmines, E.G. and Zeller, R.A. (1979). *Reliability and Validity Assessment*: SAGE Publications.
- CGAP. (2010). *Financial Access 2010: The State of Financial Inclusion Through the Crisis*. Washington D.C. Consultative Group to Assist the Poor.
- Cheung, G. and Lau, R. (2008). Testing Mediation and Suppression Effects of Latent Variables: Bootstrapping with Structural Equation Models. *Organ Research Methods*, 11, 296-325.
- Chin, W. (1998). The Partial Least Squares Approach to Structural Equation Modeling. In Marcoulides (Ed.), *Modern Methods for Business Research* (pp. 295-336). Mahweh, N.J.: Lawrence Erlbaum Associates.
- Choi, B. and Pak, A. (2005). A Catalog of Biases in Questionnaires. *Preventing Chronic Disease: Public Health Research, Practice and Policy*, 2(1), 1-12.
- Chou, C., Bentler, P. and Satorra, A. (1991). Scaled Test Statistics and Robust Standard Errors for Nonnormal Data in Co-variance Structure Analysis: A Monte Carlo Study. *British Journal of Mathematical and Statistical Psychology*, 44, 347-357.
- Christopoulos, T. (2010). Banking Correspondents as Social Innovation Network – The Case of Banco Palmas. *AMCIS 2010*. Lima, Peru.

- Chuttur, M. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions. In *Sprouts: Working Papers on Information Systems*. <http://sprouts.aisnet.org/9-37>.
- Cohen, C. (1988). *Statistical Power Analysis for the Behavioral Sciences*. (2nd ed.). Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Cohen, C. (1994). The Earth is Round ( $P < .05$ ). *American Psychologist*, 49(12), 997-1003.
- Cohen, J. and Cohen, P. (1983). *Applied Multiple Regression/correlation Analysis for the Behavioral Sciences*. (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Compeau, D., Higgins, C. and Huff, S. (1999). Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study. *MIS Quarterly*, 23(2), 145-158.
- Competition Commission of South Africa (2008). Banking Enquiry Report to the Competition Commissioner. <http://www.compcom.co.za/enquiry-in-to-banking/>. Accessed 11 November 2012.
- Comrey, A.L. and Lee, H.B. (1992). *A First Course in Factor Analysis*: Taylor and Francis.
- Conover, W. (1999). *Practical Nonparametric Statistics* (3rd ed.). New York: Wiley.
- Converse, J. and Presser, S. (1986). *Survey Questions. Handcrafting the Standard Questionnaire*. London: Sage.
- Corbin, J. and Strauss, A. (1990). Grounded Theory Research: Procedures, Canons and Evaluative criteria. *Qualitative Sociology*, 13, 3-21.
- Crowley, S. and Fan, X. (1997). Structural Equation Modeling: Basic Concepts and Applications in Personality Assessment Research. *Journal of Personality Assessment*, 68(3), 508-531.

- Curran, P., West, S. and Finch, J. (1996). The Robustness of Test Statistics to Nonnormality and Specification Error in Confirmatory Factor Analysis. *Psychological Methods*, 1(1), 16-29.
- Davis, F. (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results*. Massachusetts Institute of Technology.
- Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340.
- Davis, F., Bagozzi, R. and Warshaw, P. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982-1003.
- De Jager, N. (2004). *The Living Standards Measure as a Market Segmentation Tool for Selected Retailers*: North-West University, Potchefstroom Campus.
- Demirguc-Kunt, A. (2007). Finance and Economic Development: Policy Choices for Developing Countries. (February): World Bank Development Research Department.
- Dermish, A., Kneiding, C., Leishman, P. and Mas, I. (2011). Branchless and Mobile Banking Solutions for the Poor: A Survey. *Innovations* (Vol. 6).
- DeVellis, R.F. (2003). *Scale Development: Theory and Applications*: SAGE Publications.
- Devlin, J. (2009). An Analysis of Influences on Total Financial Exclusion. *The Service Industries Journal*, 29(8), 1021-1036.
- Dey, I. (1999). *Grounding Grounded Theory*. California, United States of America: Academic Press.

