

**MULTIDIMENSIONAL CONSTRUCTS INFLUENCING
MOBILE BANKING CONTINUANCE INTENTION IN
SOUTH AFRICA**

by

AKWESI ASSENSOH-KODUA

2018

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AKWESI ASSENSOH-KODUA

**Thesis in fulfilment of the requirements for the degree of
Doctor of Philosophy (PhD) in the Department of Management Sciences,
Durban University of Technology**

I declare that this research is my own work and has not been submitted for any other degree or examination at any institution.

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Date: _26/04/2018_____

Approved for final submission:

Advisor: Dr. Emmanuel Mutambara (PhD)

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Date: _26/04/2018_____

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It is said that, where determination exist, failure cannot dismantle the flag of success. This determination was certainly supported by the following in the completion of my thesis:

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As usual, I feel deeply indebted to all the commentaries and other sources I have used in this work and therefore take sole responsibility for any error or omission. I will hence feel copiously grateful, if comments are directed to me at mannie1111@yahoo.com for future consideration.

DEDICATION

I dedicate this thesis to Gloria Hlengiwe Lushaba, Abena Ama Nkazimulo and the rest of the family for their support. Your reward will be my freedom from all this time-consuming exercise.

PUBLICATIONS EMANATING FROM THIS WORK

Published

- ✓ Mobile Banking in South Africa: A Systematic Review of the Literature http://www.businessperspectives.org/journals_free/bbs/2016/BBS_en_2016_01_Assensoh-Kodua.pdf. Banks and Bank Systems, Volume 11, Issue 1, 2016

Awaiting editor's decision

- ✓ “Mobile banking in an Emerging Economy: Facilitating Factors, Challenges and Recommendations” The Electronic Journal of Information Systems in Developing Countries - Manuscript ID ISD-RA—0077.
- ✓ “Mobile-banking and User Device Diversity: Research Indicated Opinion” Cogent Business & Management. Cogent Business-2018-0089. Taylor & Francis Group.

ABSTRACT

The arrival of technology-based commerce has led to leadership and strategy research streams, as well as other kinds of multi-media strategies, and prevalent amongst these is mobile banking (m-banking). Businesses conducted through m-banking technologies are rapidly growing and becoming highly competitive. With global mobile telephone penetration being greater than personal computer usage these days, organisations need to better understand both the motivating and deterring key customer behaviours for this phenomenon. To be able to withstand this competition, stakeholders worldwide have invested in the various mobile commerce technologies and applications, and South Africa is no exception. M-banking is being viewed as an extremely powerful concept due to its high coverage of the rural population in South Africa, and the Klynveld Peat Marwick Goerdeler (KPMG) 2015 m-banking report which positioned South Africa as the number two after China in terms of global adoption epitomises this trend. As of January 2016, 49 percent of South Africa's total population of 54.73 million were active Internet users. There were 85.53 million mobile connections, which means that there were quite a number of people with more than one connected SIM card linked to them, which augurs well for this phenomenon. Nevertheless, only 26 percent of these were doing m-banking. This clearly demonstrates that acceptance is not the same as continuance usage. This study was meant to explore the multidimensional constructs influencing mobile banking continuance intention in South Africa, to help unravel the mysteries surrounding acceptance and continuous usage. To this end, the researcher embarked on an Internet data collection process throughout the country to obtain 1262 responses, and performed a scientific analysis using structural equation modelling (SEM) with SmartPLS 3.0. The results showed that the factors influencing m-banking in South Africa are multi-polygonal, besides small devices being the preferred instruments for this phenomenon. The issue of trust of e-vendor (online bank) also arose as a major challenge confronting this novel concept. It is therefore recommended that financial institutions conduct research into the degree of trust that is expected of them by their clients, protect their m-banking customers from cyber-attacks by configuring layers of securities before customers log in to their accounts from mobile device software applications, and enlist the services of third-party warranties as an assurance for doubting clients. M-banking, as "banking on the go" has come to stay. Join in and be on the move, stay out and stay queued.

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ACRONYMS AND ABBREVIATIONS

ActUsg - Actual Usage
AMOS - Analysis of a Moment Structures
AVE - Average Variance Extracted
BBBOnLine - Better Business Bureau online
BD - Big Device
CB - Covariance-Based
CB-SEM - Covariance-Based-Structural Equation Modelling
CFA - Confirmatory Factor Analysis
CGAP - Consultative Group to Assist the Poorest
CI - Continuance Intention
DTPB - Decomposed Theory of Planned Behaviour
d_G - Geodesic Distance
d_{ULS} - Squared Euclidean Distance
ECT - Expectation-Confirmation Theory
Extinflu - External Influence
FO - First-Order
GSM - Global System for Mobile communications
HTMT - Heterotrait-Monotrait ratio
IDT - Innovation Diffusion Theory
IEEE - Institute of Electrical and Electronics Engineers
InfoQ - Information Quality
IntInflu - Internal Influence
IntaQ - Interaction Quality
IPMA - Important Performance Map Analysis
ITU - International Telecommunication Union
MBCI - M-Banking Continuance Intention
MD - Mobile Device
MID - Mobile Internet Device
M-PESA - M for mobile, PESA for money in Swahili

MV - Manifest Variable
NFI - Normed Fit Index
OvalSat - Overall User Satisfaction
PDA - Personal Digital Assistant
PEOU - Perceived Ease of Use
Per_QLY - Perceived Quality
Per_Tr - Perceived Trust
PLS - Partial Least Square
PLS-SEM - Partial Least Square-Structural Equation Modelling
PU - Perceived Usefulness
PwC - PricewaterhouseCoopers
Res for MD - Reasons for mobile device size
rho_A - consistent reliability coefficient
SABINET - Southern African Bibliographic Information Network
SAT - Satisfaction
SD - Small Device
SEM - Structural Equation Modelling
SO - Second-Order
Soc_Norm - Social Norm
SRMR - Standardised Root Mean Residual
SRS - Stratified Random Sampling
Std Dev - Standard Deviation
STT - Socio-Cognitive Theory of Trust
SysQ - System Quality
TAM - Technology Acceptance Model
TrEve - Trust in e-vendor
TrEven - Trust in e-vendor
TrTec - Trust in Technology
TrTpt - Trust in Third Party
UTAUT - Unified Theory of Acceptance and Use of Technology
WIZZIT - mobile banking solution provider

CHAPTER 1

INTRODUCTION TO THE STUDY

INTRODUCTION

This chapter aims to provide an introduction to this study. It begins by giving the background of the research, followed by the rationale for the study which explains why it is necessary to conduct this research. A discussion of the problem statement warranting this study is then made before the aim of the study is spelt out. Next, the objectives, as well as the sub-objective that will help the study to realise its overall aim are outlined. The research question is then posed, and additional sub-questions, which help to investigate the main question, are outlined stating how these sub-questions are meant to be tested as hypotheses. The theoretical underpinning for the study is briefly discussed before covering the scope of the study. This is then followed by the anticipated contribution of the research to the field of study, and finally a brief outline of the research structure is given.

RESEARCH BACKGROUND (CONTEXT)

The increase in knowledge-grounded business has led to governance and stratagem investigation tributaries, coupled with other types of multimedia strategies (e.g., m-commerce, social networks) as encouraged by investigators (Perrigot and Penard, 2012: 24), and commerce directed through technology contemporarily has speedily grown and become extremely competitive. Predominant amongst this new wave of business sensations is mobile banking (popularly captioned as m-banking). To be capable of resisting the competitive nature of this service sector, and be in control of the game, organisations have better understood what motivates key client behaviour, such as intent and continuous usage. It is common knowledge that m-banking has seen expanding growth this century, with global mobile cellular telephone diffusion being greater than personal computer usage (Zhou, 2011: 242). This has not only created awareness amongst business competitors, but actually made many organisations around the globe capitalise on various m-commerce know-how for business applications.

Following from the above, many influences have controlled m-banking acceptance. Although initial acceptance of this phenomenon plays a substantial role, it is much more important to categorise issues which underwrite the direction of its continuation, and also those

that cause discontinuance (Lin and Shih, 2008: 68). In other words, it is significant for organisations to concentrate on both initial adoption and continued usage by its customers in order to survive. Sadly, notwithstanding the high use of mobile cellular telephones and the many advantages offered by m-banking, its acceptance was found to be underutilised and very slow in South Africa when compared with other nations. Less than 10 percent of total account holders conduct banking transaction on their cellular telephones in South Africa (Ivatury and Mas, 2008: 25).

This trend is slowly improving, though not at the rate expected. A study conducted online in 2013 shows that South Africa m-banking has counter-indicated intensification records in the number of individuals using their mobile devices for banking since 2011 (Pretorius, 2013), with twenty-six percent (26 percent) recorded as of 2016 (Shezi, 2016). The next few years promise to see banking activities conducted through mobile devices becoming an extremely strong concept because of high exposure amongst the rural populace to mobile based amenities, particularly in regions with inadequate admittance to banking halls in South Africa (Zhou, 2011: 246).

This exposé nevertheless, according to the systematic investigation of this study, shows that there is no any widespread study incorporating Perceived Trust, Subjective Norms and Service Quality which determines m-banking continuance intention in South Africa. Neither has the deployment of user satisfaction (SAT) testing, together with other m-banking constructs such as those stated above been used to investigate the proportion of 49 million phone subscribers who do m-banking in South Africa, while the number keeps growing rapidly (Shambare, 2011: 1), to predict whether this phenomenon will continue into the foreseeable future in South Africa. An investigation undertaken by Brown *et al.* in 2003 (2003: 387), only verifies the acceptance of m-banking by mobile telephone users in South Africa with a limited section of individuals situated in urban areas. Virtually all the participants who partook in the study (147 out of 162) had never used m-banking with their mobile telephone, except for only 6 percent, although some 35 percent demonstrated readiness for imminent practice.

RATIONALE FOR THE STUDY

The South African Government has recently improved its determinations for financial institutions to increase monetary enclosure amongst low income employees of South Africa. New initiatives, such as mobile banking solution provider-popularly known as (WIZZIT), which

constrict agents throughout the country regarding kiosk monetary payment and transfers, have seen ground-breaking reports from underpaid clientele (Duncombe and Boateng, 2009: 1243). The banks also, through numerous approaches and least cost representations, have serviced those of their clients with small and unstable salaries. The impacts of these plans have seen low income earners adopting m-banking through WIZZIT, although the most greatly underprivileged have yet to do so (Duncombe and Boateng, 2009). The analysis points out that adopters were mostly clients with higher levels of education and higher technological intelligence. Certainly, this outcome stresses the significance of education and awareness in the drive for m-banking continuance intention and usage.

Duncombe and Boateng's study results also confirm those of the study by Pretorius (2013), in which he interrogated more than 1400 South Africans banking by electronic means through Internet banking. The study revealed that the South African e-banking arena has indeed observed an appreciation in the number of clients using mobile devices to get their banking done. There has been an expansion of m-banking, through both banking and browsing on phones from 42 percent to 54 percent since 2011. Users performing m-banking with their tablets have risen to 17 percent, by contrast to 10 percent before. Thus, these results suggest that apart from utilising such instruments to make payments and accomplish their financial statements, clients are becoming prospective adopters, utilising devices for requesting new banking services such as credit and overdrafts (59 percent). Consumers also demonstrated the possibility of purchasing with mobile devices (60 percent, up from 53 percent), data (29 percent, up from 23 percent) and lottery tickets (19 percent up from 13 percent) through their banking programs. Acclamation has to be made here that there appears to be a good proportion of device diffusion rapidity in the country. The imaginative banking divisions attempting to get people on board who are not banking with their devices in the country is also beginning to see effects.

However, questions like: 1) to what extent will this success speed influence continuance intention? and, 2) what are the multidimensional constructs influencing this great reaction to m-banking, along with the possible issues that militate against the phenomenon? have to be explored and considered for future policy formulation and adoption. In order for the phenomenon of m-banking to make any progress in South Africa, researchers and systems developers need some kind of explicit and concrete information which indicates whether the novel process of banking on mobile Internet devices (MIDs) is moving in the desired direction. If one cannot

calculate the impact of changes this phenomenon is bringing to users, it becomes almost impossible to make any structural advances in development and practice. The conceptual model of researchers somehow affects systems development. Models predicting how the m-banking users get to accept the phenomenon and interact with the system are therefore of paramount importance if any meaningful advances are to be achieved in the contemporary world of South Africa. But this is hard to achieve with exactitude except with strong empirical research.

While psychologists have made elaborate efforts to understand the socio-physiological behaviour of human beings regarding concepts and phenomena, Hair, Ringle and Sarstedt, (2011) note that “users in the field” often display very elaborative theories. This is made even more so because these users are social beings, which makes study results obtained from them difficult to control and predict.

In South Africa, this problem is compounded by the lack of empirical research as rightly pointed out by Duncombe and Boateng (2009). Concepts are introduced and practices become norm without any scientific tests to validate their reliability and acceptability. On the global front, though academic research has made some progress in the field of business, a large number of measurement strategies and statistical methods have fallen short of expectations. The proponents of such strategies have openly declared the shortfalls of their theories, and have invited more study into their domains as the standard practice in research. Figures from quantitative studies are meaningful, and the numbers are good descriptions, but criticisms have been raised against these quantitative methods on the grounds that they only address the “how often and how long” and nothing more. The use of Partial Least Square-Structural Equation Modelling (PLS-SEM) in the current study intends to disprove the shortfalls in the above assertions by predicting m-banking continuance intention and usage. The aim of this thesis is realised through the use of quantitative techniques to show interesting possibilities and limitations of m-banking in South Africa, as outlined in the respective section.

In light of this, varied constructs and measures were used in the current study to investigate the technological innovation of m-banking in order to review the studies of others conducted with different time horizons. This offered the current study the opportunity to investigate further and make a contribution to the existing knowledge. Technology is undergoing rapid changes and there is therefore justification to revisit concepts and phenomena regarding technology on a daily basis. As pointed out by some researchers, for instance Salas (2008), there

is an explicit need to infuse theory with the study of human factors in the field if we desire to progress. Researchers responding to this call, including this study, have tried studying one phenomenon or factor in relation to human (user) performance. Nevertheless, this has rather found justification in Newell's (1973) assertion that it is impossible to use 20 questions to study nature.

A more holistic and robust approach is required which captures various constructs and phenomena and relates them in first-, second- and even third-order models to unearth hidden practices and behaviours. This can be achieved where multidimensional phenomena and cognitive theories are investigated together. This means that there is a need to build models which compare and integrate observed outcomes from user behaviours that can be tested statistically, and denounce their validity when found to contradict all reasonable hypotheses.

Modelling types

Many scientific studies have made use of modelling techniques based on theories to achieve real-life discoveries. For example, Chin's technology acceptance modelling (TAM) (1998b) and Rogers innovation diffusion theory (IDT) (1995) are two of these. By definition, a model is a real or imaginary representation of a real system (Harré, 2002). Hence, modelling could be stated by this study to be the putting together of blocks of reasonable facts in a meaningful order to explain phenomena and processes, or predict behaviours.

This is enabled by the use of data, together with the scientific process. The accuracy and the model's efficacy could be influenced by and large by the quality of the data, and how it was collected. Nevertheless, judgement about a model's efficacy should not only be based on the quality of data alone. Ahl and Allen (1996: 45) state it as follows to show the difference between data and models:

Although they are a critical part of science, data are not the purpose of science. Science is about predictability, and predictability derives from models. Data limited to the special case of what happened when the measurement were made. Models, on the other hand, subsume data. Only through models can data be used to say what will happen again, before subsequent measurements are made. Data alone predict nothing.

Models can be described at different levels of abstraction, being their first, second or third-order ability to capture or predict a behaviour. But they need to contain the salient logic to be useful, and this comes with many challenges. In this sense, researchers are allowed to alter their work provided it is based on good theory (Hair et al., 2011; Becker, Klein and Wetzels, 2012). This thesis makes use of statistical modelling to explain m-banking continuance intention (MBCI) in South Africa.

PROBLEM STATEMENT

Statistics show that mobile subscribers in the world increased between 2000 and 2009 with a compounded yearly growth rate of 24 percent from about 500 million to more than 4 billion (Fehske *et al.*, 2011: 56). Certainly, this has the potential of contributing immediate m-banking services to 61 percent of the people on the planet (Sultana, 2009). However, there have been many discussions regarding the practicability of m-banking safety, viability and vulnerability to fraud. Many individuals assert that shopping online is neither safe nor sensible, while another school of thought believes the opposite. They assert that it is secure, weatherproof and may be accomplished at anytime, anywhere (Chowdhury and Ahmmad, 2011: 49). According to Hoehle, Scornavacca and Huff (2012: 122) m-banking services are one of the primary financial services in the banking sector. This has, however, undergone widespread adoption, and continuous usage does not reflect anticipated levels of usage (Lin, 2011: 252; Cruz *et al.*, 2010; Hoehle *et al.*, 2012: 122).

The adoption and the intention to continue using have been attributed to people's attitudes, subjective norms, and perceived behavioural control (Puschel, Mazzon and Hernandez, 2010: 391). Another author (Lin, 2011: 252) pinpoints perceived relative usage, amongst other factors, as having a considerable impact on attitude, which leads to acceptance or continued usage intention. In addition to the lack of continuance behaviours cited above, there are several challenges facing mobile business implementation, some of which revolve around the issues of trust, satisfaction, privacy, security and quality which can guarantee continuance (behaviour) usage.

In order to show the uniqueness of this study, the following section summarises the challenges identified by the various authors cited with regard to the study of m-banking:

- The absence of standardised technologies for secure payment, shortage of profitable business models, consumer fears of divulging personal data, and a lack of faith in South African business and consumer satisfaction are among the factors inhibiting the continuing usage of online service models (Pearson and Benameur, 2010; Teece, 2010; Zott, Amit and Massa, 2011).
- Not having specific policies and regulatory frameworks in relation to online commercial activities are problematic, notwithstanding the fact that the virtual environment represents a very recent phenomenon (Wolcott, Kamal and Qureshi, 2008; Shakimov *et al.*, 2011). Moreover, overlay networking security of distributed systems, privacy, trust, knowledge discovery, and business and social impact are serious issues to be considered before online systems can be considered adequate for business transaction (Pallis, Zeinalipour-Yazti and Dikaiakos, 2011, Shakimov *et al.* 2011).
- The technological challenges, such as issues of navigation and usage of websites, have received much attention and have been measured for ease of use of the referent information system (Davis, 1989; Bhattacharjee, 2001; Liao, Palvia and Chen, 2009).
- Further to the above-mentioned problems facing online business implementations, privacy, information disclosure and uncertainty matters are among the top issues discussed in recent studies (Debatin *et al.* 2009; Humphreys, 2011; Men and Tsai, 2011; Tokunaga, 2011, Waters and Ackerman 2011).

Uncertainty matters, such as whether peer pressure could make someone continue to use mobile devices for m-banking, the extent to which perceived trust of technology and websites influences m-banking continuance usage, the relationship between service quality and level of satisfaction and how these are congruent with m-banking continuance usage are very critical to this study as they will surely help to address the research question.

The growing adoption of information systems in banking service delivery in South Africa makes it imperative to investigate and analyse service quality perceptions of customers. Though there is ample information on service quality, limited empirical studies have been undertaken in South Africa in this regard. This study was conducted against the backdrop of the above observations.

AIM OF THE STUDY

The objective of this research is to explore the multidimensional constructs influencing MBCI in South Africa empirically.

OBJECTIVES OF THE STUDY

In light of the above goal, the objectives of the research are to determine how multidimensional constructs (independent variables) predict MBCI (dependent) among users in South Africa and to evaluate the degree to which such factors contribute to MBCI. The specific objectives are to:

Objective 1: Show how social norms positively influence m-banking users in South Africa and identify the relative impacts of this influence (internal and external) on users' overall satisfaction with m-banking and continuance intention in South Africa.

Objective 2: Identify how trust (in technology, e-vendor and third parties) relatively influence users' perceptions towards overall satisfaction in m-banking and continuance intention in South Africa.

Objective 3: Compare how perceived quality is informed by interaction, systems and information quality towards users' overall satisfaction in m-banking and continuance intention in South Africa.

Objective 4: Demonstrate how m-banking overall satisfaction directly influences users' continuance intention in South Africa.

Objective 5: Determine whether MBCI in South Africa will lead to actual usage.

Sub-objective: Identify the control variable(s) which influence MBCI in South Africa.

RESEARCH QUESTIONS

The research question to achieve the above objectives in this study is:

- What factors influence m-banking continuance intention in South Africa?

The above question was investigated through the following sub-questions:

- What multidimensional constructs influence South Africans to opt for m-banking?
- To what extent are these multidimensional constructs predicting MBCI in South Africa?

- To what extent does m-banking continuance intention lead to actual usage?
- What control variable(s) affects MBCI in South African?
- To what extent are these controlling variable(s) influencing MBCI in South African?

SCOPE OF THE STUDY

Banking on cellular telephones and other mobile devices is a twenty-first-century phenomenon. Countries the world over are gradually shifting to this novel practice to reap the benefits it brings to their people. This has certainly increased research in the area of m-banking to address matters arising, such as trust, safety, service quality, acceptance impacts and the like. South Africa is no exception in these matters, especially, the issue of the continuity of this phenomenon.

The general purpose of this study is to empirically investigate m-banking continuance intention in South Africa since acceptance levels are good, although this might not guarantee continuance usage.

The study looked at any form of Internet-enabled banking carried out on a mobile device, such as cellular telephones, smartphones, personal digital assistants (PDAs), ultra-mobile PCs, notebooks, tablets or laptop (in short mobile Internet devices (MIDs)), dividing these devices into two: small device (SD) (handhelds) versus big device (BD) (laptops). This is done in order to be able to report on the type of mobile devices preferred by users in terms of size. Due to the special characteristics of these tools, such as its portability, banking is not only enabled anywhere, anytime, but capable of extending its services to the remotest parts of South Africa to bank the unbanked. The phenomenon is gaining momentum and stakeholders are poised to invest in this to ensure its success.

The concentration of mobility in this study is on handheld technological devices (i.e. MIDs), and not the transition of humans by vehicular movement, be it by train or airplane. The review aimed at synthesising the current study with the existing literature sources and critiquing them to identify gaps in order to make a contribution to the existing body of knowledge.

Though m-banking acceptance is gaining ground, stakeholders express doubts regarding its sustainability and continuance usage, just as with any other technological diffusion, hence warranting an investigation to predict its continued usage. This study, also meant to review topics and factors on m-banking acceptance in South Africa, can inform continuance strategies.

To this end, this study makes use of statistical modelling based on empirical findings to explain MBCI in South Africa. It makes use of the large number of statistical methods normally used to analyse bivariate and multivariate relations (Kock, 2010; Hair *et al.*, 2011). This is commonly referred to as SEM, which is exemplified in Chapter 5 of this study.

Structural equation modelling (SEM)

The desire to test concepts and to predict has given rise to the use of SEM in the current study. In this sense, SEM is a very helpful approach (Steenkamp and Baumgartner, 2000; Henseler, Ringle and Sinkovics, 2009), as it is equivalent to performing covariance-based (CB) SEM analysis. CB-SEM develops a theoretical covariance matrix based on a specific set of structural equations with the technique of focusing on a set of model parameter estimations which minimises the difference between the theoretical covariance and the estimated covariance matrix (Rigdon, 1998; Hair *et al.*, 2011). However, since the focus of this study was more on predictions than confirmation of structural relations, the PLS-SEM was considered even more appropriate (Hair *et al.*, 2011: 139).

PLS-SEM is a causal modelling aimed at maximising the explained variance of the dependent phenomena of importance to human factors which is described in statistics as latent variables, factors or constructs. For example, the different types of social norms, trusts, satisfaction or perceived service qualities that are investigated in the extant studies of psychology and humanities. These factors are very similar to those deployed to undertake this study, hence the adoption of these terms in this study henceforth. PLS-SEM is however opposite to CB-SEM's objective of reporting the theoretical covariance matrix without a concentration on explaining variance.

In brief, the scope of the current study was to predict MBCI in South Africa and to test a set of theories that was able to help in making such predictions. Hence, the ardent desire to adopt PLS-SEM as the statistical tool to achieve this objective (Hair *et al.*, 2011: 140). The primary objective was to maximise the explained variance in the dependent constructs, and more so, to evaluate the data quality through the measurement model's quality criterion.

The causal relationship amongst latent variables and the quantification of their effects on one another is something of interest to all authors using PLS-SEM. Thus, the path diagramming, the equations linking correlations or covariance to parameters, and the decomposition of effects

(Bollen, 1989) were the driving forces in the study. The linear relationships between the latent variables and the common variance between the variables formed the grounds for the analysis performed.

A set of hypotheses used to build the research model were tested statistically to determine the degree to which these are consistent with the matrix of the empirical data. Goodness of fit indices from the estimation of the statistical evaluation between the covariance matrix of the research model and the matrix of the empirical data have given an indication of how well the research model could perform.

Analysis of the measurement models and of the structural models of the PLS-SEM were the two major steps taken to give a complete picture of the study's SEM efficacy.

The measurement model

The measurement model defines the latent constructs through various manifest variables (MVs). The MVs are the responses to questions of a questionnaire, or any kind of measured data. For a robust measurement of factors, the MVs are very important elements that need to assess all different angles of the construct under investigation without being similar to each other. A good measurement model is a confirmatory factor analysis (CFA), with the possibility of undetected covariance between possible pairs of latent variables. When a measurement model assessment in a study is good enough, i.e. meets determined parameters and acceptable thresholds, the next step is to move on to the assessment of the structural model of the SEM analysis (Hair *et al.*, 2011).

The structural model

The structural model shows the relationships between the latent variables of the study, the direct and indirect effect effects of these latent variables, along with the error variance for these variables. In this manner some of the latent variables become exogenous and other endogenous. The exogenous constructs are not affected by any other variable; rather they impact other latent variables to make them endogenous. Thus, endogenous variables are those that are impacted by other variables. Changes in the exogenous variables are not explained by the model and are caused by external forces outside the model. Variances in the endogenous variables are caused by one or more variables amongst the specified exogenous variables in the model.

In this wise, models with five to six latent variables, as in the case with the current study, each measured by three to four MVs, can be established as an upper-level complex model (Diamantopoulos and Siguaaw, 2000).

The current study's systematic review of literature did not find any such models, but instead, those limited to three to four or five latent variables. It is thus worth mentioning that the larger the model size, the more challenging it becomes for the said model to meet recommended thresholds and model fit indices.

The two model types being the main reporting issues in any PLS-SEM analysis, reporting on residual and error terms is a good indication of the model's efficacy.

Residual and error terms indicate that "nothing is perfect" under the sun, especially when it comes to the study of social phenomena such as that of the current study. This assumes that there is some amount of error in measurement which is addressed by SEM as error terms for the variables. Residual error terms accordingly show the unexplained variance amongst endogenous variables not captured by constructs.

The model development process

A distinction is made between three processes when developing SEM by Jöreskog and Sörbom (1993): i) strictly confirmatory, ii) alternative models; and iii) model generating.

In the first instance, researchers are required to formulate a model based on theory and then collect data to test the model's fit to the data. There is no modification to the model, which means that the model is either accepted or rejected depending on how well it performs.

In the second instance, researchers gather many possible theory-guided models capable of fitting the data. A test is performed and the best fitting model is taken. This sounds like an exploratory research methodology. The problem that is normally encountered is that it is almost impossible to find alternative models which have been developed for the same topic one is working on.

Talking about the third scenario, the researcher embarks on a trial-and-error or exploratory approach, rejecting initial tests when they are not good and modifying subsequent models to arrive at the best possible one with good fit indices. The aim here is to re-specify a model based on theory or data to arrive at a meaningful model or statistically fitting one (Joreskog and Sörbom, 1993). The approach has the limitation of the model being a universal

model which can fit new datasets as they are arrived at based on the dataset at hand. It is therefore recommended that a cross-validation strategy is followed whereby the arrived at model is tested against an independent dataset.

The current study is well positioned to follow the first approach of SEM development because the developed theories were derived from a thorough systematic literature review.

In concluding therefore, the SEM development process envisaged by the current study is synthesised to that summarised by Diamantopoulos and Sigauw (2000) as follows: 1. model, 2. conceptualisation, 3. path diagram construction, 4. model specification, 5. model identification, 6. parameter estimation, 7. assessment of model fit, 8. model modification, and 9. model cross-validation.

The methodologies adopted to evaluate the research model are however those of Van Riel, *et al.* (2017), which suggests a three-stage approach. This is outlined as below (Figure 1.1):

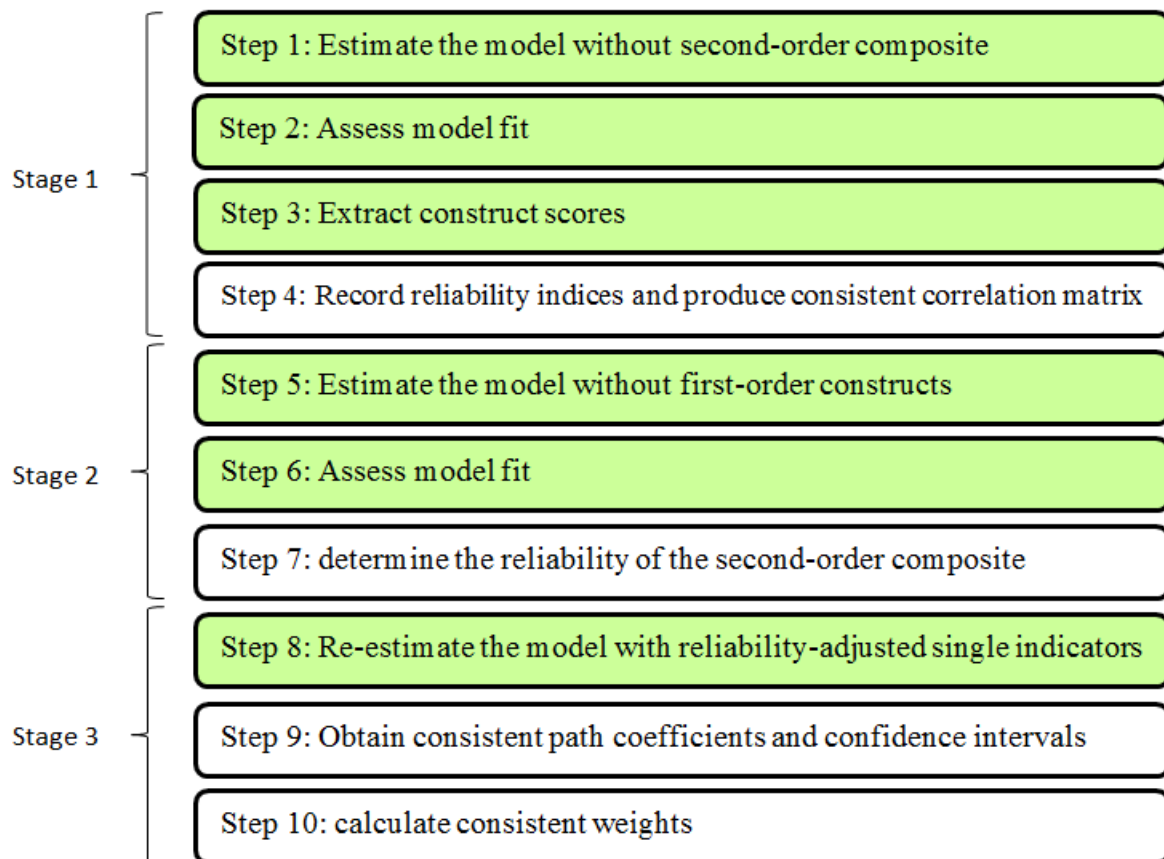


Figure 1.1: The steps of the three-stage approach to test hierarchical constructs specified as composed of common factors (Van Riel *et al.*, 2017) in Press.

(It should be pointed out in the above figure that the highlighted cells (green) are the only steps which require some kind of experiment to be performed. The rest are just extraction of information after the experiment).

This approach is adopted for the current study because: firstly, it provides a method to calculate consistent estimates such as item loadings, weights and path coefficients. Secondly, it allows for two assessments of the goodness of model fit, hence providing good reasons to answer the research questions regarding a hierarchical modelling approach.

Moderation of studies gives an opportunity to report on alternative outcomes that could otherwise remain unknown. In order to discern the impact of MBCI on actual usage, the study identified the control variable(s) and tested their effect on MBCI in South Africa.

This study was carried out in South Africa in Durban in the region of KwaZulu-Natal. An electronic questionnaire, was administered through an online research agent to capture the general opinion of m-banking users throughout the country.

The population of study respondents were clients of the major banks in South Africa, namely: Standard Bank, Amalgamated Banks of South Africa (ABSA), First National Bank (FNB) and any other, which are included in the list of the well-known banks offering m-banking to their clientele. This, it was believed would enhance the generalisability of the outcome based on SEM.

The study was commissioned in mid-2016, and data collection was launched at the end of November 2016, after a pilot study of 20 users performed to fine-tune the research instrument.

ANTICIPATED CONTRIBUTION OF THE RESEARCH

This study intends to make publications in accredited reviewed journals to enrich the body of knowledge regarding the subject matter. It also plans to make presentations at both local and international conferences to share its findings. Seminars and workshops at the learning institution (DUT) are anticipated, as these have the potential of enriching the conceptual and theoretical underpinnings of the study. To this end, both academic and practical contributions are foreseen.

Academic influence

Experimental proof based on laboratory-constrained testing of hypotheses with the PLS software at first-hand is expected. This will test the study's hypotheses on the multidimensionality of the selected constructs and how they influence continuance intention for m-banking in South Africa.

This is envisaged to fill in any gap in research in South Africa with regard to the current topic, as analysing qualitative data with principal data is lacking in this area of study.

Practical influence

The study is also expected to influence stakeholders' discernment with appropriate information to make them more competitive. Accordingly, the general populace of South Africa, including both the governed and the government are anticipated to benefit. The world at large may also draw inspiration from the tangible research results of this study.

Benefit to the banks

South African banks contribute substantially to the cultured national product. As practitioners of m-banking, they are expected to see the relationship between trust, social influence, behavioural control, satisfaction and behavioural intentions in relation to banking from the results of this study. The emphasis that is placed on the need for service quality to enhance client satisfaction is meant to ensure quality of service delivery in the country. In short, the study's precise models may allow bankers, both within the country and without, to make informed decisions for better performance in the long term, as they are bound to recognise hitherto unknown relationships between these constructs and real-life operations.

THE ORGANISATION OF THE STUDY

Chapter 1: Introduction

An overall synopsis of this work is presented in this chapter which scrutinises the academic fundamentals of m-banking. This is contextualised within the South African environment. The chapter contains research background (context), the rationale for the study, the problem statement, and aim of the study, the research question, the study's theoretical underpinning, and the scope of the study and also anticipated contributions that may be made by this research.

Chapter 2: Literature review

In this chapter, a logical demonstration of the relevant examinations done so far in the area of m-banking is reviewed. The general survey of m-banking is intertwined with studies in South Africa to synthesise and critically examine the situation in the country. This was done to identify and highlight the important variables, and to document the significant findings from earlier

research which served as the foundation on which the theoretical framework for the current investigation was built and hypotheses developed.

Chapter 3: Theoretical framing and hypotheses

Having examined relevant literature systematically, the different kinds of variables that could operate in MBCI in South Africa and the relationships among these variables are established to develop the conceptual model for this study. All-important variables relevant to this study are identified, defined and labelled in this chapter. These variables are logically constructed to describe the interconnections amongst them, and how they can predict the phenomenon under consideration. The relationships amongst the independent variables, the dependent variable(s), and the moderating and intervening variables are elaborated on. The moderating variable(s) are explained, and how and what specific relationships they would moderate are also explicated.

Chapter 4: Research methodology

The procedures by which this study went about the work of describing, explaining and predicting MBCI phenomena in South Africa are discussed within this chapter. Explanations of reliability and validity, and the type of analysis that was employed to interpret the data and information collected are also provided. This is to provide a justification for the approach the researcher assumed in conducting the study. Also defined in this chapter are the methods by which knowledge was gained through the collection of data from the study sample. Here, the study discusses the comprehensive scale of the data collection process which entails the research steps, the sample size and an explanation of the statistical tools used.

Chapter 5: Experiment and results

In this chapter, the study tests the relevance of the model for predicting the issue at hand by scientifically testing the various hypotheses which logically flow from it. The chapter then covers the outcome of experiments performed, showing the cause-and-effect relationship between the study's independent and dependent variables. It explains how all other variables that might contaminate this relationship were tightly controlled. In other words, the possible effects of the control variables on the dependent variable were accounted for, so that the actual causal effects of the investigated independent variable on the dependent variable could be determined. The results of the data analysis are also expounded on, explaining how appropriate the

conceptualised theory is, and how the problem at hand can be solved using a combination of alternatives generated by the results of statistical data analysis.

Chapter 6: Discussions and implications

The connotation and applications of the research findings are presented in this chapter. It discusses research findings and their implications in highlighting the scientific path which leads managers and stakeholders to practice good decision making. Sound discussions based on scientific persuasions are advanced to help managers make good judgements by reflecting on the research findings to find solutions to such problems. A case is made for experience and common sense, in conjunction with scientific research results, to help managers arrive at good managerial decisions, since one without the other cannot be considered completely effective.

Chapter 7: Conclusion

Chapter 7 looks at the sophisticated MBCI for financial transactions in South Africa in brief and highlights research and policy implications. Limitations of the study are also discussed, following which recommendations to solve discovered problems are then effectively communicated for implementation.

CHAPTER SUMMARY

This chapter has provided the research background and rationale for the study. It discussed the study's problem statement, aim and objectives and its research questions. The anticipated contribution of the research was delineated into theoretical and practical contributions, showing how this can be of benefit to the banks as an aspect of the study's practical contribution. Finally, the thesis structure was outlined to provide chapter summaries. The next chapter reviews key concepts and literature relevant to this study.

CHAPTER 2

LITERATURE REVIEW

INTRODUCTION

In this chapter the methodological approach to conducting a systematic literature review is outlined. This affords a classical method for classifying, criticising and summarising past scholarship related to MBCI. This is synthesised to the South African environment. The systematic literature review of educational documents, available over 30 years, provided adequate suggestions toward a maturing research methodology (Fiegen, 2010; Crossan and Apaydin, 2010; Zhang, Sun and Wang, 2012).

WHAT IS A SYSTEMATIC LITERATURE REVIEW?

Confusion seems to exist as to what really constitutes a systematic literature review and approach, and this has not only created a multitude of suggestions, but also adds varied breadth and depth to the methodology.

Webster and Watson (2002: 48-49), in trying to iron out the perceived differences have this to say: “A methodological review of past literature is a crucial endeavour for any academic”. They define an effective literature review as one which “creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed” (Webster and Watson 2002: 13).

Hart (1998: 1) defines a literature review as “the use of ideas in the literature to justify the particular approach to the topic, the selection of methods, and demonstration that this research contributes something new”. He goes on to note that for the literature review, “quality means appropriate breadth and depth, rigour and consistency, clarity and brevity, and effective analysis and synthesis”.

Levy and Ellis (2006: 182) draw a summary of the foregoing definitions by postulating that, “sequential steps to collect, know, comprehend, apply, analyse, synthesise, and evaluate quality literature in order to provide a firm foundation to a topic and research method” is what constitutes a systematic literature review.

This research followed a systematic literature review methodological approach to gather information for its literature review in order to avoid the criticism of being just a regurgitation of past work of a similar nature, but it has not yet discovered any two reports which completely agree on what a systematic literature review should comprise. This becomes even more evident from the following citations:

Although I know of no exemplars in IS research that explicitly follow the rigorous methodology of the systematic literature review, I searched several widely-read IS journals for exemplars of high-quality literature reviews to demonstrate examples of best practice in various aspects of the review process (Okoli, 2015: 43).

“From explicitly investigating the degree to which IS literature reviewers document rigour, even exemplary papers often do not do so adequately” (Vom Brocke *et al.*, 2009).

Whereas each of these systematic literature review guides present uniquely valuable contributions, none of them employs the rigorous, standardised methodology for the systematic literature review that has developed from the health sciences (Pope, Mays, and Popay, 2007) and other fields (Pawson *et al.*, 2005; Petticrew and Roberts, 2006; Kitchenham and Charters, 2007).

“No uniformity in methodology or structure among these [systematic literature review] studies exist, even between those published in the same journal” (Okoli, 2015: 886).

Having noted the shortfalls of the below authors in order to see further, the current study assumed the example set by these exemplars (Newton, 1676) to achieve the best possible methodology approach that served the need of this study:

- Webster and Watson (2002) lament the fact that IS scholars tend to be unaware of the need for structure in reviews and only briefly outline some pointers. This is taken into consideration for this study.
- Levy and Ellis (2006) produce a step-by-step guide that is particularly helpful in identifying sources for literature specific to IS. However, their detailed synthesis methodology, and guidance from argumentation theory in writing the review report fell short of the current authors’ standard as compared to that adopted for this study.

- Vom Brocke *et al.* (2009) argue in detail for the need for rigour in documenting the literature review process. This study wholeheartedly endorses that call, but goes further to follow the detailed steps of Higgins and Green (2009) and Landa *et al.* (2011), where rigour and specified detailed principles for achieving this are spelt out.
- Sylvester, Tate and Johnstone (2011) describe and illustrate a synthesis approach that, rather than synthesises a single related “true” perspective of a body of literature, purposely discerns different stories though presented them in a rigorous and enlightening way.
- Although Wolfswinkel, Wilderom and Furtmueller (2011) briefly outline all steps of the literature review process, their primary contribution is a novel synthesis approach (Okoli, 2015) that uses grounded theory techniques. By contrast, the adopted guide followed includes the entire review process in detail and covers many more synthesis approaches than that of the above authors, although Okoli employs an outline-based systematic literature review methodology to provide guidelines for developing theory in literature reviews. Despite the fact that he provides details for each of the steps to be used, his handling is not complete for any of the steps adopted.
- Bandara *et al.* (2015) exhibit how to use electronic tools for the grounded-theory coding to support the literature review process with an enviable contribution in the data extraction process stage. But their detailed process exceeds what is normally covered in graduate theses. Nevertheless, their content analysis approach to synthesis ties in well with their data-extraction methodology.

Whatever degree of disagreement exists, this study relied strongly on the belief that a systematic literature review should be able to analyse, synthesise, and evaluate the literature that provides the study’s foundation, in addition to indicating how such literature was collected.

Thus, in keeping with the arguments that, there is no generally accepted way to conduct a systematic literature review, the current study selected a typical example in Higgins and Green (2009), Landa *et al.* (2011), Okoli (2015) and Bandara *et al.* (2015) (Table 2.2 and Figure 2.1) which the researcher strongly believes provided adequate steps to follow for the current study.

Hence, for the current study a total of 1480 articles were downloaded covering the period from 1973 to 2015 (see Figure 2.1). Four of these followed the meta-analyses approach, seven combined both meta-analytic and narrative components, and forty-three employed quantitative

methodologies. Many of the papers employ detailed construct development and model building and include reviews of existing literature on the particular phenomena being investigated in this current study:

- From intentions to actions and the theory of planned behaviour (Ajzen, 1985; 1991);
- Understanding information systems continuance (Bhattacharjee, 2001);
- The partial least squares approach to structural equation modelling (Chin, 1998a);
- User acceptance of computer technology (Davis, Bagozzi and Warshaw, 1989);
- *Introducing LISREL*, Thousand Oaks (Diamantopoulos and Siguaw, 2000);
- Belief, attitude, intention, and behaviour (Fishbein and Ajzen, 1975);
- Evaluating structural equation models with unobservable variables and measurement error (Fornell and Larcker, 1981);
- Trust and TAM in online shopping (Gefen *et al.*, 2003);
- PLS-SEM: Indeed, a silver bullet (Hair, Ringle and Sarstedt, 2011);
- The use of partial least squares path modelling in international marketing (Henseler *et al.*, 2009);
- A critical review of construct indicators and measurement model misspecification in marketing and consumer research (Jarvis, Mackenzie and Podsakoff, 2003);
- A general method for estimating a linear structural equation system (Jöreskog, 1973);
- Toward a taxonomy of multidimensional constructs (Law, Wong and Mobley, 1998);
- Latent variable path modelling with partial least squares (Lohmöller, 1989);
- Measurement and evaluation of satisfaction process in retail settings (Oliver, 1980);
- Understanding information technology usage (Taylor and Todd, 1995);
- PLS path modelling (Tenenhaus *et al.*, 2005);
- Unified theory of acceptance and use of technology (Venkatesh and Zhang, 2010); and
- User acceptance of information technology (Venkatesh, Morris and Davis, 2003), to mention only a few.

The main steps from the adopted framework for the systematic review for this study were as follows (Higgins and Green, 2009; Landa *et al.*, 2011; Okoli, 2015; Bandara *et al.*, 2015):

- Outline the search parameters used to initiate a web search;
- Identify scholastic databases and search engines to use for literature searches;
- Decide on filters for inclusion of relevant papers and exclusion of irrelevant papers; and
- Ensure the resulting articles are representative enough by repeating the filtering process.