- Dillman, D. (2000). *Mail and Internet Surveys. The Tailored Design Method.* .  
New York: John Wiley and Sons, Inc.
- Diniz, E., Birochi, R. and Pozzebon, M. (2011). Triggers and Barriers to Financial Inclusion: The Use of ICT-based Branchless Banking in an Amazon County. *Electronic Commerce Research and Applications*. In press, corrected proof. Accessed online 18 March 2012.
- Donner, J. and Tellez, A. (2008). Mobile Banking and Economic Development: Linking Adoption, Impact and Use. *Asian Journal of Communication*, 18(4), 318-322.
- Dörnyei, Z. (2003). *Questionnaires in Second Language Research*. Mahwah, N.J.: Lawrence Erlbaum.
- Du Plessis, S. and Smit, B. (2005). Economic Growth in South Africa Since 1994. *Economic Policy Under Democracy: A Ten Year Review*. Stellenbosch.
- Dudycha, A. and Carpenter, J. (1973). Effects of Item Format on Item Discrimination and Difficulty. *Journal of Applied Psychology*, 58, 116-121.
- Dupas, P. and Robinson, J. (2012). Why Don't the Poor Save More? Evidence from Health Savings Experiments. *Working Paper* (Vol. 17255). National Bureau of Economic Research.
- Easterby-Smith, M., R., T. and A., L. (1993). *Management Research: An Introduction*. London: Sage.
- Eifermann, R. (1961). Negation: A Linguistic Variable. *Acta Psychologica*, 18, 258-273.
- Erdfelder, E., Faul, F. and Buchner, A. (1996). GPOWER: A General Power Analysis Program. *Behavior Research Methods, Instruments and Computers*, 28(1), 1-11.

- Fan, X. and Wang, L. (1998). Effects of Potential Confounding Factors on Fit Indices and Parameter Estimates for True and Misspecified SEM Models. *Educational and Psychological Measurement*, 58(5), 701-735.
- Faul, F., Erdfelder, E., Buchner, A. and Lang, A.-G. (2009). Statistical Power Analyses Using G\*Power 3.1: Tests for Correlation and Regression Analyses. *Behavior Research Methods*, 41(4), 1149-1160.
- Fink, A. (2003). *How to Ask Survey Questions*. Thousand Oaks, CA: Sage.
- Finlay, K., Trafimow, D. and Moroi, E. (1999). The Importance of Subjective Norms on Intentions to Perform Health Behaviors. *Journal of Applied Social Psychology*, 29(11), 2381-2393.
- Finn, R. (1972). Effects of Some Variations in Rating Scale Characteristics on the Means and Reliabilities of Ratings. *Educational and Psychological Measurement*, 32(2), 255-265.
- Finney, S. and DiStefano, C. (2006). Non-normal and Categorical Data in Structural Equation Modeling. In G. Hancock and R. Mueller (Eds.), *Structural Equation Modeling: A Second Course*. Greenwich, CT.: Information Age Publishing.
- Finscope. (2010). Finscope South Africa 2010. Johannesburg, South Africa. Finmark Trust.
- Finscope. (2011). Finscope South Africa 2011. Johannesburg, South Africa. Finmark Trust.
- Fishbein, M. and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Foddy, W. (1993). *Constructing Questions for Interviews and Questionnaires. Theory and Practice in Social Research*. Cambridge, UK: Cambridge University Press.