Outline the search parameters and web search

Table 2.1 outlines the restrictions followed to obtain most of this study’s resources. These were retrieved from similar works regarding information systems and information technology (IS/IT) continuance intention as their endogenous constructs within their representations.

Table 2.1: Search parameters

Search Parameter	Synonym
Online continuous intention	Website continuous intention
Revisit intention	Intention to reunite
Electronic banking	Online banking
Banking Website loyalty	Banking online loyalty
Banking Website stickiness	Banking online stickiness
Continue to bank online with mobile device	Continue Internet banking with mobile telephone
Customer’s intention to reunite	Client’s intention to reunite
Technology continuous intention	Information system continuous intention
M-banking continuance intention	M-banking on the move loyalty
M-banking acceptance	M-banking in South Africa

Considering that continuance has to do with technology usage, which has to stem from technology acceptance, the resources gathered for this study were mostly on technology dissemination, with the vast majority of them dealing with continuous intentions and behaviour.

- **Identify scholastic databases and search engines to use for literature searches (inclusion-exclusion criteria)**

All symposium proceedings and periodical articles which were gathered had to meet the following critical criteria as applicable for inclusion (Landa *et al.*, 2011: 50):

- Is the supporting evidence shown and finish?
- Are there (unacceptable) conflicts or vested interests?
- Is it repeatable; that is, rigorous?

Other pertinent periodicals in the English language, in peer-reviewed journals or “grey” literature (government reports, dissertations, draft papers, etc.), which met the overhead standards remained for further inclusion.

In light of the above-mentioned, this study investigated m-banking in South Africa using ground-breaking technology strategies such as smartphones, tablets and PDAs on one hand, as opposed to laptops on the other, while excluding mobile vans and GPS navigation systems, along with other heavy-duty apparatus capable of performing m-banking.

- **Decide on filters for inclusion of relevant papers and exclusion of irrelevant papers (Filtering process and results)**

Papers dealing with only online banking, without emphasising the freedom of apparatus used to execute the banking were assumed to be using stationary computers, and were excluded as they were adjudged to be divergent from the primary context of this study. Nevertheless, papers that discussed the key issues, such as banking through a mobile telephone, laptops and with other devices, were put in one folder for further refinement. The researcher skimmed the literature by means of this folder, to identify a more applicable location listing for some of them, and an additional 370 papers were thereby gathered (Hart, 1998; Park and Gretzel, 2007). Following the critical selection process to its end, a total of 238 papers were found to be most suitable for use (Figure 2.1).

The majority of the articles used within this research were peer reviewed papers in IS and m-commerce readings. More than 50 percent of the readings reviewed examined user satisfaction as an essential determinant of continuance intention, while others considered age and habit as the backgrounds for this occurrence. This establishes the degree of consciousness and the vested interest researchers have in m-commerce theories. The Google Scholar evaluation of papers on information systems continuance intention (170), were authored or co-authored by Asians (41 percent), Europeans (29 percent), North Americans (19 percent) and Africans (11 percent). Other sources used are summarised in Table 2.2 below.

Table 2.2: Summary of data collected for this study

Database or method	No. of articles found from search	No. of articles not meeting inclusion criteria	No. of duplicate articles	No. of articles to review by title and abstract
BENG	1		1	1
SCIENCE DIRECT	11			1
SABINET	3			3
IEEE	3			2
HAND SEARCH	-		-	-
GREY LITERATURE	17			17
GOOGLE SCHOLAR	170		8	11
REFERENCE LISTS				

The search selections from Beng, Science Direct, SABINET and IEEE were stricter than Google scholar, and aimed at articles more closely related to the subject in South Africa. This was to enable a more in-depth review of South Africa than a generalised perception. Out of the total number of materials collected from Google Scholar, 17 were dissertations/theses by South African scholars, 2 of the 3 IEEE sources were articles on South Africa, all 3 articles from

SABINET were on South Africa, and only 1 article out of the 11 Science Direct sources were on South Africa. The only 1 obtained from Beng also surfaced in the Google Scholar publications, while 8 duplicates were recorded among the Google Scholar collections. Figure 2.1 below sets out the process that was followed to collect literature for this study.

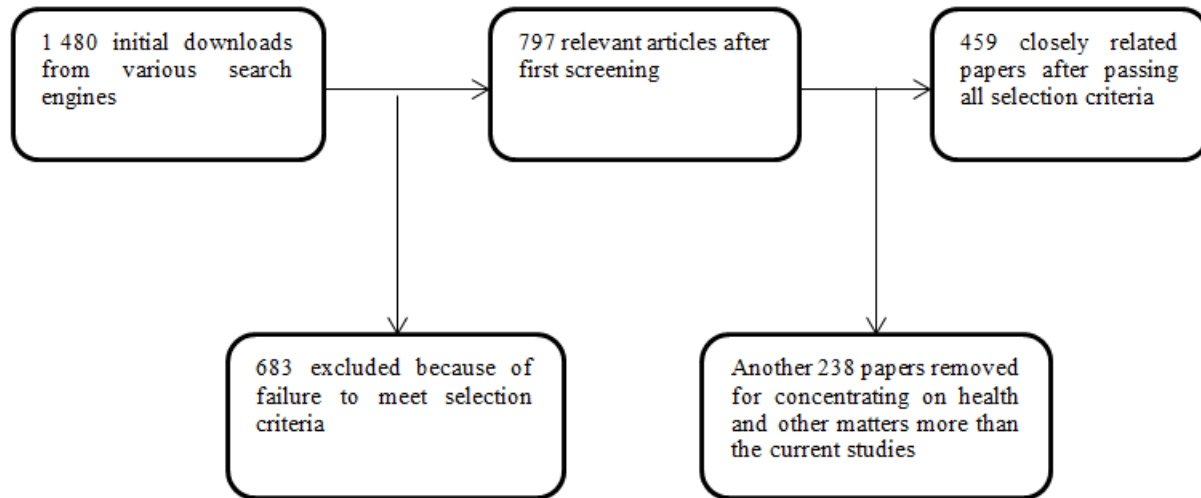


Figure 2.1: Procedure for literature search-snapshot

- **Ensure the resulting articles are representative enough by repeating the filtering process (evaluation and synthesis of search results)**

Electronic commerce continues to impact the worldwide commercial sphere, and technological know-how presentations tend to concentrate more on computing and the wireless Internet. This trend arrives along with the set of phenomena comprising mobile e-commerce, also known as m-commerce (Tarasewich, Nickerson and Warkentin, 2002: 42). Mobile e-commerce is all actions linked to a commercial operation directed via telecommunications networks which can be accessed with wireless or mobile apparatus (Tarasewich, Nickerson and Warkentin, 2002: 42). Mobile devices are the apparatus utilised to connect to these services. M-banking, on the other hand, is specifically regarded as one of the applications that empowers users to gain access to Internet banking through mobile instruments (Hoehle *et al.*, 2012: 123). Ranging from sizable laptops to small handheld devices, like mobile telephones, PDAs or smartphones, these machines are capable of communicating with lender Websites to execute banking dealings from balance investigations to countless additional business transactions. In South Africa, m-banking is also used to obtain lottery vouchers or effect transfers of money and airtime.

Luo *et al.* (2010: 221) pronounce m-banking as a ground-breaking development for obtaining banking facilities using a network which assists the user to interact with a financial institution through a mobile device. This definition, which is highly comparable to those of Tarasewich *et al.* (2002: 42) and Hoehle *et al.* (2012: 123), is approved for this study for many reasons: first of all, it looks at the banking occurrence as empowered by a network that may be reachable at any moment, and secondly, through a system that is mobile, empowering a combination of the two (linkage and mobility) for this purpose. It needs to be highlighted here for the sake of the study that m-banking is not about humans moving from one spot to another to execute banking via some stationary technology, but the device itself going with the humans anyplace they desire to perform banking at potentially any time. As admitted by the writers mentioned below, there is a rise in the use of mobile devices, especially mobile telephones to access online social network websites, such as Twitter and Facebook. This has concomitantly improved mobile telephone expertise and behavioural control; in other words, self-efficacy (Brown *et al.* 2003; Bicen and Cavus, 2010) with its favourable effect on cellular commerce. This phenomenon of improved utilisation of cellular phones is likely to have an overflow effect in South Africa, allowing individuals to comprehend m-banking better.

The 2009 International Telecommunication Union (ITU) figures indicate that cellular penetration of services in South Africa then stood at roughly 83.3 percent, while fixed-line penetration was at only 9.97 percent. This is a sign that South Africans consider cellular devices as requirements, and are rooting aggressively for solutions on them compared to any other media for their daily actions, such as against traditional walk-ins for their financial transaction requirements. This research scrutinises this sensation through a systematic overview of literature to highlight m-banking continuous intention and use in South Africa as opposed to simply its adoption.

Attention needs to be drawn here to the fact that this study has used the term m-banking to designate m-banking through m-devices. However, the terms “handset banking”, “m-computing”, “financial transactions on the go”, “wireless or distance banking”, besides a multitude of other jargon terms, similar to those presented in Table 2.1, likewise surface in civic discourse, and are frequently loosely used.

- **Multidimensional constructs that affect the South Africa m-banking continuance intention to accept banking using a mobile device**

South Africa saw the introduction of its first m-banking in 2005 (Goldstuck, 2005: 219), and since then has witnessed an upward surge in this phenomenon. This could be attributed to the multidimensional factors discussed below, with innovative ideas like M-PESA and WIZZIT having also played a role. M-PESA is all about a mobile money transfer model enabled by a Kenyan telecommunication network – Safaricom. WIZZIT provides a basic banking service for unbanked and underbanked people, and for organisations which have no access to a bank, or limited access in South Africa, based on the use of mobile devices to access bank accounts and conduct transactions.

WIZZIT is on record for its groundbreaking results amongst the poor using m-banking in South Africa (Duncombe and Boateng, 2009: 1243). The fact that the penetration levels of cellular telephones in Africa are much higher than those for the Internet (ITU, 2009) also created a fertile ground for their success story. To this end, there has been confirmation of such results in South Africa. For instance, Pretorius (2013) reported that South African m-banking records have seen an increase in users using their mobile devices to perform banking since 2011. The continuance behaviour for the sustainability of this concept is therefore crucial for this study.

From the review of literature in this context, it was clear that researchers' interests are more on Internet banking than m-banking. With this in mind, this thesis makes clear in Chapter 1 the scope it intends to cover, showing the difference between Internet banking and m-banking in addition to other related issues.

As a theoretical framework for this study, a systematic literature review of the following important theories normally used to study technological innovation and adoption, such as m-banking the world over, are examined, synthesised and critically evaluated to study m-banking continuance intentions in South Africa.

SOCIO-COGNITIVE THEORY OF TRUST

M-banking, e-banking or Internet banking involves a socio-psychological attempt to hand over to another, and the individual's perceptual and emotive feelings for business purposes. Trading using digital platforms, although partners do not see one another but must build resistance against the negative ideas and emotions that keep ringing in the mind, to react to social act which

lead to typical and complex business, requires trust. It comprises an excruciating effort by individuals to organise such inward emotions, yet conducting business on mobile platforms continues to develop. Research in m-banking is small by contrast to wired banking, and it has received little scholarly attention (Puschel *et al.*, 2010). Cognitive and affective trust is therefore required to solidify and consolidate this sort of business, and to serve as a principled theory for such social functions.

To this end, the theory of socio-cognitive trust is employed to demonstrate how this affects the public's behavioural intentions in using m-devices for banking.

The theory of cognitive trust defines trust as a notion, valued by agents with regard to its cognitive ingredients (Castelfranchi and Falcone, 2010: 401), and treats cognitive trust as a relational construct between the principal (trust giver) and a trustee (trust receiver) that could be established in a given environment or context. Most significantly, it is about a specified action or task to be fulfilled.

This research consents to this characterisation because it treats trust as a relationship between two people in a given situation, and as being about a specified action or a task to be achieved. It is thus appropriate to this research which seeks to express this construct of trust between two parties who have consented to fulfil commercial tasks within a digital environment. It is worth mentioning here that m-banking via the virtual environment makes use of technology, and as such this technology can also influence trust. The current study intends to show how trust in technology can influence people to practice m-banking.

Castelfranchi and Falcone's (2010: 401) pronouncement of trust distinguishes between cognitive trust and affective trust, and treats cognitive trust as a relational construct between trust giver and trust receiver that can be recognised in a given context. With regard to being realised by another as trustworthy, McAllister (1995) maintains that the trust givers decide whom they would like to trust, and base this decision on what they think of as their having many good reasons to do so. The choice to trust and the pursuit of this variety of reasons, according to McAllister, indicate a procedure where the individual determines that someone – a team or organisation – can be trusted. When the decision to trust is made, the individual concerned becomes satisfied with the results of their decision, along with their levels of uncertainty decreasing in an environment where they may feel vulnerable because they know that they can confidently rely on the trusted individual, group or organisation. Individuals might choose to

conduct business with a banking website of their preference because they are acquainted with that platform (Garbarino and Strahilevitz, 2004; Gefen and Heart, 2006; Stranahan and Kosiel, 2007), and will continue visiting such websites once they have positively affirmed their satisfaction levels.

Castelfranchi and Falcone (2010), however, do not clearly indicate the various forms of trust, and which one in particular affects people's confidence to use IT to transact their banking online. For instance, in determining people's behavioural intentions regarding m-banking, trust could be affected by the technology being used to transact the banking (trust in technology), trust in the service provider (trust in the bank), and trust in the banking website. With this gap in mind, this study intends to investigate the particular element of trust which affects people most in deciding to perform m-banking.

Trust is an intentional psychological factor that influences users' satisfaction or intentions before these manifest in actions. It is the manifestation of individual belief in thoughts and actions. For instance, trust will convince users of m-banking that a mobile device can be utilised for financial activities, and that they can use the device to transact business with a banking institution. Trust is a very significant factor of e-loyalty (Xu and Liu, 2010), and the concept of trust has received an affirmative statement in relation to online business. For instance, Bianchi and Andrews (2012) state that trust makes consumers comfortable to share their information, act on a web retailer's instructions, and make purchases. This obedience is designed to guarantee widespread acceptance of m-banking and continuance usage. Trust has also been demonstrated as being a critical factor for vendors to create and maintain relationships with their customers (Deng *et al.* 2010) in the context of electronic business. Trust cannot be overemphasised when it comes to business, let alone conducting such business in a virtual environment, where participants do not see each other. This study accepts that trust influences the continuation of m-banking in m-commerce.

Surprisingly enough, Koenig-Lewis, Moll and Palmer (2010: 410) conducted a study in Germany on consumers between the ages of 18 and 35, applying the TAM and IDT. They found trust not to be a prominent factor inducing the behavioural intention to accept m-banking, but rather only as crucial in reducing the overall perceived risk of m-banking. Their empirical approach was based on an online survey of 263 consumers in Germany, and the data were analysed with the Analysis of a Moment Structures (AMOS) SEM software. This made their

study fall short on three issues: firstly, online respondents totalling 263 could be considered too small a number to warrant generalisability of the results, ignoring the inherent limitations of such surveys and how they were mitigated in the study; secondly, the sample population was only limited to a section of the general public (young Germans); and lastly, the AMOS analytical tool requires a sample size of more than 300 (Gefen *et al.*, 2003) to yield any meaningful outcome. The current study wishes to achieve more insight into the issue of trust in m-banking using a more appropriate methodology.

Trust is considered a multidimensional concept, categorised into several referents in an online setting (Hsu, Chuang and Hsu, 2014). For instance, Teo, Jiang and Srivastava, (2009) classify trust into: trust in government; trust in technology; and trust in e-government websites. Lu, Wang and Zhao (2010), and Shu and Chuang (2011), classify trust as: trust in the vendor (Lu *et al.*, 2010); trust in the auction's initiator (Kauffman, Ho and Lai, 2010); and trust in group members (Lu *et al.* 2010, Shu and Chuang, 2011). This study further categorises trust into lower-level dimensions, such as: trust in e-vendor (website); trust in technology; and trust in third parties.

Trust in e-vendor (website)

Many researchers have concentrated on various trust issues in electronic-business (Awad and Arik, 2008; Choudhury and Karahanna, 2008) and indications are that people's trust in the online vendor is positively related to attitudes towards buying using a virtual setup (m-banking). For instance, when consumers trust a vendor, they are expected to have increased satisfaction and loyalty towards the vendor (Kassim and Abdullah, 2008), and can be expected to influence others to transact with the vendor. This is what Chen and Dibb (2010) describe as the significant association of shoppers' attitudes toward a website based on their trust in it.

In South Africa, Maduku and Mpinganjira's (2012:171) study of customers' attitudes towards the usage of cellular telephone banking in Gauteng, South Africa revealed that trust has a stronger predictive power on customers' attitudes towards this type of banking than all the other variables. Nevertheless, their study does not tell us the particular trust that impacted on the customers' attitude. A total of 394 usable responses were utilised for analysis in this study that itself used a self-completing structured questionnaire.

Maduku and Mpinganjira (2012) also state that due to a lack of a readily available sampling framework, they made use of non-probability sampling in the form of convenience sampling in order to select study respondents. Selecting respondents on the basis that they happened to be in designated malls where the survey took place, as well as on their willingness to co-operate with the researcher, may however have impacted on the reliability of their results. The method of sampling should be randomised and not self-selected to be generally applicable to South Africa, as such a method of sampling can compromise the study's results. The sampling method used by Maduku and Mpinganjira (2012) ignores a section of the population who had no opportunity to meet the researchers at the mall where the questionnaires were administered. This denies their study the ability to deliver a feeling of the impact of the subjective norm, since friends and relatives amongst this section of people could mistakenly be influenced to practice cellular telephone banking.

Trust in technology

A study conducted in South Africa by Wentzel, Yadavalli and Diatha (2013: 670) found that people's trust in technology-enabled financial services was the third most important construct after attitude and perceived benefits influencing its usage.

Trust in the Internet seeks to evaluate the degree of trust required at which humans will perform a financial act relying on a machine. For illustration, the theory of reasoned action (Fishbein and Ajzen, 1975) is of the conviction that beliefs directly affect attitudes, and for that matter the higher the level of trust, the more favourable the attendant attitude (Hsu *et al.* 2014). Keen *et al.* (2004) found that the choice of the Internet over brick-and-mortar business models is conditioned by individuals' subjective norms. It thus follows that trust in m-banking also implies trust in the infrastructure and the underlying control machinery (technological trust) dealing with transaction integrity, authentication, confidentiality, and non-rejection (Ratnasingam *et al.*, 2002: 384).

In this age of ICT, it could be expected that humans have come a long way towards believing in mobile technology. However, there is evidence from a range of research (Chen and Dibb, 2010; Koenig-Lewis, Moll and Palmer, 2010; Zhou, 2011) to suggest that users consider m-banking as an uncertain and risky venture, and will therefore always search for trustworthiness before undertaking m-banking. For instance, within the e-health context, it is known that users

are more likely to trust websites owned by well-known and well-respected organisations (Sillence *et al.*, 2004) than in other technologies.

Trust in m-banking is synonymous with human trust in an automated or computerised system, which depends on three factors: 1) the perceived technical competence of the system; 2) the perceived performance level of the system; and 3) the human operator's understanding of the underlying characteristics and processes governing the system's behaviour (Lee and Turban, 2001: 81). Evaluation of these three factors confirms the perceived ability (regarding speed, reliability and availability) of the system to perform the task of m-banking. When expectations of these three are lower than performance, trust in m-banking is confirmed; otherwise, trust in m-banking is disconfirmed. This study argues that m-banking service adoption and continuance usage depends on banking users' trust in Internet technology.

Trust in the third party

Trust-creation can occur through the process of transference (Doney, Mullen and Cannon, 1998: 606), whereby a third party is used to guarantee trust in online transactions. Doney *et al.* (1998) maintain that the formation of trust through the transference process necessitates the identification of proof sources, and the establishment of links between the known entities or proof sources (third parties) and the unknown ones (online banks that the third party recommends as trustworthy). This is based on the premise that such third parties are themselves considered trustworthy.

Third party guarantors are well-established institutions with formal marketable structures. They sell certificates to users pledging integrity, ability and intention, which are meant to build trust in bank account holders. Trust of this type can relate to: 1) specific individuals or firms whose reliability can be guaranteed and purchased in the form of a certificate; and 2) intermediary entities such as banks, escrow account agents, and government regulators.

Organisations such as the “for-profit technology compliance and security company” (TRUSTe) and component of the Better Business Bureau (BBBOnline) are examples of such certifying third parties or intermediary mechanisms which create the required trust between e-vendors and customers. E-vendors purchase online trustworthiness from the privacy-seal programmes of the above-mentioned organisations (TRUSTe and BBBOnline), which is intended to provide consumers with a trusted brand of privacy practices. When users deal with e-

banks with such digital certificates, they are protected online and need not worry about invasion of their personal privacy. Therefore, users' privacy concerns are significantly reduced in the m-banking market with certification institutions or third parties.

In South Africa, a survey by the consultative group to assist the poorest (CGAP) in 2009 suggests that fewer people would have a problem trusting in m-banking services if they were backed by a mobile operator rather than a bank. Zhou (2012: 728) also found that institution-based structural assurances (e.g. Web-seals) have a positive and significant impact on e-vendor trust. This study attempted to ascertain the authenticity of these statements.

THEORY OF PLANNED BEHAVIOUR

When it comes to examining user intentions, the theory of planned behaviour is a widespread one. It was initially formulated by Ajzen (1985), and provides a classical approach to predicting the rudiments of such intentions. Being an expansion of the theory of reasoned action, this latter exhibited some discrepancies, thus warranting further investigation. The theory of planned behaviour (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980) upholds people's intentions as being the contiguous foundations of their behaviour, and sees intention as an indication to capture people's drive for performing consented-to conduct (Ajzen, 1991) It is a widespread framework to intellectualise, quantify and identify factors regulating conduct and behavioural intention (Vermeir and Verbeke, 2008: 544). Accordingly, it is in fact an inventor of conduct (Ajzen, 2008).

The theory of planned behaviour supports behavioural objectives through approach and subjective norms. This implies that both of these impact on the true act of utilising m-banking. By adding a third construct to the theory of reasoned action, in the shape of perceived behavioural control, the theory upholds that this last element informs behavioural intention and usage (Ajzen, 1991; Lee, 2010: 508), which forms the m-banking continuance intention which is the subject of this research. Perceived behavioural control is the awareness that a different person within South Africa will have control of a personal cellular device, and all the auxiliaries to be capable to perform m-banking. These three components have been authenticated through various readings which encourage the assertion that they indeed enlighten users in planning to utilise IT devices to undertake transactional behaviour (Venkatesh and Davis, 2000; Lee, 2010).