- Fowler, F. (1995). *Improving Survey Questions. Design and Evaluation*. London: Sage.
- Glaser, B. and Strauss, A. (1967). *The Discovery of Grounded Theory*. Chicago: Aldine.
- Gleser, L. (1996). Comment on Bootstrap Confidence Intervals by T. J. Di-Ciccio and B. Efron. *Statistical Science*, 11(3), 219-221.
- Hair, J. anderson, R., Tatham, R. and Black, W. (1998). *Multivariate Data Analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
- Harlow, L., Mulaik, S. and Steiger, J. (1997). *What if There Were No Significance Tests?* Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Holbrook, A., Cho, Y. and Johnson, T. (2006). The Impact of Question and Respondent Characteristics on Comprehension and Mapping Difficulties. *Public Opinion Quarterly*, 70(4), 565-595.
- Hooper, D., Coughlan, J. and Mullen, M. (2008). Structural Equation Modelling: Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods*, 6(1), 53-60.
- Hosmer, D. and Lemeshow, S. (2000). *Applied Logistic Regression*. New York: Wiley.
- Hsiao, C. and Yang, C. (2010). The Intellectual Development of the Technology Acceptance Model: A Co-citation Analysis. *International Journal of Information Management*. (in press)
- Hu, L. and Bentler, P. (1999). Cutoff Criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55.

- Hwang, Y. (2010). The moderating effects of gender on e-commerce systems adoption factors: An empirical investigation. *Computers in Human Behavior*, 26, 1753-1760.
- Ivatury, G. (2007). Microfinance: Future success hinges on technology. *Revue Banque*, 692, 38-40.
- Ivatury, G. and Mas, I. (2008). The Early Experience with Branchless Banking. In *Focus Note* (Vol. 46). Washington, D.C.: Consultative Group to Assist the Poor.
- Jackson, D., Gillaspay, J. and Purc-Stephenson, R. (2009). Reporting Practices in Confirmatory Factor Analysis: An Overview and Some Recommendations. *Psychological Methods*, 14(1), 6-23.
- Jaruwachirathanakul, B. and Fink, D. (2005). Internet Banking Adoption Strategies for a Developing Country: The Case of Thailand. *Internet Research*, 15(3), 295-311.
- Jayo, M., Diniz, E., Zambaldi, F. and Christopoulos, T. (2011). Groups of Services Delivered by Brazilian Branchless Banking and Respective Network Integration Models. *Electronic Commerce Research and Applications*(0).
- Johnson, S. and Nino-Zarazua, M. (2011). Financial Access and Exclusion in Kenya and Uganda. *Journal of Development Studies*, 47(3), 475-496.
- Jöreskog, K. (1971). Simultaneous Factor Analysis in Several Populations. *Psychometrika*, 36, 409-426.
- Judd, C. and Kenny, D. (1981). Process Analysis: Estimating Mediation in Treatment Evaluations. *Evaluation Review*, 5, 602-619.
- Kahai, S. and Cooper, R. (2003). Exploring the Core Concepts of Media Richness Theory: The Impact of Cue Multiplicity and Feedback Immediacy on

- Decision Quality. *Journal of Management Information Systems*, 20(1), 263-299.
- Karahanna, E., Agarwal, R. and Angst, C. (2006). Reconceptualizing Compatibility Beliefs in Technology Acceptance Research. *MIS Quarterly*, 3(4), 781-804.
- Kline, R.B. (2004). *Principles and Practice of Structural Equation Modeling, Second Edition*: Guilford Publications.
- Kline, R.B. (2010). *Principles and Practice of Structural Equation Modeling, Third Edition*: Guilford Publications.
- Kugemann, M. (2009). UPU–AFI Workshop on Financial Inclusion and Postal Banking. (November). Berne, Switzerland. Universal Postal Union.
- Kulviwat, S., Bruner II, G., Kumar, A., Nasco, S. and Clark, T. (2007). Toward a Unified Theory of Consumer Acceptance Technology. *Psychology and Marketing*, 24(12), 1059-1084.
- Kumar, A. (2006). *Expanding Bank Outreach Through Retail Partnerships: Correspondent Banking in Brazil*. World Bank.
- Lee, M.-C. (2009). Factors Influencing the Adoption of Internet Banking: An Integration of TAM and TPB with Perceived Risk and Perceived Benefit. *Electronic Commerce Research and Applications*, 8(3), 130-141.
- Legris, P., Ingham, J. and Collerette, P. (2003). Why Do People Use Information Technology? A Critical Review of the Technology Acceptance Model. *Information and Management*, 40, 191-204.
- Leyshon, A. and Thrift, N. (1995). Geographies of Financial Exclusion: Financial Abandonment in Britain and the United States. *Transactions of the Institute of British Geographers*, 20(3), 312-341.

- Luarn, P. and Lin, H.-H. (2005). Toward an Understanding of the Behavioral Intention to Use Mobile Banking. *Computers in Human Behavior*, 21, 873-891.
- Lyman, T., Ivatury, G. and Staschen, S. (2006). Use of Agents in Branchless Banking for the Poor: Rewards, Risks and Regulation. Washington, D.C.: Consultative Group to Assist the Poor.
- MacCallum, R., Browne, M. and Sugawara, H. (1996). Power Analysis and Determination of Sample Size for Covariance Structure Modeling. *Psychological Methods*, 1(2), 130-149.
- MacKinnon, D., Lockwood, C., Hoffman, J., West, S. and Sheets, V. (2002). A Comparison of Methods to Test Mediation and Other Intervening Variable Effects. *Psychological Methods*, 7, 83-104.
- MacKinnon, D., Lockwood, C. and Williams, J. (2004). Confidence Limits for the Indirect Effect: Distribution of the Product and Resampling Methods. *Multivariate Behavioral Research*, 39(1), 99-128.
- Marsh, H., Hau, K.-T., Balla, J. and Grayson, D. (1998). Is More Ever Too Much? The Number of Indicators Per Factor in Confirmatory Factor Analysis. *Multivariate Behavioral Research*, 33(2), 181-220.
- Martin, P. and Turner, B. (1986). Grounded Theory and Organisational Research. *The Journal of Applied Behavioral Science*, 22(2), 141.
- Martinez, J. and Carbonell, M. (2007). Value at the Bottom of the Pyramid. *Business Strategy Review*, 18(3), 50-55.
- Martins, J.H. (2004). *Household Income and Expenditure in Gauteng by Living Standards Measure (LSM) Group, 2003*: Bureau of Market Research, University of South Africa.

- Mas, I. (2008). Realizing the Potential of Branchless Banking: Challenges Ahead  
*Focus note: CGAP.*
- Mas, I. and Almazan, M. (2011). Banking the Poor through Everyday Stores.  
*Innovations*, 6(1), 119-128.
- Mas, I. and Hannah, S. (2008). Banking Through Networks of Retail Agents.  
*Focus Note: CGAP.*
- Maxwell, E. (1976). Analysis of Contingency Tables and Further Reasons for Not  
Using Yates Correction in  $2 \times 2$  Tables. *Canadian Journal of Statistics*,  
4(2), 277-290.
- May, J. (2010). Poverty Eradication: The South African Experience. *Group  
Meeting on Poverty Eradication*. Addis Ababa, Ethiopia.
- McCoy, S., Galletta, D. and King, W. (2007). Applying TAM Across Cultures: The  
need for Caution. *European Journal of Information Systems*, 16, 81-90.
- McKay, C. and Pickens, M. (2010). Branchless Banking 2010: Who's Served? At  
What Price? What's Next? *Focus Note* (Vol. 66). Washington, D.C.:  
Consultative Group to Assist the Poor.
- McNemar, Q. (1947). Note on the Sampling Error of the Difference Between  
Correlated Proportions or Percentages. *Psychometrika*, 12, 153-157.
- Mendoza, R. (2011). Why do the Poor Pay More? Exploring the Poverty Penalty  
Concept. *Journal of International Development*, 23, 1-28.
- Meyers, L.S., Gamst, G. and Guarino, A.J. (2005). *Applied Multivariate Research:  
Design and Interpretation*. SAGE Publications.
- Midgley, J. (2005). Financial Inclusion, Universal Banking and Post Offices in  
Britain. *Area*, 37(3), 277-285.
- Mlambo, K. and Ncube, M. (2011). Competition and Efficiency in the Banking  
Sector in South Africa. *African Development Review*, 23(1), 4-15.