Some researchers have seen initial acceptance and continuation as being the same as acceptance decisions (Hong, Tam and Thong, 2006; Hsu *et al.*, 2006). Nevertheless, others (Bhattacharjee and Barfar, 2011: 4) including this researcher believe that these two are not synonymous. Having the intention to do something surely does not mean that a person will do that thing at all costs. Hence, this research investigates whether favourable intentions towards m-banking will favourably influence continuance usage and *vice versa*. Ajzen (1991) labelled perceived social pressure to perform a given behaviour or otherwise as the subjective norm, implying that normative principles of people’s anticipation can influence others to use and continue utilising m-banking if these individuals perceive the initial users’ experiences to be influential enough in their own lives to urge the usage of m-banking.

This study takes great consideration of the above declaration, and therefore takes action to examine further if simple pressure from close associates may actually influence others to yield to behaviour, such as accepting m-banking. It should be pointed out, though, that there are pockets of proof which lend support to the above assertion. For example, Sripalawat, Thongmak and Ngarmyarn’s (2011) combined TAM and theory of planned behaviour, in research performed on 195 users, established that subjective norms are the most overriding influence in m-banking acceptance.

But will this same subjective norm be able to inspire continued usage of m-banking in these influenced individuals? Such is the concern of the current study, hence the inclusion of this factor to investigate its effect in this particular direction. A study by Suoranta and Mattila (2004), for example, saw social impact as the dynamic most affecting users to transportable monetary dealings in Indonesia.

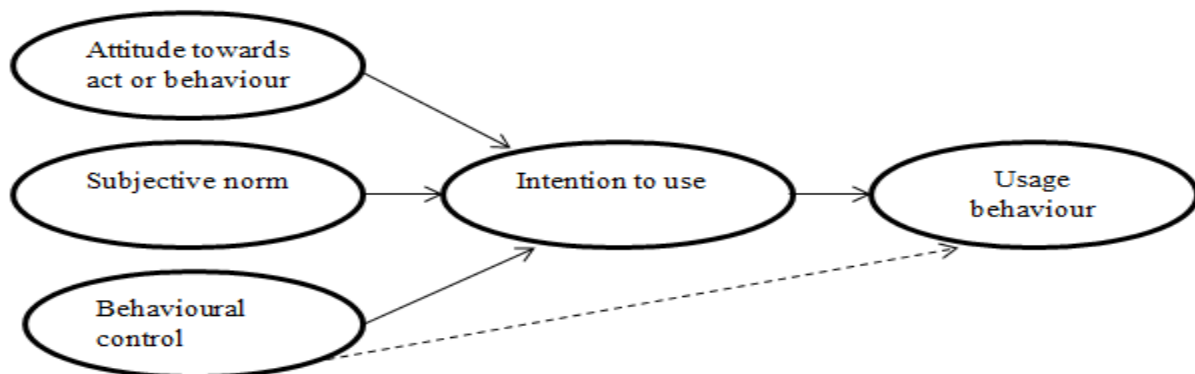


Figure 2.2: The theory of planned behaviour (Ajzen, 1991)

Though the theory of planned behaviour has been successfully applied to predict Internet banking behaviour and has been found to be better than others (Yousafzai, 2012: 218), it could be criticised for ignoring other factors which may influence the intention-behaviour relationship (Yousafzai, 2012), such as the TAM.

In conclusion, the theory of planned behaviour, as already stated, supports behavioural intentions through attitude and subjective norm. Subjective norm could be due to external or internal influence (Bhattercherjee, 2001). A highlight of the particular influence which creates MBCI and continuance usage in South Africa is of high interest to the current study, and a decomposition of this theory to assist in this regard is thus warranted.

SOCIAL (SUBJECTIVE) NORM

The social norm constructs used in this study are derived from the decomposed theory of planned behaviour (DTPB). By preserving the generality of the theory of planned behaviour and TAM, Taylor and Todd (1995) advance the DTPB, and claim that this provides effective guidance and fuller comprehension of technology usage when compared with the theories of reasoned action and planned behaviour.

Shih and Fang (2006), however, compared the theory of reasoned action and the theory of planned behaviour to the DTPB and conclude that the decomposition of beliefs into multi-dimensional structures improves understanding of Internet banking behaviour with a better explanatory power than the theories of reasoned action and of planned behaviour. Puschel *et al.* (2010: 392) propose an integrative framework for m-banking by combining the DTPB, IDT and the perceived characteristics of such innovation. The model indicates a 22 percent variance for users of m-banking, suggesting that combining these theories will not always lead to better results unless supported by critical and robust theoretical reasoning. This study therefore divides social (subjective) norm into two first-order dimensions in order to accomplish this type of reasoning.

INTERNAL AND EXTERNAL INFLUENCES

Subjective norm is viewed as being made up of internal (interpersonal) and external influences (Bhattacharjee, 2000). Bhattacharjee refers to external influence as “mass media reports, expert opinions, and other non-personal information considered by individuals in performing a

behaviour”, while interpersonal influence refers to “influence of friends, family members, colleagues, superiors, and experienced users who are recognised by potential adopters” (Bhattacharjee, 2000).

Evidence exists to suggest that advice and suggestions from critical people (supervisors, intimate friends, or family members) could have a pivotal influence on the decision-making processes and outcomes of others (Aggelidis and Chatzoglou, 2009), and in this regard people in South Africa are no exception. South Africans are known to depend on close friends and family members to influence purchase decisions (Njenga and Ndlovu, 2012: 8).

In the context of m-banking applications, measures of subjective norm should look at influences that are interpersonal as well as external, since an individual is often motivated to comply with the views of their supervisors and/or peers in order to meet their expectations or earn their approval (Ajzen and Fishbein, 1980; Liao, Chen and Yen, 2007). The usage of mobile devices for communication and other activities, such as banking, is socially-oriented, and subjective norm is potentially related to their continued use.

As hinted already, this research deems it fit to decompose subjective norm into external and internal influences as part of a holistic concept to construct a research model (Figure 3.1) which addresses this study’s objectives. The critical and robust theoretical reasoning underpinning these decompositions in the formation of research hypotheses is elaborated on in Chapter 3 of this study, though the gist of the meaning of perceived quality is investigated below.

PERCEIVED QUALITY DIMENSIONS

The controversy surrounding the definition of service quality is an age old problem which has entered into debate in the research world. This has made some authors conclude that service quality is the level to which a service meets customer expectations (Asubonteng, McCleary and Swan, 1996). Service quality is, however, a key to competitive advantage and customer retention in today’s business world (Voss *et al.*, 2004). Oliver (1993) proposes a model intended to combine satisfaction and service quality literature (see Figure 2.3 for a modified version of this model), and this has been applied to studies conducted in South Africa. For instance, Petzer and De Meyer (2011: 7461) undertook a study aimed at determining different generations’ perceived quality of services and satisfaction with services provided by cellular telephone network providers, in addition to their behavioural intentions towards these providers. The outcome was

that young Generation-Y users perceive the service quality and service satisfaction of providers as being significantly lower than other generations, and this must surely affect their behavioural intent. Petzer and De Meyer (2011) also found significant correlations to exist between the generations' perceived level of service quality experienced, their perceived level of satisfaction, and their behavioural intent towards providers.

A cause of concern from Petzer and De Meyer's study for this research is that they did not provide a holistic opinion of the correlation between the sub-dimensions of perceived service quality, satisfaction level and behavioural intention. While this and other such studies report a positive correlation between perceived service quality, satisfaction level and behavioural intention there is limited conclusive evidence for us to know which type of quality most affects behavioural intention.

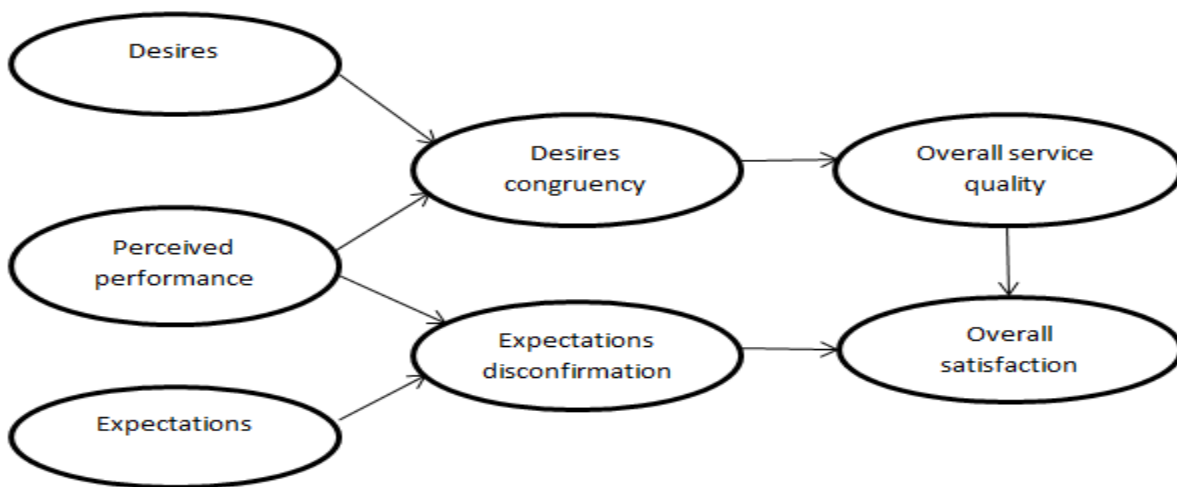


Figure 2.3: Modified SAT-service quality model (Oliver, 1993)

Quality, as noted in the above sections could be attributed to the manner in which the provider interacts with users, or the availability of the network required by these users. Yet others may measure quality in terms of information and its accuracy. This gap creates a need for research to reveal these different types of quality perception, and their contribution towards determining m-banking continuance intention in South Africa. Thus, the current study breaks perceived quality into the following lower-level dimensions to measure their contribution towards m-banking continuance intention in this country.

Interaction quality

The first lower-level dimension of service quality that the current study investigates is interaction quality. This reveals the quality of a user's interaction with the m-banking provider in the course of service delivery. More often than not, users who have problems with their m-banking services will require assistance from the provider. The interaction strategies that a representative of the provider adopts in handling these issues are very important in influencing the user's perception of service quality as an antecedent to satisfaction. Research has shown that interaction quality has the most significant effect on service quality (Hartline and Farrell, 1996) due to the intangibility of the service being provided.

The interaction quality consists of such sub-dimensions as attitude, expertise, problem-solving and information, all of which must be adequate in order to give a good impression, especially with regard to attitude and skills (Hartline and Farrell, 1996). Westbrook (1981) reveals that consumers were more concerned about the handling of their problems and complaints during the interaction process than anything else, and this assertion receives confirmation from Kim, Ferrin, and Rao (2009). Thus, this study considers interaction quality as representing serious factors which need to be validated amongst South African m-banking users.

Balaji (2009: 54-55) gathered evidence in support of the direct relationship between perceived quality and users' overall satisfaction to show how service quality significantly influences customer satisfaction, while interaction quality is found to be the most important dimension of service quality by Sangeetha and Mahalingam (2011: 95). The current study models itself along this line of assertion in order to obtain more insight in this regard.

System quality

System quality involves the reliability, response speed, ease of use and navigational issues regarding their mobile devices required by users. If the mobile device platforms used for m-banking are unreliable, difficult to use and have slower response times, inducing users to wait for longer times to receive information and services, they will be dissatisfied and discontinue its usage. If such circumstances are compounded by abrupt service interruptions, and users have to begin transaction processes again, their behavioural outcomes will obviously be negative, as such occurrences will undermine users' experience and perception. Guo and Poole (2009) find that perceived complexity affects the flow in conducting online shopping.

Furthermore, a system of poor quality may reduce users' perceived usefulness (PU) for it. For instance, difficulty in accessing banking sites, coupled with requesting unnecessary information from users to validate the process may result in users needing to spend more time to achieve their banking goals. This will increase their difficulty with using m-banking, and reduce their PU for it. A system of poor quality cannot lead to users' satisfaction, as they will always expect to adopt a high quality mobile platform.

Information quality

Information quality refers to information relevance, accuracy, timeliness, unbroken characters and comprehensiveness, giving clear directions to the least IT literate to perform banking. Poor information quality may demoralise user satisfaction, because users will have to spend much effort on searching and analysing information. This will affect their procedural difficulties and subsequent discontinuation behaviour. This is confirmed by Jung, Perez-Mira, and Wiley-Patton, 2009 (2009) stating that content quality affects the mobile TV user experience.

Users adopting m-banking may do so on the premise that they can conduct banking at anytime from anywhere. If they are discouraged by irrelevant, inaccurate, outdated or limited information, users will perceive m-banking in South Africa as being of low quality. Again, Zhou (2011) confirms this by maintaining that information quality of a mobile website affects the users' PU for it. Hence, poor information quality may not only decrease users' satisfaction, but also their continuance intention, as they expect to be provided with quality information at all times from their systems.

USER SATISFACTION: FROM THE EXPECTATION-CONFIRMATION THEORY

The expectation-confirmation theory (ECT) is mostly used to examine user intention in IS research. Oliver's (1993) ECT research reveals user satisfaction of IS usage as a crucial factor in influencing IS continuance intention. User satisfaction could be referred to as a general assessment of IS usage which reproduces an emotional reply to the IS objective (Kim et al., 2009). Experimental proof of IS continuation posits that user satisfaction is the main influence of IS assimilation (Kim et al., 2009).

The basic logic of the ECT features is expressed by Kim *et al.* (2009), Venkatesh *et al.* (2012), and Brown Brown, Venkatesh, and Goyal, (2012), amongst others. They posit that the immediate motivator that determines a person's intention to continue using information systems

(m-banking) is users' satisfaction. They maintain that firstly, a user forms an expectation regarding a service or product and confirms or disconfirms this expectation after use. Next, the user compares the initial expectation to what was experienced and quantifies the degree to which the expectation was met. Thirdly, the user forms a decision based on the degree of validation. Thereafter, the user forms their repurchase or continuance intention and behaviour depending on the degree of satisfaction experienced.

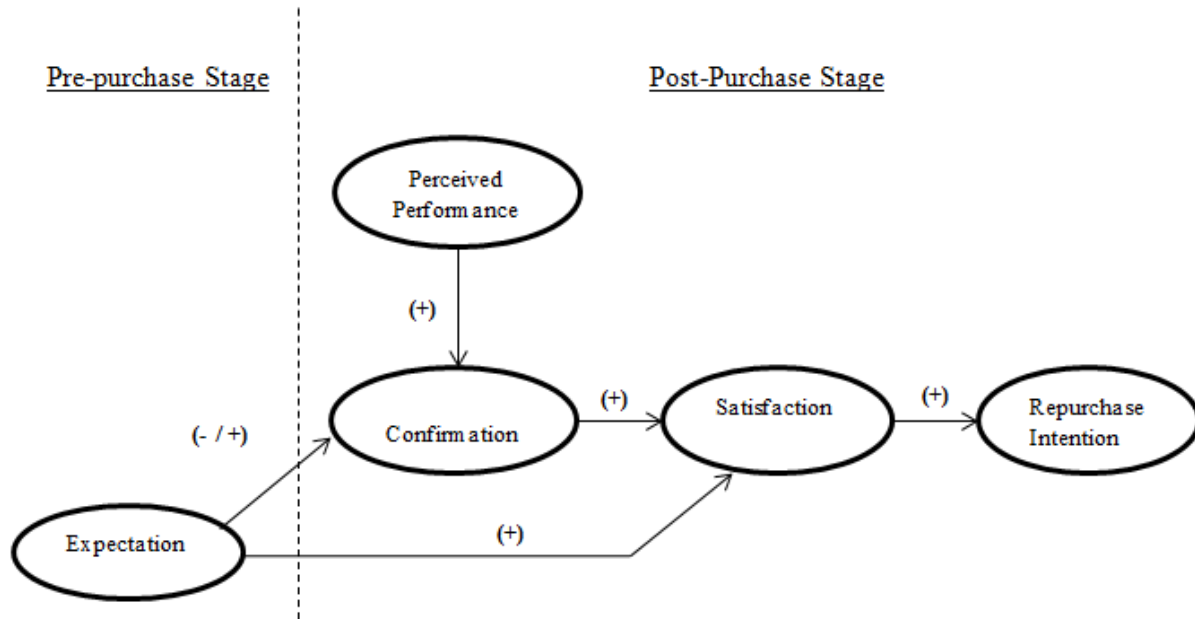


Figure 2.4: Expectation-confirmation theory (Oliver, 1980; 1993; Anderson and Sullivan, 1993)

Attention has shifted from acceptance to continuous usage, giving rise to the consumer satisfaction/dissatisfaction model (CS/D) (Oliver and Burke, 1999), and the post-acceptance model (Bhattacharjee, 2001).

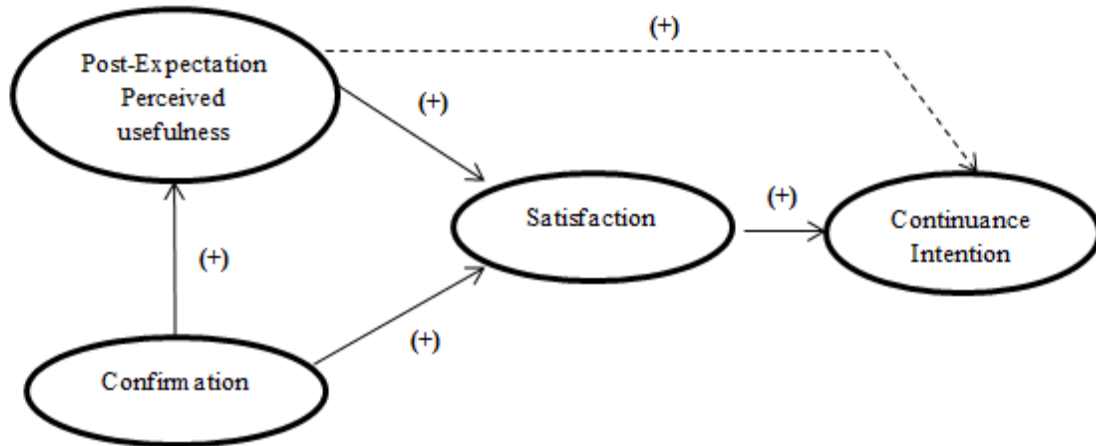


Figure 2.5: Post-acceptance model (Bhattacharjee, 2001)

The predictive capability of ECT is a success story across the marketing, electronic commerce and information systems world. But like any other invention, critiques have found some limitations, giving rise to yet another model which is more symmetrical to this study, the post-acceptance model (Figure 2.5). The post-acceptance model proposes several striking determinants of IS continuance intention, including satisfaction and post-expectation variables (e.g. PU). Bhattacharjee (2001), however, criticised the post-acceptance model by maintaining that confirmation and PU influence the level of satisfaction and are captured within this satisfaction construct, which then renders these factors as being somewhat redundant. In light of this, the current study re-affirms that all the factors used to determine m-banking continuance usage in South Africa (research model) are post-acceptance factors positioned to investigate continuance behaviour rather than initial acceptance.

Trust and satisfaction are considered critical elements for successful long-term business dealings with customers (Kim *et al.*, 2009), with many studies focusing on the various issues of trust in e-commerce (Bhattacharjee, 2002; Awad and Arik, 2008; Choudhury and Karahanna, 2008; Kim, *et al.*, 2009).

In particular, satisfaction has been extensively investigated as a topic of interest throughout psychology, marketing, management and information system literature (Kim *et al.*, 2009), and as a psychological factor, satisfaction is considered a post-purchase attitude formed through a mental comparison of the service and product quality that a customer expects to

receive from an exchange, and the level of service and product quality the customer actually perceives from the exchange (Kim et al., 2009).

Lee (2010) tested the ECT, TAM, theory of planned behaviour and flow theory on 363 web-based students in Taiwan and concludes that the subject norm and perceived behavioural control impact of m-banking are significant, but that satisfaction remains the strongest influence. The study did not, however, show the type of mobile devices used by these students, as this can provide an idea as to why the study results reflected what they did.

In South Africa, studies on m-banking using ECT are non-existent. The current study is thus expected to be helpful in this regard.

Cognitive model of satisfaction decisions

In the cognitive model of satisfaction decisions (Oliver, 1981), satisfaction is postulated as an antecedent to post-exposure attitude and an immediate psychological state ensuing when the emotion neighbouring disconfirmed hope is attached with the consumer's prior emotional state about the consumption experience (Oliver, 1981). These satisfaction decisions are usually built on perceived enactment and never on actual enactment. When this perceived enactment of expectation exceeds actual enactment, it is confirmed. Otherwise, it is disconfirmed, and this affects future usage intention.

The cognitive model of satisfaction decisions nevertheless fails to expose what actually brings the element of satisfaction to the consumer, since this could be the attitude of the vendor, the credibility and trust of the e-vendor, the environment of the service, or the quality of the service being provided. Since m-banking is a service-oriented product, this study seeks to determine how service quality, and especially trust, impart satisfaction to users, thus affecting their intention to use m-banking continuously.

This study acknowledges the existence of other studies conducted on the CI of IS theory, particularly the TAM by Davis (1989) and its extensions: IS continuance (Bhattacharjee, 2001), and IS habit (Limayem and Cheung, 2008: 2011). The TAM identifies PU and perceived ease of use (PEOU) as the factors determining intention to use IS, and the further intention of actual system use. The concept was extended with additional constructs by the unified theory of acceptance and use of technology (UTAUT) of Venkatesh *et al.* (2003). This study therefore implements this theory with perceived trust, perceived quality and some control variables.

CONTINUANCE INTENTION (CI)

Zhou (2011) argue that studies on continuance behaviour are becoming increasingly important, particularly for companies seeking to achieve profitability and a sustainable competitive advantage. An understanding of the factors which influence continuance behaviour is, therefore, important.

M-banking user retention will ensure m-banking continuity and *vice versa*. It is therefore not surprising that this subject of continuity has become a current research issue in both the IS and m-commerce areas. Research on this phenomenon has taken many different directions, though looking at the same concept. Some examples are: “Continue to shop online” (Mouakket, 2009); “Customer intention to return” (Koufaris, 2002); “Website stickiness” (Li *et al.*, 2006); and “Continued information systems/IT intention” (Bhattacharjee, 2001; Hong *et al.*, 2006).