- Mohan, R. (2006). Economic Growth, Financial Deepening and Financial Inclusion. Reserve bank of India (Ed.), (Vol. November, pp. 1305-1319).
- Møller, V. (1997). *Quality of Life in South Africa*: Kluwer Academic Publishers.
- Moore, G. and Benbasat, I. (1991). Development of An Instrument To Measure The Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, 2(3), 173-191.
- Motlounge, B. and Mears, R. (2002). Combating Poverty in South Africa. *Development Southern Africa*, 19(4), 531-543.
- Mulaik, S., James, L., Van Alstine, J., Bennet, N., Lind, S. and Stilwell, C. (1989). Evaluation of Goodness-of-Fit Indices for Structural Equation Models. *Psychological Bulletin*, 105(3), 430-445.
- Natu, A., Bandsal, A., Kurian, A., Khuranu, G. and Bhushan, T. (2008). Linking Financial Inclusion with Social Security Schemes. In *Working Paper Series* (Vol. 22): Institute for Financial Management and Research.
- Nevitt, J. and Hancock, G. (2001). Performance of Bootstrapping Approaches to Model Test Statistics and Parameter Standard Error Estimation in Structural Equation Modeling. *Structural Equation Modeling*, 8(3), 353-377.
- Nunnally, J. (1967). *Psychometric Theory*. New York: McGraw-Hill.
- O'Muircheartaigh, C., Gaskell, G. and Wright, D. (1995). Weighing Anchors: Verbal and Numeric Labels for Response Scales. *Journal of Official Statistics*, 11(3), 295-307.
- Okeahalam, C. (2007). Estimating Market Power in the South African Banking Sector. *International Review of Applied Economics*, 21(5), 669-685.
- Olsson, U., Foss, T., Troye, S. and Howell, R. (2000). The Performance of ML, GLS and WLS Estimation in Structural Equation Modeling Under

- Conditions of Misspecification and Nonnormality. *Structural Equation Modeling*, 7(4), 557-595.
- Oppenheim, A. (1992). *Questionnaire Design, Interviewing and Attitude Measurement*. London: Pinter.
- Ozler, B. (2007). Not Separate, Not Equal: Poverty and Inequality in Post-apartheid South Africa. *Economic Development and Cultural Change*, 55(3), 487-529.
- Pearce, D. (2011). Financial Inclusion in the Middle East and North Africa: Analysis and Roadmap Recommendations. *World Bank Policy Research Working Paper Series*: The World Bank.
- Pearl, J. (2000). *Causality: Models, Reasoning and Inference*: Cambridge University Press.
- Peduzzi, P., Concato, J., Kemper, E., Holford, T. and Feinstein, A. (1996). A Simulation Study of the Number of Events per Variable in Logistic Regression Analysis. *Journal of Clinical Epidemiology*, 49(12), 1373-1379.
- Peng, C.-Y., Lee, K. and Ingersoll, G. (2002). An Introduction to Logistic Regression Analysis and Reporting. *The Journal of Educational Research*, 96(1), 3-14.
- Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. and Pahnla, S. (2004). Consumer Acceptance of Online Banking: An Extension of the Technology Acceptance Model. *Internet Research*, 14(3), 224-235.
- Pitta, D., Guesalaga, R. and Marshall, P. (2008). The Quest for the Fortune at the Bottom of the Pyramid: Potential and Challenges. *Journal of Consumer Marketing*, 25(7), 393-401.
- Polit, D. (1996). *Data Analysis and Statistics for Nursing Research*. Stamford, Connecticut: Appleton and Lange.

- Powell, D. and Schafer, W. (2001). The Robustness of the Likelihood Ratio Chi-Square Test for Structural Equation Models: A Meta-Analysis. *Journal of Educational and Behavioral Statistics*, 26(1), 105-132.
- Prahalad, C. and Hammond, A. (2002). Serving the World's Poor, Profitably. *Harvard Business Review*, 80(9), 48-57.
- Prahalad, C.K. (2006). *The Fortune at the Bottom of the Pyramid*: Wharton School Publishing.
- Prahalad, C.K. and Hart, S. (2002). The Fortune at the Bottom of the Pyramid. *strategy+business*, 26(1), 1-26.
- Prendergast, G. and Marr, N. (1994). Towards a Branchless Banking Society? *International Journal of Retail and Distribution Management*, 22(2), 18-26.
- Raykov, T. and Marcoulides, G.A. (2006). *A First Course in Structural Equation Modeling*: Taylor and Francis.
- Rhee, K. (1992). *Alternative Estimation Methods in Structural Equation Modeling with LISREL-7: Effects of Noncontinuity and Nonnormality of Variables with Varying Sample Sizes*. University of Illinois at Urbana-Champaign.
- Riquelme, H. and Rios, R. (2010). The Moderating Effect of Gender in the Adoption of Mobile Banking. *International Journal of Bank Marketing*, 28(5), 328-341.
- SAARF. (2011). SAARF Segmentation Tools. <http://www.saarf.co.za/lsm-presentations/> Accessed 26 January 2012.
- Schoombe, A. (2009). Access to Formal Financial Services for South Africa's Poor. Developments Since 1990. *South African Journal of Economic History*, 24(2), 131-156.



- Schuman, H. and Presser, S. (1996). *Questions and Answers in Attitude Surveys*. London, UK: Sage.
- Seifert, J. (2003). *Primer on E-Government: Sectors, Stages, Opportunities and Challenges of Online Governance*. Congressional Research Service, The Library of Congress. Washington D.C.
- Shang, R.-A., Chen, T.-C. and Shen, L. (2005). Extrinsic Versus Intrinsic Motivations for Consumers to Shop on-line. *Information and Management*, 42, 401-413.
- Sharma, S. (2005). E-Government and E-Governance: Definitions/Domain Framework and Status around the World. *International Conference on e-Governance 2005*. Lahore, Pakistan.
- Simon, H. (1953). Causal Ordering and Identifiability. W. Hood and T. Koopmans (Eds.), *Studies in Econometric Method*. (pp. 49-74). New York: Wiley.
- Soper, D. (2012). Effect Size Calculator for Multiple Regression. (Online Software). <http://www.danielsoper.com/statcalc3>. Accessed 17 February 2012.
- Sorbom, D. (1989). Model Modification. *Psychometrika*, 54, 371-384.
- StatsSA. (2008). *Community Survey, 2007 Basic Results: Municipalities*. Pretoria: Statistics South Africa.
- StatsSA. (2011). *Mid-year population estimates 2011*. Pretoria, South Africa: Statistics South Africa.
- Steiger, J. and Lind, J. (1980). Statistically Based Tests for the Number of Common Factors. *Annual meeting of the Psychometric Society*. Iowa City, IA.
- Strauss, A. and Corbin, J. (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. London: Sage.

- Sudman, S. and Bradburn, N. (1974). *Response Effects in Surveys: A Review and Synthesis*. Chicago: Aldine Publishing Company.
- Tabachnick, B. and Fidell, L. (2007). *Using Multivariate Statistics*. Pearson/Allyn and Bacon.
- Taylor, S. and Todd, P. (1995). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, 19(4), 561-570.
- Thorndike, R. (1996). *Measurement and Evaluation in Psychology and Education* (6th ed.). Upper Saddle River, NJ: Prentice Hall.
- Tucker, L. and Lewis, C. (1973). A Reliability Coefficient for Maximum Likelihood Factor Analysis. *Psychometrika*, 38(1), 1-10.
- Vachani, S. and Craig-Smith, N. (2008). Socially Responsible Distribution: Distribution Strategies for Reaching the Bottom of the Pyramid. *California Management Review*, 50(2), 1-54.
- van de Wijngaert, L. and Bouman, H. (2009a). Coppers, Context and Conjoint: A Reassessment of TAM. *Journal of Information Technology*, 24, 186-201.
- van de Wijngaert, L. and Bouman, H. (2009b). Would You Share? Predicting the Potential use of a New Technology. *Telematics and Informatics*, 26(1), 85-102.
- van der Heijden, H. (2004). User Acceptance of Hedonic Information Systems. . *MIS Quarterly*, 28(4), 695-704.
- Varian, H. (2005). Bootstrap Tutorial. *Mathematica Journal*, 9, 768-775.
- Venkatesh, V. (1999). Creation of Favourable User Perceptions: Exploring the Role of Intrinsic Motivation. *MIS Quarterly*, 23, 239-260.
- Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation and Emotion into the Technology Acceptance Model. *Information Systems Research*, 11(4), 342-365.