Both IS continuance intention and repurchase intention are influenced by the initial use or purchase experience and could therefore be applied to m-banking. Nevertheless, IS continuance intention in the m-banking context is slightly different from online repurchase intention. IS continuance (in this case m-banking continuance intention) emphasises the continued usage of banking websites to perform banking transactions, instead of the use of physical stores, while online repurchase underlines consumer behaviour (Wen *et al.*, 2011).

Chang *et al.* (2013: 373) used the extended TAM after adding factors such as curiosity and perceived convenience to investigate 125 Taiwanese senior high school students’ continuance intention for mobile learning. They found that: 1) curiosity had a positive effect on continuance intention; and 2) perceived convenience also had a positive effect on PU and continuance intention. Continuance intention could thus depend on various variables similar to repurchase intention.

Online repurchase intention is a concept combining IS and marketing theories which is very similar to m-banking continuance usage as well. Therefore, given the successful acceptance rate and popularity of m-banking in South Africa, retention and continuity of the phenomenon become crucial. Such continuance intention is needed for business and investment purposes. Bhattacharjee (2001) defines IS continuance intention in the ECT as an individual’s intention to continue using an information system (m-banking), as opposed to initial use or acceptance. It is worth mentioning that continuance intention is not the same as actually using a system, thus the need to differentiate between the two concepts for strategic purposes.

ACTUAL USAGE

The concept of actual usage has been brought into the spotlight by many other theories. While some of these theories find common ground with others, there is also disagreement on various constructs between them. Below are some of the most germane ones to this study, as they also form the basis for m-banking actual usage in South Africa:

The theory of perceived risk

This theory assumes that consumers suffer some risk as a result of trying to realise behaviour benefits in using a mobile device to undertake their banking activities. Perceived risk, being the anticipated risk associated with the usage of a mobile device to perform banking, is a hindrance to the diffusion of new innovations (Ostlund, 1974: 24). There is research confirming this assertion (Lee, 2009), whereby perceived risk had a strong effect on Internet banking usage compared with its benefits. The six types of perceived risk research in the field of Internet banking are: security; privacy; financial; social; time/convenience; and performance risk. Security and privacy risk are the possibility of losing personal (identity theft) or financial information through the network, and of transactional attack through unauthorised access to accounts by means of false or defective means, thus placing the security of Internet banking websites at risk (Yousafzai, 2012: 222).

The above risks are seen as a huge hindrance to m-banking usage, in addition to social risk. Social risk, according to Yousafzai is the likelihood of users losing self-image, prestige or invoking the displeasure of close relatives as a result of Internet banking usage, while performance risk may occur due to deficiencies of m-banking websites, the failure of system servers, or Internet failures, which may reduce patron readiness to use online banking (Kuisma *et al.*, 2007; Yiu *et al.*, 2007; Lee, 2009).

In South Africa, however, an opposing view was discovered when Njenga and Ndlovu (2012: 1, 8) tried to measure perceived risk using empirical data. Controversially, their study noted that the perceived benefits of m-banking had a much stronger influence on South African banked consumer psyche than the perceived risks, and again was more greatly influenced by the PEOU than the perceived risk.

The above study provides a basis for comparing perceived risk against ease of use and benefit. However, it does not include any discussion of m-banking continuance intention in order

to assess the extent to which this outcome can be relied upon and taken advantage of. The proliferation of trust studies amongst researchers (Bhattacharjee, 2002; Kim *et al.*, 2009) is due to risk and its effect on Internet banking. It is therefore worrying that Wentzel *et al.*'s (2013) study is the only one of its kind in South Africa, and does not provide sufficient information on this risk outcome and its antecedents, hence leaving room for further investigation. It is possible that the theory of reasoned action could assist in highlighting why there are such differences amongst the various users.

Theory of reasoned action

The theory of reasoned action is a well-established psychological model assuming the individual to be coherent and to reflect on inferences of their activities before performing a behaviour (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). The theory of reasoned action posits that an individual's calculated action is dependent on their boldness (A) and subjective norm in order to perform that behaviour. The former (A) is the individual's positive or negative feelings (evaluative affect) about carrying out the behaviour (Fishbein and Ajzen, 1975: 216), and the latter is the general awareness of what referent others who are important to the individual think they should do or not (Fishbein and Ajzen, 1975: 302).

Contextualising this in the domain of m-banking, it could be said that the greater the attitude to use m-banking, the tougher the intent to use will be in South Africa; and the stronger the effect of the subjective norm of the individual is, the higher the likelihood is that they will perform the act of m-banking.

The theory of reasoned action has suffered from criticism, mainly due to it ignoring some situational factors capable of influencing the attitude-intention-behaviour relationship, and as a result, is considered weak to predict situations where the individual has low levels of volitional control (Yousafzai, 2012: 217). This criticism may be unfounded, however, since people with low-level volitional control are the kind of people who will yield to the subjective norm.

This could explain why m-banking users in South Africa are not perturbed by any risk regarding m-banking, but rather subject to the norms of close associates to undertake this practice. This is supported by the study of Njenga and Ndlovu (2012: 8), who state that South Africans rely on their close friends and relatives to make usage decisions. It could then be said

that m-banking users in South Africa rely on their close associates to reduce uncertainty regarding the innovative diffusion of m-banking technology.

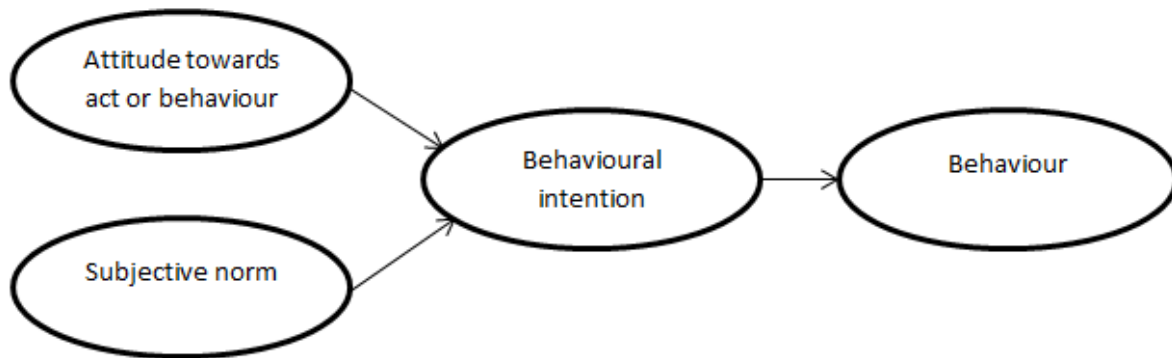


Figure 2.5.1: Theory of reasoned action (Ajzen and Fishbein, 1980)

Innovation diffusion theory

The IDT is a classical theory that talks about the foundation for future innovation diffusion research. It models innovation adoption as a process of information gathering and uncertainty reduction with an eye to evaluating the technology used (Rogers, 2010). The theory is rooted in economic theories, sociology and communication, which synthesises adoption diffusion literature over other study areas. IDT pinpoints the five characteristics of innovation, such as m-banking in South Africa, and which impact on its implementation as being: relative advantage; compatibility; complexity; trialability; and observability (Rogers, 1995). These are used to investigate Internet banking behaviour and its effect, in addition to other models. Below two studies and their outcomes are described:

Table 2.3: Application of IDT

Authors	Theories	Respondents and Countries	Actual Outcomes
Kim <i>et al.</i> (2009)	Trust and IDT	Pre-test survey with college students in Korean yielded 192 responses	Relative benefits, the propensity to trust and structural assurances had an effect on initial trust in m-banking.
Lin	IDT and	Total of 368	PRA, PEOU, CO, competence and

(2011)	knowledge-based trust	respondents (177 from likely users and 191 from recap users) through paper-based questionnaire in Taiwan	integrity considerably impact attitude, leading to the intention to accept or continuance m-banking.
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PRA= perceived relative advantage, CO = compatibility, PEOU = perceived ease of use, IDT = innovation diffusion theory

Only a few studies process the five features from Rogers, with most suggesting that only relative advantage, compatibility and complexity are reliably connected to Internet banking (Koenig-Lewis *et al.*, 2010: 413; Yousafzai, 2012: 218). Some have gone further to replace complexity with PEOU from the TAM in their studies, by using the IDT framework (Koenig-Lewis *et al.* 2010: 413; Puschel *et al.*, 2010) to investigate m-banking. To investigate MBCI in a country like South Africa, with many cultural differences, IDT could be used as a good starting point. However, factors like dissemination, shared norms and people’s dissimilarities need to be taken into consideration for an enhanced appreciative work to be produced.

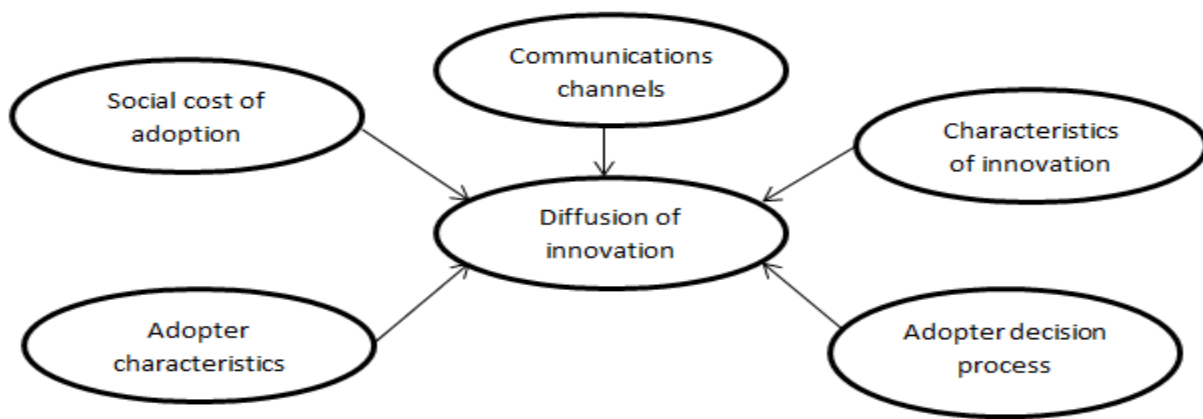


Figure 2.5.2: Innovation diffusion theories (Rogers, 1995)

One of the traits Rogers (1995) proposes should be inherited by any technological innovation is that the innovation should be perceived as being better than the technology it replaces, including its technical performance, cost, risk, and other attributes (relative advantage). Therefore, if m-banking is seen by the South African banking community as being better than

using an ATM, cost saving in terms of travelling to banks, and safer than queuing for services and transportation (social issues that people face when handling money), then they would be expected to embrace the m-banking innovation and continue its usage. The opposite is true, however, whilst not forgetting that users in South Africa are not influenced by any risk factor attached to m-banking. Efforts to ensure that users in South Africa continue using their mobile devices to perform banking need to understand, first of all, how these users first came to accept the phenomenon. In this regard, the TAM could prove helpful.

Technology acceptance theory

Technology acceptance theory (Davis and Fred, 1986) is an adaptation of the theory of reasoned action intended for modelling user acceptance of information systems (Davis *et al.*, 1989: 985). It posits that m-banking is influenced by users' behavioural intention (BI) to use such technology, which is also swayed by customers' attitude to use (A), describing A and BI as interior emotional variables which directly impact on customer performance.

Customarily, when the TAM is elaborated it captures the IS (i.e., m-banking) post-adoption performance, which refers to a number of performances after initial acceptance (Rogers, 1995); these are: continuance, infusion adoption, re-utilisation and assimilation. Such constructs are seemingly the same, but given different terminologies assist to discover behaviour after the adoption of m-banking, and how this impacts on m-banking continuation in South Africa.

Given m-banking's successful acceptance rate and popularity in South Africa (Pretorius, 2013), the issue of the preservation of this phenomenon in the foreseeable future is paramount to this study. One study that provides a hint about what influences acceptance in South Africa is that of Njenga and Ndlovu (2012: 8), who maintain that if there is affirmative group thinking for any technological service derived from social interactions, users will accept it.

A similar study was conducted in South Africa by Wentzel *et al.* (2013). Their study used 341 respondents through a house-to-house distribution and collection agent to highlight the methodological process of classifying additional concepts that, when added to the original TAM, allow successful modelling of financial services adoption in South Africa. It was determined that attitude was the most significant factor in the model, after using the non-refined method, followed by PEOU while social factors and technological self-efficacy were the least significant.

Brown *et al.* (2003), however, state that acceptance in South Africa depends on the relative advantage, technological resistance, perceived risk and consumer banking needs associated with m-banking.

A study by Puschel *et al.* (2010: 389-405) combined the TAM, the theory of planned behaviour and IDT to investigate the elements which influence m-banking acceptance in major Brazilian cities. After collecting 666 valid responses, the results showed that visibility, compatibility and relative advantage have considerable influence on the attitudes of users in making use of portable banking. Technology-enabling situations and self-efficacy considerably influenced perceived behavioural control on m-banking; while perceived behavioural control, subjective norm and attitude considerably influenced the intention to opt for m-banking.

Ravindran (2012: 2) applied an extended TAM, because of its strictness and prognostic ability to study the factors affecting continuance decisions of the early adopters of m-banking services in Kerala, India. The study collected 184 usable responses and posits that there is a strong linkage between perceived service quality, satisfaction and continuance intention. The study also confirms that after the adoption of the technology, users find satisfaction in the quality parameters of the service. However, perceptions of the risk involved in m-banking had an adverse effect on service quality and level of satisfaction, and continuance intention was found to be solely dependent on satisfaction in the m-banking context.

Riquelme and Rios (2010: 328) applied the TAM and IDT while surveying 681 users in Singapore. The study determined that PU, social norm and social risk influenced the adoption of m-banking.

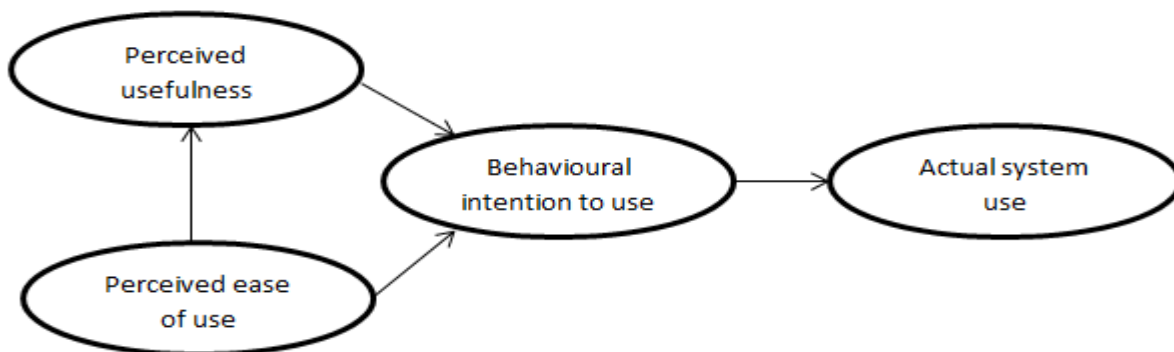


Figure 2.6: Technology acceptance model (Davis et al., 1989)

The TAM shows how individual attitudes and perceptions about mobile devices, that is their technological usefulness and ease of use, lead to their eventual usage. PU refers to the perception that m-banking will enhance individual performance, while PEOU is the perception that adopting a mobile device does not demand too much technological effort on the part of the user. Generally, the literacy rate in Africa is low compared to the western world. It is therefore hoped that the direct effect of PEOU on behavioural intention becomes insignificant in South Africa as individuals master the technology's usage in the long term. This is achievable when people are able to perceive a mobile device as a useful tool for banking, just as they adopt it for accessing Facebook. This will eventually deal with the PEOU notion, and the behaviour of usage will be performed as a result of an automatic association made with such devices (Venkatesh, Thong and Xu, 2012: 164).

Mastering mobile telephone usage for m-banking, for instance, requires constant practice and utilisation, especially given the levels of sophistication supplied by smartphones contemporarily. Some of these telephones require an intermittent upgrade of software to enable continuance usage, and this could lead to frustration and discontinuance of m-banking. However, the TAM has been the most widely adopted model to study Internet banking behaviour (Yousafzai, 2012: 219), probably due to its parsimonious nature, and utilitarian and technological focus. The information supplied in Table 2.4 attests to this fact:

Table 2.4: Application of technology acceptance model (TAM)

Authors	Theories	Respondents and Countries	Actual Outcomes
Gu, Lee and Suh, 2009	TAM and trust	An online survey of 910 valid feedbacks from users of m-banking service in Korea.	Self-efficiency was the most solid antecedent of m-banking.
Luarn and Juo, 2010	TAM	476 users through a survey.	In technology, trust plays an important mediating impact on trust to inform users' behavioural intentions towards

			NFC mobile payment.
Masinge, 2010	TAM	A total of 316 responses through a physical hard-copy survey in townships around Gauteng, South Africa.	Trust, cost, PU and PEOU enhance customers' loyalty to m-banking.
Rejikumar and Ravindran, 2012	TAM	184 focused groups via questionnaire.	A relationship exists between perceived service quality and CI of m-banking.

PU = perceived usefulness; PEOU = perceived ease of use; TAM = technology acceptance model

The TAM is stringent and technologically focused. This may lead to overlooking the influence of users' social, psychological, demographical and behavioural differences, which range from prior experience, age and gender to many other factors which can influence intention to use. In a bid to circumvent these restrictions, this study incorporates variables other than the traditional TAM variables to design a comparable new model for a better understanding of this explorative topic.

In comparing the TAM, the theory of planned behaviour and the theory of reasoned action's ability to predict actual Internet banking usage, Yousafzai (2012) proves that the TAM is empirically superior. It is also worth noting that the methodology used, as evinced from the reviews so far discussed above, is that of online surveys and hard-copy surveys (For instance, Masinge (2010) in South Africa) (Table 2.4).

However, the TAM explains behaviour in four domains only – knowledge, persuasion, decision and implementation – hence, the TAM and its extensions are unable to explain the main concerns of this study regarding discontinuance after successful acceptance (Bhattacharjee, 2001: 357), or to predict continued usage of a new technology (m-banking in this respect) after initial adoption.

Perceived characteristics of the innovation

A perceived characteristic of the innovation as a combination of the TAM and IDT, which results in a comprehensive and enhanced model to describe a complex innovation adoption phenomenon such as m-banking in South Africa. Gounaris and Koritos (2008: 282) find that perceived characteristics of this innovation provide better results than the TAM and IDT, by capturing both social and psychological factors in m-banking adoption very well. On the contrary, using the same model, Puschel *et al.* (2010: 402) did not find support in the context of m-banking behaviour. These contradictions provide impetus for research in m-banking based on well-grounded theories which integrate salient individual characteristics, such as level of education and interpersonal influence, to explain the concept of this behavioural phenomenon. The current study endeavours to do just that as a contribution to the body of knowledge.

For instance, one's level of education could influence one's understanding of the characteristics of m-banking in South Africa. If the individual sees this phenomenon as very helpful, it is likely they would embrace it and help propagate it with others. On the other hand, if the opposite happens to be the case, the individual will not only be expected to resist this innovation but negatively influence others to resist the m-banking innovation.

Theory of innovation resistance

Resistance to innovation can be seen on the individual or group level. It is fiercer when meted out at the group level, especially when such groups decide to fall "out of love" with the innovation. Initial resistance is not based on any factual grounds, but is mere perception. But after acceptance, when things go wrong, and resistance mounts, it is based on experience and anticipated multidimensional factors and could therefore be dangerous.

The theory of innovation resistance assumes that all innovations are better than existing technology and must be accepted (Rogers, 1995). This makes innovation diffusion researchers accuse the theory of innovation resistance of bias because it ignores the non-adopter phenomenon, leading to m-banking literature omitting a vital source of information that could assist in developing, marketing and implementing Internet banking (Laukkanen *et al.*, 2009: 111).

To comprehend barriers to Internet banking adoption, the researcher has adopted Ram and Sheth's (1989) stand that people will oppose the use of technology by creating their own

barriers for functions (usage, value for money and risk) associated with the product usage, along with various psychological factors (traditions and norms of users and perceived product image) (Laukkanen *et al.*, 2009: 112). Knowledge of the above resistance factors can assist in realising m-banking in South Africa by developing an appropriate antidote campaign and training packages for m-banking technologies.

Njenga and Ndlovu (2012: 8) show that South Africans rely on close friends and family to influence their purchasing decisions, stating that if there is a general positive “groupthink” towards a proposed technological service (m-banking) emanating from social interactions, South Africans will then subscribe to that particular technological service. This then means that South African innovation resistance, to for instance m-banking, lies in the hands of their close friends and families and as such the psychological element of social influence could be deployed to stimulate acceptance and continuance usage.

EXAMINATION OF MODERATING FACTORS: FROM THE UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY

UTAUT is a model that was developed by comparing and integrating eight other theories. It is a new model which has not gained as much popularity as the TAM. Nevertheless, researchers are gradually applying it to explore users’ acceptance of Internet banking (Im, Chung and Lee, 2010; Zhou and Wang, 2010). What is fascinating about this model are the moderating characteristics introduced into it by Venkatesh. Moderating effects are suggested by variables whose variation impacts the power or the path of a link between an exogenous and an endogenous variable (Baron and Kenny, 1986). This is done to explore alternative outcomes for different situations.

Neglect of moderating effects leads to a lack of relevance (Henseler and Fassott, 2010), assuming that relationships which hold true, regardless of the context factor, are perfect and work under all conditions.

Despite this, some studies applying the UTAUT without considering moderating effects are shown in Table 2.5.

Table 2.5: Application of unified theory of acceptance and use of technology in Internet banking

Authors	Theories	Respondents and	Actual Outcomes
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		Countries	
Yu, 2012	UTAUT	441 valid responses from structured questionnaire	Social influence, perceived financial cost influenced m-banking. Moderators: gender and age.
Zhou and Wang, 2010	TTF and UTAUT	250 valid responses in China	Performance expectancy, task-technology fit, social impact, and enabling situations impact on user acceptance.

TTF = task technology fit model, UTAUT = unified theory of acceptance and use of technology

Im *et al.* (2010) applied the UTAUT to model cultural effect on Internet banking in the USA and Korea, but found no major differences between the two countries. Only effort expectancy had some behavioural impact on the intention to use Internet banking in the USA when compared to Korea. Zhou and Wang (2010) found a strong effect on performance expectancy of m-banking after integrating the Task Technology Fit (TTF) model with UTAUT. This opposing result requires additional investigation of UTAUT in the Internet banking domain, and this study believes such findings could shed more light on this matter. Another intriguing factor in the UTAUT model is the use of demographic variables to moderate the relationship between constructs. As seen below (Figure 2.7), gender, age, experience and voluntariness of use are factors believed to have some effect on outcomes, and are therefore used to discover such effects. This does not however preclude other constructs from being investigated in studies as moderating or control variables.

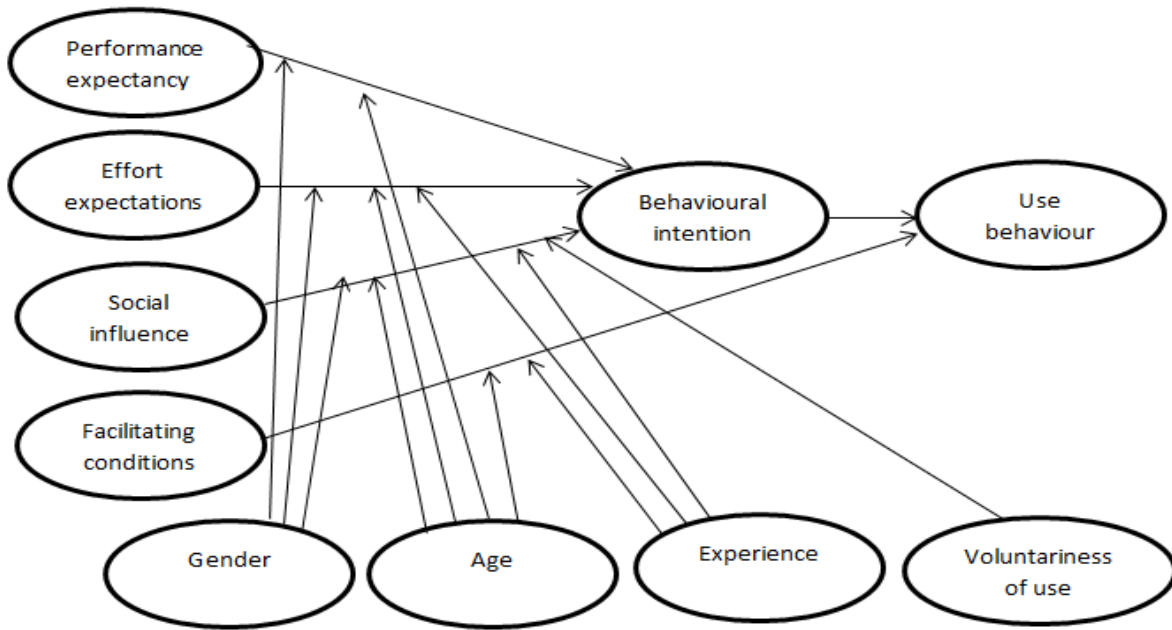


Figure 2.7: Unified theory of acceptance and use of technology model (Venkatesh et al., 2003)

In South Africa, Bankole and Cloete (2011: 1) adopted the UTAUT to compare m-banking between South Africa and Nigeria. Their result showed that SMS alert for account transactions is the most used m-banking service in both countries. Factors such as awareness, convenience and literacy level were also shown to influence the acceptance of m-banking in both countries.

Bankole and Cloete’s (2011) study purporting to use the UTAUT provides a basis to compare m-banking intention and usage in both countries only. The UTAUT, according to the above authors, was developed for PC or fixed-line systems and technology. However, it was adopted by them to test for acceptance of m-banking without considering this special attribute of its moderating characteristics.

The Bankole and Cloete study adds to the number of studies in South Africa which do not moderate or control studies to report on alternative outcomes for the benefit of the research community. The current study addresses this gap by giving reasons for the use of a particular device size to control the study and to unravel this factor’s effects on m-banking continuance behaviour.

Adoption of mobile services across different technologies

The global system for mobile communications (GSM) was launched in 1991. It incorporated a short message system (SMS) which became popular after 1995 when users began using it to send messages amongst themselves (Carlsson *et al.*, 2005: 3). Services based on SMS became popular, but were cumbersome to use because they required typing and coding.

In South Africa, such services rose to unprecedented levels as Nedbank South Africa deployed an innovative M-PESA money transfer services to enable its clients to deposit, withdraw and transfer money using a mobile telephone with a Vodacom (South Africa) SIM by SMS.

The wireless application protocol (WAP) was another breakthrough meant to enhance usage and ability (Carlsson *et al.* 2005: 3) on cellular telephones to bring the Internet and Internet services to such devices (Saha, Jamtgaard, and Villasenor 2001). However, WAP's uptake was disappointing, since the majority of users did not seem encouraged to try WAP services, nor was the Internet community particularly willing to try it (Teo and Pok, 2003). However, it was a great breakthrough because it made Internet browsing possible on mobile telephones (Teo and Pok, 2003: 3).

In South Africa, Standard Bank in partnership with MTN unveiled a mobile money service based on a wireless Internet gateway (WIG). A SIM card from MTN on Standard Bank customers' telephones enabled this service for mobile telephone banking via WAP technology (Standard Bank, 2010). However, unlike the Nedbank M-PESA innovation, the user needs to have an account with Standard Bank to be able to conduct this m-banking with Standard Bank.

Again, an initiative by a division of the South African Bank of Athens, popularly known as WIZZIT, made mobile telephone banking possible in the country. WIZZIT users are required to pay as they use the phenomenon (20c per 20 seconds) on MTN and Vodacom networks.

In the case of ABSA, two mobile telephone banking options were adopted: WAP-based (the Internet via a cellular telephone), and WIG, which was made possible through secure SMS usage (ABSA, 2010). ABSA's style of WAP was to load the banking options (menu) to the telephone SIM card for the convenience of clients to select transactions and transmit them through encryption to the bank (ABSA, 2010). This is currently used by MTN and Vodacom network operators for their subscribers.

COMPARING THE INFLUENCE OF SMALLER MOBILE DEVICES VERSUS BIGGER DEVICES ON CUSTOMERS' M-BANKING CONTINUANCE INTENTION

Laptop or handheld (minicomputer) devices

As mentioned earlier, the current study looks at wireless devices, such as wireless telephones, wireless-enabled handheld computers (so-called pocket, palmtop, and tablet computers), laptop computers, and PDAs that can interface with other devices and networks through unwired synchronisation, but which excludes vehicle-mounted technologies, desktop computers, public telephones or any fixed-line telephones and personal message pager devices. Wireless connection to the Internet can be accomplished through one of the following two possibilities described below (Waters, 2000):

(a) mobile devices from numerous points of access to the existing web and Internet in a different format, or in a more limited or constrained way; and (b) wireless use of the Internet which is something completely new and fundamentally different because the traditional website is accessed differently, due to their smaller screen sizes, lack of colour, limited or non-existent keyboards, and other limitations of these smaller devices (Waters, 2000). In addition, the content of the communication with these devices is also unique, due to bandwidth constraints imposed by public frequency limitations.

Again, their nearly ubiquitous capability enables straight software support and information access for many new business functions in real time that were previously unsupported by IT (Tarasewich *et al.*, 2002: 43).

In investigating this phenomenon of accessing the Internet through mobile devices, research seems to concentrate more on the mobile telephones than laptop devices (Cruz *et al.*, 2010; Yu, 2012). This implicitly or explicitly assumes m-banking is accessed mainly through mobile telephones.

However, there is evidence to suggest that laptops are still used to access mobile Internet and banking services (Carlsson *et al.*, 2005; Konigstorfer and Goopel-Klein, 2007). Thus, it is deemed useful for this study to show how differences in these accessible media could influence continuance behaviour. It is believed that when this is done the outcome could provide vital information to banking practitioners, manufacturers of mobile devices and network providers for possible collaboration to make such mobile devices successful.

According to Gerpott (2011), there is agreement that mobile telephones and laptops are the two most widely used devices to access the mobile Internet (Gerpott 2011: 2153). For instance, Okazaki (2005: 4), quotes a survey which indicates that roughly 70 million people in Japan (55 percent of the population) signed up for Internet access from their cellular telephones, compared with 12 percent of the population in the USA, maintaining that the Japanese see cellular telephones or “Keitai” as a device for surfing the Internet, while Americans use their laptops. This is an indication that there are preferences between these two devices with different effects.

A similar situation was witnessed in South Africa, where a study asked respondents to indicate the device they used most often to access the Internet. The results show that the majority use a laptop (62.9 percent) (Mentz, 2011: 273). There is thus a clear indication that laptops are still favoured when it comes to device preference for m-banking.

Laptops and handheld devices are different, with the following distinguishing features: weight, physical dimensions, size, resolution and touch sensitivity of the display keyboard, battery operating and standby time, data storage capacity and computing performance (Konigstor and Goepel-Klein. 2007). M-banking through the laptops offers larger screens, easy data key-in and a “look and feel” (Gerpott, 2011: 2154) scenario akin to the systems users are familiar with from their desktop computers at home or office, while mobile telephones are easy to carry around for unobtrusive m-banking access (Gerpott, 2011: 2153).

Due to their size, laptops have the advantage of better resolution, and bigger font size suitable for ageing eyes, whereas mobile telephones seem to appeal to the youth who would like to listen to music and chat with loved ones even while on the move. The SMS for mobile telephone devices is not considered Internet technology (cf. Ishii, 2004), giving these devices the capability to remain in touch even without an Internet connection. The recent advent of the additional functionality of SMS, popularly known as “WhatsApp”, seems to have augmented this attitude on the part of the youth even further.

Many industry practitioners and consultants emphasise that the capabilities and usability of mobile devices have a strong impact on mobile Internet acceptance (Gerpott, 2011: 2143). The proponents of such assertions, according to Gerpott, believe that a better understanding of mobile Internet diffusion patterns may be obtained by showing the differences between customers who access the mobile Internet through mobile telephones or laptops.

In the current study, the laptops include those capable of being fitted with an embedded modem or an external USB modem (i.e. “dongle” or “stick”) and solutions which utilise a customer’s cellular handset as a modem to connect to m-banking. Surprisingly, among the approximately 100 research articles collected in order to review current trends in m-banking, only 12 articles specifically investigated m-banking continuance behaviour, with just 5 articles looking at device specifics used to perform m-banking (mobile telephones or laptops). There were no articles for this topic in South Africa.

This finding drives home the uniqueness of this study, since opinions vary considerably as to whether continuous access to m-banking will be induced by mobile telephones such as Apple’s iPhones or laptops. It is therefore necessary to clarify the kind of device used to access m-banking services, especially in South Africa, as this can shape policy direction and market targeting, with device security effectiveness in mind.

M-banking security considerations

The security issues of mobile devices depend on the kind of network technology a particular device applies. However, the laptop appears to have the upper hand over mobile telephones. In South Africa, the two main technologies utilised by Standard Bank and FNB to provide m-banking is the WAP over General Packet Radio Service (GPRS) and SMS using the WIG (Kelvin, Chong, Arnab, and Hutchison, 2006).

Of the five banks (Standard Bank, FNB, ABSA, Nedbank, and Investec) offering m-banking through GPRS, four are using the MTN m-banking gateway, which allows a bank account holder to access WAP sites and perform banking the same way he would perform Internet banking (Kelvin *et al.*, 2006). FNB, on the other hand, uses unstructured supplementary services data (USSD) with an SMS approach, which requires the user to first send a USSD string with the user’s PIN to the banking server. The server then returns a message to notify the user of its readiness to accept a banking SMS message. This approach is not considered secure because users’ details are transmitted in plaintext, and the mobile network operator has full control over the users’ banking details (Kelvin *et al.*, 2006).

Some recent mobile telephones (e.g., iPhone), are equipped with certain security features (accelerometers) which are not ordinary on other devices. For instance, physically shaking/twirling which is unsuitable for many sensitive devices as well as stationary (e.g. access

points) and large devices (e.g., laptops) (Kumar *et al.*, 2009: 737), are seen used on handheld mobile devices.

Sometimes, user behaviour also compromises the security of the device in use. For instance, a “rushing user” (user who, in a rush to connect their device, tends to skip through the security process of the m-device) in the context of phishing attacks (Dhamija, Tygar and Hearst, 2006), logs on to the website of their bank, and because their focus is on paying a bill which is overdue may tend to ignore any warning indicating a phishing attempt (Kumar *et al.*, 2009: 737).

Traditional authentication systems which rely on textual password entry are not adequate for small portable devices. The compact nature of a handheld mobile device limits the amount of data that can be displayed while at the same time makes data entry challenging. Because of this, it is impractical to enter long strings of text, which forces users to pick short passwords, making them easily predictable and unsafe (Hayashi *et al.* 2008: 1, 35). With records to systems denial for an incorrect password, a locked cellular telephone may need to be returned to the manufacturer or service provider for unlocking while a laptop is always manageable by the user.

Theoretical evaluation of literature review

Following from the overview above, it seems obvious that a user’s choice would be laptop over mobile telephone, but as already noted, the portability advantage wielded by mobile telephones gives them another dimensional benefit which might compel users to overlook the security characteristics of a laptop over a handheld device. In brief, user authentication on a mobile device must aim to secure this authentication process on all small devices as they would on large-size display devices. The intended research model for this study is expected to uncover the true sense of users’ behaviour in this regard.

There seems to be a considerable overlap of constructs used to model studies within the South African domain rather than the creation of new theories which seek to unleash new findings with supporting models. This is prevalent in the field of social recognition models (Armitage and Conner, 2001), but what is even more striking is that the majority of these models do not treat the issue of trust and faith as anything important to consider when modelling continuance behaviour in business. It is well known that in business trust is very important, especially as it is conducted through technology without physical contact with partners.

This is another gap this research intends to fill. Again, the majority of these constructs used do not provide enough detail to show how different causes affect behaviour psychologically, functionally, technologically, and socially or emotionally.

For instance, in diagnosing South Africa and showing how it is linked to continuance behaviour for m-banking, should the concern be about South Africa and mobile device usage, South Africa and network service provision, or South Africa and the quality of banking services offered? As noted earlier on, if satisfaction is the psychological effect that can influence others through their peers, then this raises the issue of whether the measurement of satisfaction is over-emphasised, or just a state of mind which dissipates quickly after a period of time when these influencers are no more.

Again, service quality is dependent upon so many factors with different assessment levels according to different customer references. It was pointed out earlier that what constitutes quality for “A” might not satisfy “B” and *vice versa*. Therefore, in evaluating this construct, care needs to be taken to address the antecedents of this factor properly before any conclusion is drawn. This study intends to do this, and show how satisfaction and service quality constructs converge to ensure m-banking continuance usage.

Though many industry practitioners and consultants call for the need to distinguish between the usage of mobile devices used in m-banking, because the capabilities and usability of such mobile devices have a strong impact on mobile Internet acceptance (Gerpott 2011: 2143), a summary of m-banking adoption or CI applies other theories, or a combination of the above theories as presented below, which shows that on the whole researchers have not yet bought into the above suggestion yet. It could be seen that these studies, including those provided in the various theories described above, do not seem to bother about the type of device used in transacting m-banking, thus creating a gap for research to which this study intends to contribute. Table 2.2 highlights these gaps.

Table 2.6: Empirical Summary of m-banking around the world not showing m-banking devices used

Authors	Theories	Respondents and Countries	Actual Outcomes
Laukkanen et al., 2007	Mean-end theory	20 intensive sessions with Scandinavian bank customers in Finland	Perceived benefits are the main factors which encourage people to opt for m-banking.
Yang, 2009	Rasch measurement model and item response theory	178 learners from a university in southern Taiwan	Location-free convenience, fulfilling personal banking needs and cost effectiveness impacted the adoption, while security and a basic fee of connection to m-banking affected adoption.
Natarajan, Balasubramanian, and Manickavasagam, 2010	Analytical hierarchy process	40 data were collected from a bank in India	Perceived risk, purpose, benefits and requirements influence users to opt for banking channels.
Riquelme and Rios, 2010	TAM and IDT and TPB	600 users of e-banking in Singapore gave their views about their intention to use m-banking	Usefulness, social norms and social risk impact intention to accept m-banking. Ease of use impacts less or more on female participants than men, and relative advantage impacts on perception of usefulness of men.
Luo, Li, Zhang, and Shim, 2010	Multi-dimensional trust and multi-faceted risk	122 undergraduate learners at a university in Eastern U.S.	Perceptions of risk were a salient precursor to innovative technology acceptance (m-banking).

	perceptions		
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ECT = expectation-confirmation theory, TAM = technology acceptance model, TPB = theory of planned behaviour, IDT = innovation diffusion theory

Although m-banking for the unbanked is being deployed in some 44 countries (Tobbin, 2012: 77), including South Africa, there is currently the challenge of security and fears amongst users. This could, in part, be attributed to the absence of documented research. For instance, the majority of the literature on South Africa m-banking is not peer-reviewed (Table 2.7), instead it is based on practitioners' experience, with just a handful of academic studies (Ivatury and Pickens, 2006; Mas and Morawczynski, 2009; Dermish *et al.*, 2011). Although the information from these practitioners provided useful insight and contextual information on the m-banking phenomenon in South Africa; for instance, Ivatury and Pickens (2006) provided information about the behaviour of the early adopters of WIZZIT in South Africa (Tobbin 2012); it is important to understand that, in the quest to discover factors influencing people in South Africa to continue using m-banking, a body of knowledge which builds on previously discovered problems is important to track user behaviour for more pragmatic solutions.

To the best of the researcher's knowledge, no studies were found investigating m-banking continuance behaviour in South Africa, let alone the type of mobile device. The closest studies found in this domain were mostly grey literature, which mainly investigated only acceptance of m-banking in South Africa. These are summarised in Table 2.7.

Table 2.7: Closely related studies of MBCI in South Africa

Authors	Theories	Respondents	Actual Outcomes
Brown <i>et al.</i> , 2003	IDT	162 respondents across South Africa	Relative advantage, perceived risk and consumer banking needs are the main factors which encourage acceptance of m-banking.
Masinge, 2010	TAM 2	Physical hardcopy surveys in townships around Gauteng	Customers in the finance business will consider adopting m-banking as long as it is perceived to be useful and perceived to be easy to use. But the most critical

			factors for the customer are cost and trust.
Maduku and Mpinganjira, 2012	TAM	394 responses from retail banking customers in Gauteng	PU, PEOU, trust and subjective norm have significant impact towards cellular telephone banking, with trust being the strongest.
Shambare, 2011	IDT	124 cellular telephone users from Gauteng, Mpumalanga and Limpopo	Perception of risk and security concerns slow down adoption rate.
Ismail and Masinge, 2012	TAM2	309 responses from Gauteng province	The most critical element is cost with trust negatively correlating with perceived risk but enhancing loyalty.
Bankole and Cloete, 2011	UTAUT	Both questionnaire and interview of 220 respondents	Culture, awareness, convenience and literacy level impacted m-banking acceptance.
Wentzel <i>et al.</i> , 2013	TAM	341 respondents through a house-to-house agent collector	Attitude followed by PEOU, while social. Factors and technological self-efficacy were the least significant factors in determining technology financial service adoption in South Africa.
Borg and Persson, 2010	Diffusion framework	21 semi-structured interviews and a number of observations	Main influencing factors are innovative features, social factors, customer perception and suitability of innovation for users' environment.

PU = perceived usefulness, PEOU = perceived ease of use, TAM = technology acceptance model, IDT = innovation diffusion theory, UTAUT = unified theory of acceptance and use of technology

Since m-banking acceptance is not the same as m-banking continuance behaviour (Bhattacharjee and Barfar, 2011: 4), and was not considered in the above studies, investigating the type of mobile device used to undertake m-banking will contribute a great deal to

collaboration and targeted policy implementation for banking practitioners. Terms used in the studies listed in Table 2.7 are consistent with the current study, except that this study looks at continuance behaviour whilst those in Table 2.7 concentrate on adoption.

Not only is it evident that studies in South Africa did not show the type of mobile device used to perform m-banking, but these studies were also limited to only unidimensional measures. This again presents an opportunity for further studies, as the knowledge contributed is limited in this way. This study intends to model the concept under investigation in a hierarchical manner as a solution to the above issues, as the foregoing literature review clearly shows that some of the variables intended for investigation in this study are hierarchically latent in nature.

SUMMARY

The literature review of over 217 relevant articles published between 1983 and 2014 highlighted twelve theories normally used to investigate m-banking continuance behaviour, with only 5 studies detailing the type of device used to access the service.

A systematic literature review, providing a model for identifying, critiquing and summarising past studies related to m-banking continuance behaviour in general was adopted. This was however synthesised with the situation in South Africa.

Due to the scarcity of relevant materials in investigating MBCI in South Africa, this study relied heavily upon literature in the study domain to learn about South African m-banking continuance behaviour. This led to the examination of a set of models and hypotheses based on the overview of all considered literature to develop the research model, particularly the hierarchical modelling.

The applicable hypotheses are different from other hypotheses, categorising these influencing factors into multidimensional constructs which are modelled in a higher-order fashion for better analysis. The next chapter discusses these hypotheses.

CHAPTER 3

THEORETICAL FRAMING

INTRODUCTION

This chapter develops a set of hypotheses based on the research model that enables the study to realise its objectives. The hypotheses are reasonably positioned within the broad framework of the theory of reasoned action (Fishbein and Ajzen, 1975), because it is based on a theory of continuance intention and usage.

THEORETICAL FOUNDATION

This study's model follows the two stages of consumer purchase behaviour, namely: the pre-acceptance and post-acceptance stages, focusing more on the post-acceptance stage. This is because m-banking CI depends on post-acceptance decisions rather than first-time use (Kim *et al.*, 2009), although initial acceptance is an important first step in creating awareness. Hence, focusing on users' continuation of m-banking behaviour is important in the post-adoption phase (Wu *et al.*, 2010).

The study makes use of three other theories in addition to the theory of reasoned action, which are: the expectation-confirmation theory (ECT), the socio-cognitive theory of trust (STT), and the theory of planned behaviour (TPB). As hinted already, the study focuses on post-acceptance decisions of MBCI to shed light on the long-term relationship of m-banking users and their stickability (post-acceptance model of IS continuance) (Oliver, 1993; Kim *et al.*, 2009). Thus, the four major constructs used in the model are Social Norm (Soc_Norm), Perceived Trust (Per_Tr), Perceived Quality (Per_QLY) and Satisfaction (SAT).

The first three constitute the higher-order constructs. To develop a parsimonious model, the current study descended into the lower-order dimensions of Soc_Norm, Per_Tr and Per_QLY, with detailed discussion outlined in Chapter 2 drawing upon the literature of internal and external influences of trust in technology for Soc_Norm, trust in e-vendor and trust in third party for Per_Tr, and finally interaction quality, system quality and information quality for Per_QLY. The outcome is an integrated model which validates the relationship between these lower-order constructs and their higher-order constructs before linking them to overall user satisfaction (OvalSat), MBCI and finally to actual usage. These were formed into independent

variables with MBCI as the dependent variable. To predict customer MBCI and actual usage (objective 2), MBCI was linked to actual usage as shown in Figure 3.1.