- Venkatesh, V. and Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decision Sciences*, 39(2), 372-315.
- Venkatesh, V. and Davis, F. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186-204.
- Venkatesh, V. and Morris, M. (2000). Why Dont Men Ever Stop to Ask for Directions? Gender, Social Influence and thier Role in Technology Acceptance and Usage Behaviour. *MIS Quarterly*, 24(1), 115-139.
- Venkatesh, V., Morris, M., Davis, G. and Davis, F. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425-478.
- Wang, Y.-S. and Shih, Y.-W. (2009). Why Do People Use Information Kiosks? A Validation of the Unified Theory of Acceptance and Use of Technology. *Government Informational Quarterly*, 26, 158-165.
- Westland, J. (2010). Lower Bounds on Sample Size in Structural Equation Modeling. *Electronic Commerce Research and Applications*, 9, 476-487.
- White, J. and Weatherall, A. (2000). A Grounded Theory Analysis of Older Adults and Information Technology. *Educational Gerontology*, 26(4), 371-386.
- Winkelman, W., Leonard, K. and Rossos, P. (2005). Patient-Perceived Usefulness of Online Electronic Medical Records: Employing Grounded Theory in the Development of Information and Communication Technologies for Use by Patients Living with Chronic Illness. *Journal of the American Medical Informatics Association*, 12(3).
- Wixom, B. and Todd, P. (2005). A Theoretical Integration of User Satisfaction nd Technology Acceptance. *Information Systems Research*, 16(1), 85-102.

- Wright, S. (1921). Correlation and Causation. *Journal of Agricultural Research*, 20, 557-585.
- Yaghoubi, N. (2010). Factors Affecting the Adoption of Online Banking An Integration of Technology Acceptance Model and Theory of Planned Behavior. *International Journal of Business and Management*, 9(5), 159-165.
- Yaghoubi, N. and Bahmani, E. (2010). Factor Affecting the Adoption of Online Banking: An Integration of Technology Acceptance Model and Theory of Planned Behavior. *Pakistan Journal of Social Sciences*, 7(3), 231-236.
- Yang, S., Lu, Y., Gupta, S., Cao, Y. and Zhang, R. (2012). Mobile Payment Services Adoption Across Time: An Empirical Study of the Effects of Behavioral Beliefs, Social Influences and Personal Traits. *Computers in Human Behavior*, 28, 129-142.
- Yates, F. (1934). Contingency Table Involving Small Numbers and the  $\chi^2$  Test. *Supplement to the Journal of the Royal Statistical Society*, 1(2), 217-235.
- Yeow, P., Yuen, Y. and Tong, D. (2008). User Acceptance of Online Banking Service in Australia. *Communications of the IBIMA*, 1, 191-197.
- Yuan, K. (2005). Fit Indices Versus Test Statistics. *Multivariate Behavioral Research*, 40(1), 115-148.
- Yuan, K. and Bentler, P. (1997). Improving Parameter Tests in Covariance Structure Analysis. *Computational Statistics and Data Analysis*, 26, 177-198.
- Zhou, T., Lu, Y. and Wang, B. (2010). Integrating TFF and UTAUT to Explain Mobile Banking User Adoption. *Computers in Human Behavior*, 26, 760-767.