The rationale behind the proposed model is that CI is a necessary psychological attitude required to generate actual usage, but since this is not always the case, the factors mediating between the good intention to use and the actual usage need to be unravelled for the appropriate action to be evinced. Therefore, the proposed model also explains and validates the moderating effects of the reasons for mobile device size on MBCI.

There is a strong link between the theory of reasoned action, ECT and the theory of planned behaviour as the theoretical background for this study. ECT and the theory of planned behaviour evolved from the broader spectrum of the theory of reasoned action, building on the shortfall of the theory of reasoned action. These relationships are shown in the ensuing review. The different constructs introduced to better the original theory of reasoned action model within these two are reviewed and some are selected to generate the proposed model. The theory of reasoned action was formulated by Ajzen and Fishbein (1980), ECT popularly by Oliver (1980, 1993), Anderson and Sullivan (1993) and Bhattacharjee, (2001), while the theory of planned behaviour is popularly attributed to Ajzen (1985).

On this basis, constructs such as Soc_Norm, Per_Tr, Per_QLY and overall user satisfaction (OvalSat) would be the antecedents for MBCI to be investigated, since this study uses the hierarchical approach. With the exception of OvalSat, which is operationalised as a first-order construct, the first three are shown to have underlying dimensions which form them. User satisfaction and continuance intention are selected from ECT because of their strong relationship, social norm from the theory of planned behaviour because of its influence on behavioural intention, perceived trust from TST because of the role trust plays in banking transactions, and finally service quality based on its strong reasoning. Consequently, critical analyses of the above constructs are presented to show the subsequent association of post-purchase stage and continuance usage.

Nevertheless, before proceeding to hypotheses development, this study believes a brief discussion of multidimensional modelling (often referred to as hierarchical, higher-order, second-order or composite modelling) upon which the research framework is based is warranted.

HIERARCHICAL LATENT VARIABLE MODELLING

Hierarchical component, second-order variable or higher-order constructs are explained by Chin (1998b). The author states that a higher-order construct is an explicit representation of multidimensional constructs which exist at a higher level of abstraction, and are related to other constructs at a similar level of abstraction, mediating the influence from or to their underlying dimensions.

Law *et al.* (1998: 741) put it this way: a construct is multidimensional when it consists of a number of interrelated attributes or dimensions, and exists in a multidimensional domain. In contrast to a set of interrelated unidimensional constructs, the dimensions of multidimensional constructs can be conceptualised under an overall abstraction, and it is theoretically meaningful and parsimonious to use this overall abstraction as a representation of the dimensions. Hence multidimensional constructs are different from unidimensional constructs (Netemeyer *et al.*, 2003).

For instance, job satisfaction can be conceptualised to be unidimensional when measuring the overall satisfaction of employees (Brayfield and Rothe, 1951; Quinn and Staines, 1979; Birnbaum and Somers, 1993; Law and Wong, 1999), and can also be operationalised as a multidimensional measurement (e.g., Chacko, 1983; Law *et al.*, 1998), whereby it is determined by: 1) pay; 2) supervision; 3) co-workers; 4) promotion; and 5) the work itself (Becker *et al.*, 2012: 362).

In this study, therefore, the measurement of the OvalSat of m-banking users is operationalised as unidimensional in nature, which represents all the satisfaction levels of Soc_Norm, Per_Tr and Per_QLY. This then builds a case for the current study to show its model as hierarchical. This is elaborated more in the section for hypothesis development. It is also worth noting that when hierarchical modelling is undertaken researchers need to state categorically the taxonomy under which their model falls, either as reflective or formative to make a more meaningful contribution to the body of knowledge.

The taxonomy of hierarchical models

According to Wentzel *et al.* (2009) as seen in Becker *et al.* (2012: 363), there is no agreement on the terminology for hierarchical latent variable models, but on the basis of second-order hierarchical latent variable models, the following authors differentiate the four types of model,

depending on the relationship amongst: 1) the First-Order (FO) latent variables and their manifest variables (MV), and 2) the Second-Order (SO) latent variables and the FO latent variables (Jarvis *et al.*, 2003; Ringle *et al.*, 2012), as follows: a) reflective-reflective, b) reflective-formative, c) formative-formative, and d) formative-reflective.

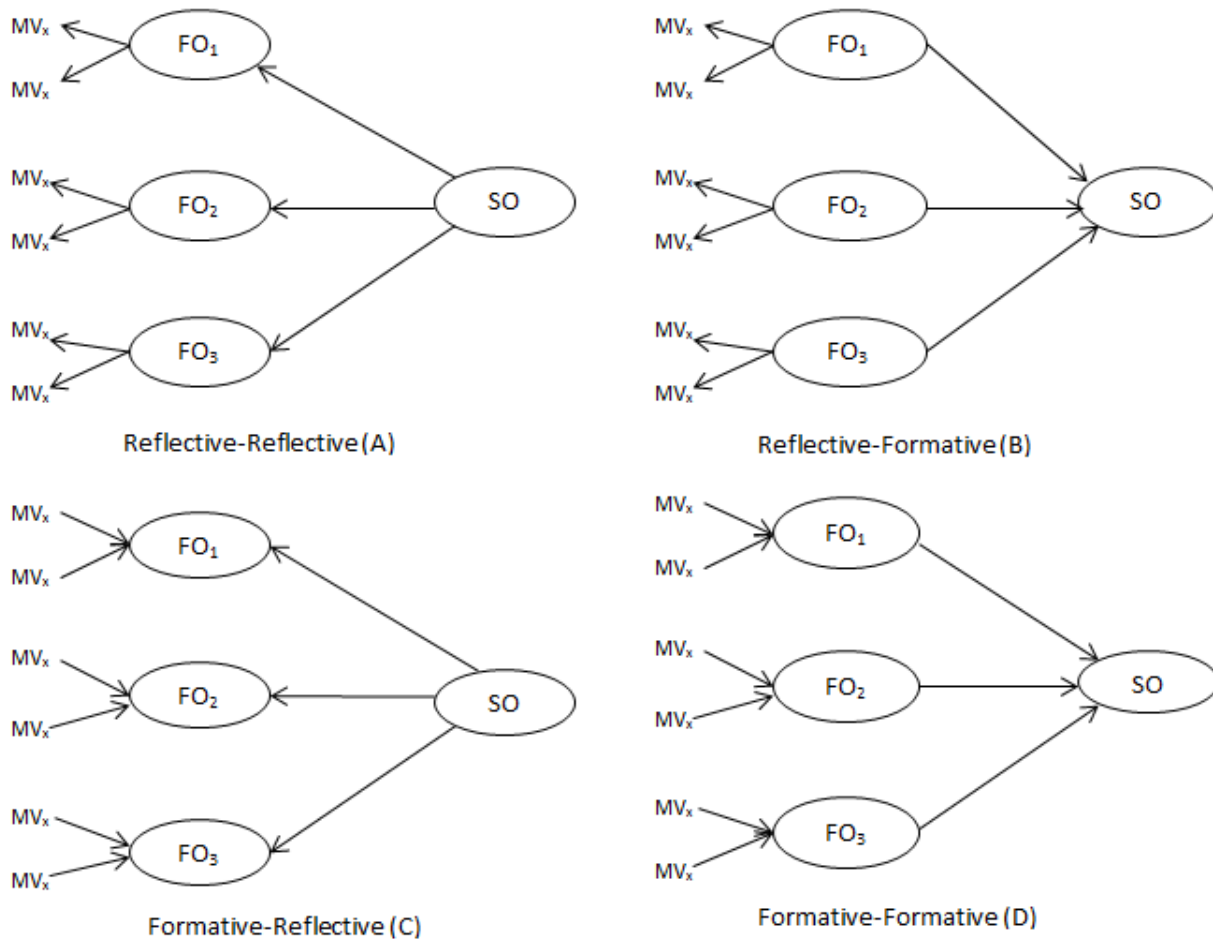


Figure 3.1: The four types of hierarchical latent variable models – adopted and modified for this study (Source: Jarvis *et al.*, 2003, Ringle *et al.*, 2012)

Reflective-Reflective

A reflective indicator is perceived as a function of the latent construct, and changes in the latent construct reflect on changes to the MV. A reflective indicator is shown with a single arrow from a latent variable to MV. In PLS-SEM, the resulting coefficient of this relationship is known as outer loading (Hair *et al.*, 2011: 141). Therefore, the reflective-reflective model is the situation

whereby a FO construct is reflectively modelled and connected to a SO construct (dimension), which is also reflectively modelled to this FO construct (Figure 3.1A). When this FO manifest variable is more than one, the variables should be correlated, but differentiated from each other.

Lohmöller (1989) contends that this type of hierarchical latent variable modelling is appropriate for a study where the objective is to find a common factor of several related, but different reflective constructs. Nevertheless, critics of this idea maintain that there is “no such a thing” as a reflective-reflective hierarchical latent variable.

Reflective-Formative

The reflective-formative type of modelling (Figure 3.1B) is a situation whereby a FO construct is reflectively modelled and linked to a SO dimension that is formatively modelled to this FO construct. The FO MVs do not share a common source, but rather form a general concept that fully mediates the impact on a successive endogenous variable (Chin, 1998b). An empirical example is the current study’s model of multidimensional Soc_Norm, Per_Tr and Per_QLY (Figure 3.2) each having underlying constructs of two, three and three respectively. This study will demonstrate the use of these types of hierarchical latent variables and use them to account for the measurement error of the indicators for the formative constructs (Becker *et al.*, 2012).

Formative-Reflective

A formative MV is an instance where the MV can impact a latent construct such that a change in the MV influences a change in the outcome of the latent construct (Diamantopoulos and Winklhofer, 2001). The arrow, in this case, points to the latent construct from the MV (Figure 3.1C). Thus, the resultant coefficient for this relationship is known as outer weight in PLS-SEM. Therefore, a formative-reflective type modelling is a situation whereby the SO dimension is a common concept of many FO constructs. The objective of such a hierarchical order modelling, according to Becker *et al.* (2012: 364) would be to epitomise the common part of several MVs which claim to measure the same thing (say, firm performance) but use different methods.

Formative-Formative

Lastly, a formative-formative type of relationship modelling is the situation whereby FO constructs are formative, and are measured in such a way that they form a more abstract general

concept. All the above taxonomy can be found in empirical research used to capture different situations.

HYPOTHESES DEVELOPMENTS

Social (Subjective) norm

The three main norms identified by research are descriptive, injunctive and subjective norms (Cialdini, Reno and Kallgren, 1990; Ajzen, 1991). A descriptive norm pertains to individuals' beliefs about how prevalent behaviour is amongst referent others. This norm gives information about the strength of the norm and how often it is observed amongst others (Cialdini *et al.*, 1990). Injunctive norms are those norms which indicate the extent to which individuals believe their society would disapprove of certain behaviours (Schultz, Nolan, Cialdini, Goldstein and Griskevicius, 2007; Göckeritz *et al.*, 2010). A subjective norm refers to the perceptions regarding the degree to which members of individuals' reference groups, for instance friends and family members, would expect them to behave regarding a certain action (Ajzen, 1991).

Injunctive and subjective norms seek to measure the perceptions of others' beliefs. Subjective norms are paramount to this study as they ponder more on perceptions of pressure from particular referents than on any other issue.

Ajzen (1991) designated that the relative importance of subjective norm to predict intention is predicted to vary across behaviours and situations. In other words, reference groups in subjective norm are closer in terms of social distance than the reference groups in other norms (Ho *et al.*, 2014), and are therefore more significant.

Ho *et al.* (2014) performed a study and revealed that adolescent non-drinkers, for instance, consider pro-drinking advertisement messages to be more convincing to their peers than anti-drinking messages from distant others. In effect, the proximal referent groups are likely to exert stronger and more immediate effects on adolescents' intentions to drink rather than general perceptions of societal approval. This outcome was found to be consistent with previous work by Bhattacharjee (2000), which proved that subjective norm was an important predictor of intention to use electronic brokerage services. Again, Keen *et al.* (2004) found that the choice of the Internet over other business models is conditioned by an individual's subjective norm and the amount of control perceived during the purchasing process.

The positive association between social norm and continuance intention is well documented (Chen, Yen, and Hwang, 2012, Lee, 2010). For instance, Li *et al.* (2008) reveal that subjective norm significantly affects user trust in organisational information systems, implying therefore, that with the smallest influence from referent groups individuals are likely to yield to m-banking.

Lee (2010) conducted a study using ECT, the TAM, the theory of planned behaviour and flow theory with 363 web-based students in Taiwan and reports that subjective norm and perceived behavioural control impact continuance intention. Likewise, Chen *et al.*, (2012) and Lee (2010) show that the effect on continuance intention with specific regard to social norm is significant.

It should be emphasised here that the second determinants of intention, as described by Ajzen (1991) in Chapter 2 is the person's perception of social pressures placed on them to perform the behaviour in question; that is, to yield to the social norm. Since it deals with prescriptions, this factor is termed subjective norm. Simply put, subjective norm and social norm are used interchangeably. Ajzen further maintains under the section "A Hierarchical Model of Perceived Behavioural Control" that control over the execution of a behaviour depends on the presence of various internal and external factors which may serve to facilitate or interfere, but do not invalidate the unitary nature of the construct.

It should be pointed out at this stage, how the term subjective norm has been used interchangeably with social norm without any intention to mislead. Accordingly, the research model for this study captures social norm from two lower-order components: external influence and interpersonal influence, which is described as the perceived social pressure to perform or not to perform the behaviour (Ajzen, 1991: 188). These play a crucial part in influencing people's acceptance and the usage of new IT (Aggelidis and Chatzoglou, 2009), such as m-banking.

Drawing inferences from the above-related concepts, this study hypothesised that social norm will affect the individual user's intention to use m-banking in the following manner:

H1: Social norm positively influences m-banking users' overall satisfaction towards continuance intention.

Perceived trust

The theory of socio-cognitive trust defines trust as a notion that is appraised by agents, in terms of cognitive ingredients (Castelfranchi and Falcone, 2010: 401), and treats the cognitive trust as a relational factor between a trustor (trust giver) and a trustee (trust receiver). The trust giver, in terms of this study, pertains to the user of m-banking (customer), while the trust receiver is the bank offering the services and the technology through which the user performs the banking transactions. The website representing the bank as a salesperson, as well as any third party guaranteeing trust for the user, need to be trusted to ensure complete formation of intentions.

Following from the above, trust could be seen as a multidimensional model that could be grouped into many factors in m-banking, and for that matter becomes a crucial commodity in an uncertain and risky environment. Doubts about m-banking services, the perceived technical competence of the system, and the human operators' understanding of the underlying physiognomies and processes governing the system's behaviour compound these fears of user uncertainty. This is triggered by the fear that the use of new Internet technology can enable m-banking, hence warranting the need for trust to arise in such a risky situation (Mayer, Ramsey and Williams, 1995: 711). Trust is a significant psychological factor of electronic loyalty and it is crucial for users to know that online transactions come with some amount of risk (McCole, Ramsey and Williams, 2010: 1019) as they continue to perceive online purchasing as risky (Bianchi and Andrews, 2012; Xu and Liu, 2010).

While Srivastava and Teo (2009: 370) classify trust into trust in government, trust in technology, and trust in e-government websites, Shu and Chuang (2011: 33) classify trust into the website vendor and trust in group members. McCole *et al.* (2010) contend that the consumer (in this instance the m-banking user) need to consider whether: 1) they trust the systems facilitating the transactions (the Internet); 2) they trust a particular vendor (the bank); or 3) they trust other third parties to safeguard the transactions online (McCole, Ramsey and Williams, 2010). McCole *et al.*'s classification of trust and that of group m-banking (Shu and Chuang, 2011) are of interest to this study.

Contrary to the views of this current study, Koenig-Lewis *et al.* (2010) conclude that there is no straightforward association between trust and intention to use m-banking; rather, it is indirect and occurs through variables of compatibility and perceived risk which exert influence upon usage intention.

Zhou (2011) investigated the effect of trust on the adoption of m-banking and concluded that important assurance and information quality are key factors influencing initial trust, while information quality and system quality significantly affect perceived use. He also concludes that trust affects perceived use and that both of these factors exert influence upon the intention of m-banking usage.

The above opposing scenarios affirm the necessity for further investigations regarding this trust concept, especially as the factors listed by Zhou (2011: 242) are also relevant to the current study. Therefore, investigating this trust variable and its effect on behavioural and usage intention will help throw more light on the confusion described above.

Trusting a particular banking institution which enables a user to conduct banking through the Internet is a long-term process. In fact, such trust given to the bank is what makes the user automatically or psychologically trust the Internet, without realising that the Internet and the bank are separate entities. It is a common feeling that whenever we are dealing with a business unit of more than one person, recognised by law and which has been in existence for some time, we tend to trust that institution with little or no effort. As first timers, we rely on publicity or word of mouth to simply confirm our trust. Without prior experience with a banking institution, we may ignore our general tendencies to trust others, and instead form our trust beliefs based on perceptions about the bank and its website. As the interface between users and online vendors, website quality is a significant factor affecting initial trust (Zhou, 2012: 1519).

The existence of a positive organisational reputation helps, and well-respected organisations are easily trusted (Sillence *et al.*, 2004: 665) as against their counterparts. This results in a more open and trusting relationship between users and the banks, providing approval to post-purchase users to confirm their continued trust.

From a sociological point of view, this trust can be viewed as a property of collective units (ongoing dyads, groups, and collectives), and not of isolated individuals (Lewis and Weigert, 1985: 968). As a collective attribute, trust is applicable to the relations amongst individuals rather than to their psychological states taken individually (Lewis and Weigert, 1985).

To view trust as an institutional phenomenon means to acknowledge that trust is not only restricted to interpersonal relations within the bank but also extends between a person and an organisation. Employees of banking institutions normally work together to provide their users

with the best possible services and products, and this strengthens users' trust in the bank knowing that the institution is geared towards their welfare, and the feeling that they are dealing with an individual. This warrants division of labour on the part of the bank. Pronounced division of labour results in strong ties of dependence and trust is a requirement for effective operation.

The results of some empirical studies reveal that the positive reputation of an e-vendor (McKnight *et al.*, 2002; Teo and Lee, 2010) and recommendations within one's social network, particularly positive referrals (Kuan and Bock, 2007) significantly influence clients' trust in online organisations. In view of above arguments, the following trust hypothesis is examined:

H2: Perceived trust positively influences m-banking users' overall satisfaction towards continuance intention.

Perceived quality

There is a direct association between perceived quality and overall satisfaction (Balaji 2009: 55), where perceived quality is based on previous expectations, and evaluating the choice that the user makes to determine satisfaction (Grounaris, Tzempelikos and Chatzipanagiotou, 2007: 68). Service quality is a judgement adjudicated by a customer who evaluates a service depending on what he or she expects against what is actually provided. Electronic services (e-service) are services provided through e-media such as mobile devices or through a website enabled by the Internet. The quality of such service could be attributed to elements of this medium which play various roles in shaping this perception, such as availability of the website, quality of information provided by the vendor on the website, and so on.

Zeithaml *et al.* (2002) define website quality as "the extent to which a website facilitates efficient and effective shopping and delivery of product and services". The authors modelled a seven-dimensional factor which researchers could use to measure the judgement of what customers perceive to be service quality. Thus: efficiency, reliability, fulfilment, privacy, responsiveness, recovery and contact measure customer perception of service quality in the online field. However, the issue of perception is psychological, which could be influenced by many factors, including social pressure, thus rendering the above definition subjective and argumentative. In other words, what "A" perceives to be quality might not mean anything to "B"

and *vice versa*. This therefore demands further work to be done in order to develop a more rigorous framework.

Saha and Zhao (2005), in an attempt to address this gap, added four new elements (communication, personalisation, technology update and logistic/technical equipment) to Zeithaml *et al.*'s (2002) factors of efficiency, reliability, fulfilment, privacy and responsiveness to formulate a nine-factor model to measure service quality in Internet banking, describing the five dimensions of Zeithaml *et al.* as core dimensions in Internet banking. This study however, intends to validate service quality through the sub-dimensions of interaction quality, system quality and information quality by positing the following hypothesis:

H3: Perceived quality positively influences m-banking users' overall satisfaction towards continuance intention.

User satisfaction

Satisfaction is a user's emotional feeling after assessing the differences between expectations and actual performance. Studies have investigated IS continuance intention based satisfaction (Bhattacharjee, 2001, Liao, *et al.* 2009, Akter, Ray and D'ambra, 2013), with Bhattacharjee and Premkumar (2004) making a notable contribution in using ECT to study user satisfaction and continuance behaviour.

The ECT states that user satisfaction grows from a user's comparison of post-purchase evaluation of a product or a service, with pre-purchase expectations. When pre-purchase expectations are met, satisfaction is attained; otherwise dissatisfaction is the result and can have negative consequences on continuance intention. In other words, when the perceived performance of a product or service is near to the likely level of performance, it is said to have fallen into the zone of indifference. If the performance is higher/lower than expectations, a positive/negative relationship is formed. If expectations are positively/negatively disconfirmed, satisfaction or dissatisfaction occur (Oliver, 1981).

Oliver (1981) recaps satisfaction as a "summary of psychological" state which results when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience, adding that these satisfaction decisions are based on perceived performance and not on actual performance.

This is very important in the context of m-banking, as evinced by the number of studies which indicate that the relationship between overall satisfaction levels and continuance intention is critical and worth the attention of investors (Limayem, Hirt and Cheung, 2007). User satisfaction is a post-purchase outlook, formed through a mental comparison of the service and product quality that a customer expected to receive from a transaction, and the level of service and product quality the user perceives from such transaction.

Earlier studies suggest that satisfaction is a strong determinant of continuance behaviour (Kim *et al.*, 2009; Lee, 2010). Concluding from the literature above, it is expected that a positive effect of user's satisfaction will result in their continuance behaviour towards m-banking. The following hypothesis is thus proposed:

H4: Overall satisfaction positively influences m-banking users' continuance intention.

Continuance intention

Continuance intention has been shown to have a correlation with actual IS usage (Davis *et al.* 1989; Bhattacharjee, 2001) and is used as the endogenous construct in many models, including this study. There is a need to ensure m-banking continuance usage to reap its benefits in the long term. For instance, the issue of trust in m-banking can only be realistic if users become familiar with and continue visiting the websites of their banks.

Despite the importance of continuous usage, the extant literature has concentrated on examining the initial adoption of mobile commerce and exploring its antecedent variables (Xu and Gupta, 2009) rather than its post-antecedents. Little attention has been paid to investigating the post-adoption usage of m-banking, and in South Africa this is no exception.

In light of the above, this study uses the second-order constructs of Soc_Norm, Per_Tr, Per_QLY and OvalSat to predict m-banking CI in South Africa. This is an area worthy of pursuit because of the business value of the mobile device as a tool of both leisure and convenience, a way of communication and a new business venture. It is therefore propounded that:

H5: M-banking continuance intention positively influences users' actual usage.

Reasons for device sizes preference as a control variable

Demographic factors such as age, gender, income level, level of education and location (Mattila, Karjaluoto and Pento, 2003; Yousafzai and Yani-de-Soriano, 2012), because of its inherent psychological elements in relation to users' decision making in the extant literature, have been used to moderate many studies. Never has there be any study performed that used reasons for preferring a particular device size as a control variable. In light of this, the current study used the reasons why m-banking users prefer a particular mobile device (MD) size over others to control the study in order to discover a new sense of direction. The data capturing the scale items for these control variables are shown in Table 4.6 and Table 4.8.

To provide a breakdown of this chapter, it needs to be pointed out that little is identified about the control effects of constructs in South Africa, given the scanty number of published articles regarding these issues. It is therefore necessary to ascertain the effect of these factors to confirm their degree of inconsistency or otherwise, and to provide more insight into such phenomena in the country. This study will thus examine the impact of these psychological elements (reasons for SD or BD) in relation to m-banking users' decision-making in South Africa in line with the research model provided below.

THE RESEARCH MODEL

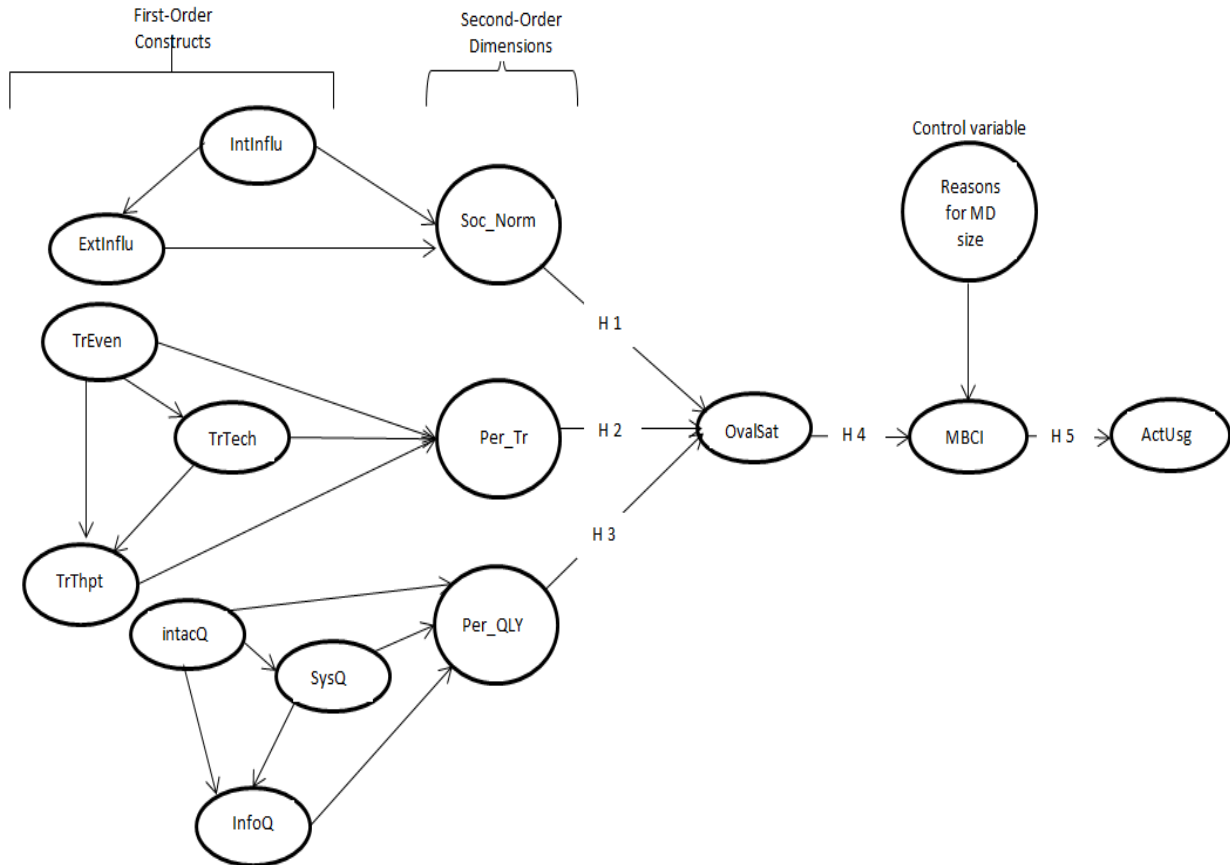


Figure 3.2: Proposed conceptual model – mobile banking continuous intention model- (MBCIM)

ExtInflu = external influence, IntInflu = internal influence, TrEven = trust in e-vendor, TrTec = trust in technology, TrTpt = trust in third party, InfoQ = information quality, IntaQ = interaction quality, SysQ = system quality, Soc_Norm = social norm, Per_Tr = perceived trust, Per_QLY = perceived quality, OvalSat = overall satisfaction, MBCI = m-banking continuance intention, ActUsg = actual usage

SUMMARY

This chapter compiles the relevant extant literature that was used to generate the research hypotheses. In conceptualising a MBCI model for banking services in South Africa, the study firstly proposed that users' social norm is informed by two dimensions: internal influences (IntInflu) and external influences (ExtInflu). Secondly, users' trust is also determined by three dimensions: trust in technology (TrTec); trust in an e-vendor (TrEven); and trust in a third party (TrTpt). Thirdly, users' perceived service quality is informed by three dimensions: interaction quality (IntaQ); system quality (SysQ); and information quality (InfoQ).

Finally, users' satisfaction levels are informed by the overall satisfaction obtained from these three second-order constructs, which in turn positively influences their MBCI, and then, depending on the control variable(s), determines their actual usage. Therefore, focusing on these four variables, the study proposes a MBCIM as given in Figure 3.1, which is second-order, multidimensional and context specific (Aker *et al.*, 2013). The study specified that the research model be made up of reflective-formative modelling which constitutes its formative model (Petter *et al.*, 2007) in short.

The above intriguing and thought-provoking hypotheses lead this study into the investigation and analysis of the proposed MBCI model. This will induce readers to gain a clear and detailed appreciation of the factors propelling MBCI in South Africa.+

CHAPTER 4

METHODOLOGY

INTRODUCTION

The research design and methodology are explained in this chapter in four parts. In the first part, the research model developed from theoretical framing in this study is provided, together with a summary of the ensuing hypotheses. In the second part, the measurements used in the study are presented along with a focus on data collection and data sources. The third part looks at the reliability and validity of measurement model, and the last part looks at the rationale for the selected statistical approach used to prepare the data for analysis.

OBJECTIVES OF THE STUDY

This thesis outlined the research question and objectives in Chapter 1. These objectives, (below) are translated into hypotheses as set out in Table 4.1 to address the research question.

Table 4.1: Summary of research hypotheses

Objective 1	H1:	Social norm positively influences m-banking users' overall satisfaction towards continuance intention.
Objective 2	H2:	Perceived trust positively influences m-banking users' overall satisfaction towards continuance intention.
Objective 3	H3:	Perceived quality positively influences m-banking users' overall satisfaction towards continuance intention.
Objective 4	H4:	Overall satisfaction positively influences m-banking users' continuance intention.
Objective 5	H5:	MBCI positively influences users' actual usage.
Sub-objective		Identify the control variable(s) that influence MBCI in South Africa.

Hypothesis testing

The above hypotheses were based on the literature review and formulated along the second-order paths of Figure 3.2., dubbed the MBCIM. PLS will be used to evaluate the MBCIM. The tools provided by SmartPLS3 helped to depict the visual relationship amongst the constructs and their items. The following steps were followed for the evaluation process:

First of all, a group variable was used to indicate the period of experience for each user for every data record. Secondly, PLS was used to compute group analysis. Thirdly, the total goodness of fit between the theoretical model and the empirical data across user groups was evaluated using the measurement model's indices. Fourthly, the path coefficient and path significance corresponding to each hypothesis were examined and compared to different user groups.

Fifthly, the magnitude of the variance of each endogenous construct as explained by the model constructs was analysed to see if all fit indices met the suggested threshold and confirmed the fitness of the empirical data with the research model. Lastly, factors that were likely to affect the outcome of the predicted results were accounted for. In other words, the possible effects of other variables (control) on the dependent variable were considered so that the actual causal effects of the investigated independent variable on the dependent variable could be determined. Such factors, mentioned earlier as moderating factors, are suggested by variables whose variation impacts the strength or the direction of a relationship between an exogenous and endogenous variable (Baron and Kenny, 1986: 1174). This was done to determine alternative outcomes for different situations.

Research design

Research design differs in many specifics (Cooper and Schindler, 2003: 146, Welman and Kruger, 2001: 107). Nonetheless, they all invariably agree on the following:

- The design is activity and time-based;
- The design is always based on the research questions;
- The design outlines procedures for every research activity;
- The design guides the selection of sources and types of information; and lastly
- The design is a framework for specifying the relationships amongst the study variables.

In this manner, the research design answers the questions about the kind of techniques that need to be used to manipulate data, the type of sampling, and how to manage issues such as time and cost constraints. The research problem is a crucial component in guiding the research design, and once it is carefully formulated, the nature of the method, data collection processes and analysis follows (Walliman, 2005: 270).

Types of Research Design

Studies may be either exploratory or descriptive in nature, or may be conducted to test hypotheses (Sekaran, 2003: 119). An exploratory study is pursued when not much discovery is done about any particular condition at stake, or no information is available to guide how similar difficulties or the investigation was dealt with previously. Such a situation warrants broad introductory work to be done to gain knowledge of the phenomena in order to understand what is happening. In short, this type of study is necessary to comprehend better the nature of the problem because very few studies exist in this area.

In order to describe the features of the variables of the study, a descriptive study is followed. It is also undertaken to understand the physiognomies of the organisations that follow certain common practices. Hence, the goal of a descriptive study is to afford the investigator a profile to describe relevant aspects of the phenomena of studies from an individual, organisational, industry, or other perspective.

Studies that employ hypothesis testing, explain the nature of certain relationships or establish the differences among groups of dependent and independent variables. It is undertaken to explain the variance in the dependent variable or to predict outcomes. It could also be used to examine whether or not conjectured relationships have been substantiated, and an answer to a research question has been obtained.

This research has stated earlier on in the relevant chapters that not much is known about South African m-banking continuance intention, whilst describing the characteristics of the variables which are normally used to investigate such a phenomenon. It developed a set of hypotheses designed to investigate MBCI in South Africa based on these variables, and could therefore be described as using elements of all the above research methods to address its objectives. However, its main methodology is hypothesis testing.

Research Philosophy

The development of knowledge and the nature of that knowledge is referred to as research philosophy (Saunders, Lewis and Thornhill, 2007). Research entails the development of knowledge and therefore researchers ought to have a philosophy, the importance of which is to reinforce the research strategy and define the view of the author on the assessment of his research. Saunders *et al.* (2007) define three types of research philosophies as being: 1) epistemology; 2) ontology; and 3) axiology.

1) Epistemology: This, according to the above authors, is about what constitutes acceptable knowledge in a field of study. M-banking is a contemporary philosophy that has not been explored in much detail, especially in South Africa, let alone by looking at its multidimensional outlays. Thus, it is the belief of this study that an adventure to investigate m-banking in South Africa using a model will not only help to make an incremental contribution in this field, but also help to understand the different levels of factors which play important roles in shaping the understanding of this phenomenon, right from its acceptance to continued usage. This understanding it is believed could help other emerging economies as well, as they all have almost the same socioeconomic and technological challenges. Banking is undergoing a technological transformation all over the world and therefore, any research that leads to new knowledge and strategies should be welcome.

2) Ontology: is about the nature of social phenomena as entities. M-banking users are social beings with complex social behaviours. Investigating how these social behaviours impact this concept of m-banking through the lenses of social norms and trust will again not only uncover a new sense of direction for strategic implementation of m-banking, but could also contribute to the field of sociology, an understanding from the technological point of view, and how this could be dealt with for the advancement of mankind.

3) Axiology: is about judgments concerning value. The value of technology that enables the provisioning of banking services through mobile technology is undoubtedly beyond the subjection of this concept to any kind of debate. It is therefore no surprise that this concept is gaining momentum amongst researchers all over the world. The South African government has expressed concern regarding the marginalisation of rural people from mainstream banking in the country. One of the ways that this concern could be addressed is through the epistemology and

implementation of m-banking by the banks that are unable to provide branches in rural areas. Therefore, the study of m-banking is valuable for both local and international economies which seek to be part of the technological revolution sweeping the world.

Based on the above exposition by Saunders *et al.*, this current study's epistemological stance is described as positivism. This is because this research, while it uses the quantitative approach of numbers, offers an understanding of differences between humans (Saunders *et al.*, 2007) in its predictions. Other options, once having reviewed their nature critically, were considered inappropriate for this research.

Research setting

Research can be done in the natural environment where work normally proceeds (that is, in a non-contrived setting), or in a contrived artificial setting (Sekaran, 2003: 129).

- **Natural Setting**

Here, various factors are examined in the natural setting in which daily activities go on as normal with minimal researcher interference. For instance, correlational studies are conducted in a non-contrived setting.

- **Contrived Setting**

Experiments done to establish cause and effect relationships beyond every reasonable doubt require the creation of an artificial, contrived environment in which all the extraneous factors are strictly controlled. Similar subjects are chosen carefully to respond to certain manipulated stimuli. These studies are referred to as laboratory experiments.

This study was conducted in a natural setting. However, due to its rigorous nature in establishing cause and effect relationships, hypotheses were developed and tested in a contrived laboratory setting, using the SmartPLS 3.0 software package.

Time horizon

Research can be done in such a manner that data are collected just once or over a period of time, in order to find solutions to a research question. Such studies are called one-shot or cross-sectional studies.

- **One-shot case study**

Data that are collected from a source once between a certain time, say January and June, to study a situation fall into this category. Data collected in this manner have not been collected before, and will not be collected again from this same group for the same research.

- **Longitudinal study**

In some instances, the researcher might want to study the situation, people or phenomena at more than one point in time in order to answer the research question. Thus, data could be collected before a certain time and after a certain time from similar samples. Since data are gathered at two different points in time, the study is not cross-sectional or one-shot, but is carried out in a longitudinal manner over a period of time. Such studies, because data on the dependent variable are gathered at two or more points in time to answer the research question, are called longitudinal studies.

This research has made use of both quantitative and qualitative methods, because a range of sources was used to organise the primary research and questionnaires were sent to respondents electronically requesting them to participate in the study. Designing a research instrument or questionnaire to target a group of people within a time horizon is informed by the kind of sample the researcher has in mind, and this is guided by sampling design strategies.

SAMPLING DESIGN

Sampling design for research purposes is normally used in order to permit the detailed study of part of a population as against the whole. The information derived from the ensuing sample is typically employed to develop useful generalisations about the population.

- **Population and sample**

A population is an entire set of individuals or objects, which may be finite or infinite in a certain situation. Examples of finite populations are the m-banking users of a given bank, the kind of cellular telephones owned by particular users, or the potential m-banking users in South Africa. Examples of infinite populations include the number of m-banking users of a bank who plan to use m-banking forever, or the m-banking users of South Africa.

Gathering data from every individual in this population would be impossible and expensive. Hence, it would be more reasonable to collect data from a subset or a sample of the

population. To this end, the population of this study constitutes m-banking users throughout South Africa. If the sample is impartial, the sample result can be used to make inferences about the population. In order for a sample to be impartial, it must be representative of the population, randomly selected and sufficiently large (Sekaran, 2003: 268).

The current study sampled m-banking users from a database of a survey agent based in Johannesburg South Africa. To randomly select and obtain a sufficiently large number of respondents, the researcher also sent a copy of the electronic version to students of University of KwaZulu-Natal (UKZN) and the general public known to be practicing m-banking.

- **Sampling Technique**

There are two major types of sampling technique: probability and non-probability sampling. In probability sampling, the elements in the population have some known chance or probability of being selected as sample subjects, while in non-probability sampling, the elements do not have a known or predetermined chance of being selected as subjects (Sekaran, 2003: 269). The sampling techniques under each category are discussed briefly below:

Probability Sampling

The following sample techniques fall under this category:

- **Simple random sampling**

In this type of sampling, the entire element in the population has a *known and equal* chance of being nominated as a subject. In other words, the probability of any one of them being chosen is one, and each single element in the population has the same or equal probability of being chosen. This sampling design has the least bias and offers the most generalisability.

However, this sampling process could become cumbersome and expensive; in addition, an entirely updated listing of the population may not always be available. For these and other reasons, other probability sampling designs are often chosen instead.

- **Systematic sampling**

The systematic sampling design involves drawing every *n*th element in the population, starting with a randomly chosen element between 1 and *n*. For instance, assuming this study wanted a sample of 45 households which practice m-banking from a total population of 360 houses in a

particular locality, then the researcher could sample every seventh house starting with a random number from 1 to 7. Assuming that the random number is 7, then houses numbered 7, 14, 21, 28, and so on, would be sampled until the 45 houses are selected. For market surveys and consumer attitude surveys, amongst others, the systematic sampling design is often used, and the telephone directory frequently serves as the population frame for this sampling design (Sekaran, 2003: 271).

- **Stratified random sampling**

There are instances where some identifiable subgroups of elements within the population may be expected to have different parameters on a variety of interest to the researcher other than the sample population. Data will then need to be collected in a way that would help the assessment of needs at each subgroup level in the population. The emphasis of analysis would then be on the groups, and the stratified random sampling (SRS) process therefore becomes the obvious choice.

- **Cluster sampling**

Further to SRS discussed above, there are times when portions of population elements having preferably heterogeneous qualities amongst the members of each group are preferred for study. In this instance, cluster sampling is used. The unit cost of cluster sampling is much lower than simple or SRS or systematic sampling. However, cluster sampling leads to greater biases; hence it is the least accepted for generalisability.

Nonprobability sampling

In a non-probability sampling design, the components in the population do not have any probabilities attached to their being chosen as sample subjects. They are selected as follows:

- **Convenience sampling**

From its name, convenience sampling is the collection of information from members of the population who are conveniently available to provide the information. It is most often used during the exploratory phase of a research project and is perhaps the best way of getting some basic information quickly and efficiently.

- **Judgment sampling**

Judgement sampling entails the choice of subjects most advantageously placed to provide the required information. Thus, it is used when a limited number, either categories or people, have the information that is sought after. This does not require any probability strategy.

- **Quota sampling**

Quota sampling is a strategy which ensures that certain groups are adequately represented in the study through the allocation of a quota. It can be considered as a practice of proportionate stratified sampling to allow a predetermined proportion of people sampled from different groups, but on a convenient basis, to be part of a study.

- **Snowball sampling**

Snowball sampling is a sample strategy whereby a selected sample for a study is entreated to recruit further others to also participate in the study or simply forward a questionnaire to known ones for their participation as well. This can multiply the sampled size drastically and could be good if these further recruitments are carefully selected to make sure they qualify for the study.

- **Self-selection sampling**

Self-selection sampling is when the participants of a study determine of their own accord to participate because of some advantages they possess that enable them to do so. For instance, hosting of the questionnaire online for participants to answer will mean only those with access to mobile devices and the Internet can do so. However, this might prevent potential respondents from participating in the study.

Data collection techniques

The online instrument entailed an integrated online model designed with the help of a Google Drive survey tool. Google Drive contains an online survey tool that assists researchers with the design of survey instruments capable of collecting data online. This instrument was directed to a group of m-banking users who constitute the database of a survey agent. Thus, this study uses simple random sampling, as each element in the database of the survey agent has a known and equal chance of participation. The collection process also entailed judgment sampling because the subjects were most advantageously placed to provide the required information. Lastly, the collection strategy also afforded participants the opportunity to be self-selecting in the sampling,

as it meant those with access to the Internet were definitely those who answered the questionnaire.

This bias in the self-selection process is certainly what this study is meant to test because normally only users with access to online devices will undertake m-banking. A total of 1 262 responses was collected from this source.

The advantages of online data collection, apart from surveying hard-to-reach respondents are: 1) faster responses; 2) lower cost; and 3) a geographically unrestricted sample (Tan and Toe, 2000) throughout South Africa.

Sample size

Although Struwig and Stead (2001: 125) state that it is not possible to identify an ideal sample size, Schlegelmilch, Love and Diamantopoulos (1997: 16) recommend a size between 20 and 50. Cavana, Delahaye and Sekaran (2001: 278) however believe a size of 374 respondents for a population of 10 000 is good enough. This study targeted a sample of not less than 300 (Bearden, Sharma and Teel, 1982) from the four main national retail banks: Standard Bank, First National Bank, Nedbank, and ABSA in addition to the other sources listed above. All of these banks utilise the m-banking concept under discussion (Manson, 2002). The total of 1 262 responses received was therefore considered good enough for the study's generalisability.

The study undertook a CFA via the PLS covariance approach. The CB-SEM was preferred because of its flexibility in sample size restrictions, which gives credence to this work. According to the following recommendations the study first needs to consider sample size, and secondly test reliability and validation of hypotheses. Sample size must fall within the following conditions: bigger than five times, but smaller than ten times parameters (Bentler and Chou, 1987).

Again, a sample size should not be less than 200 when dealing with models (Kwon and Wen, 2010). Thirdly, extreme probability should be one of the structural methods. This study's 1, 262 responds satisfy these constraints. The research instrument and the collected data were validated against some of the popular models in the field of study to predict MBCI in South Africa.

Justification for data collection Methods

The types of measures typically used in quantitative research include (Sampson, 2012: 36):

- Instruments;
- Tests;
- Questionnaires using predominantly fixed-response items;
- Interviews using predominately fixed-response questions;
- Ratings of written, visual, auditory, or tactile exercises using predominately predetermined variables;
- Unobtrusive observations; and
- Analysis of archival data.

The current study used an instrument developed for data collection online. Online surveys, as mentioned under the data collection section above, allow for the collection of data nationwide. Since the current study concerns m-banking users across the length and breadth of South Africa, the researcher believes that, as much as possible, respondents should be selected across the country so as to get a true and fair view of the phenomenon under study. An online survey is one option which offers an opportunity to collect data nationwide, amongst the above-listed methods, where the population is large.

Questionnaires (the instrument) afford a researcher the following advantages (Popper, 2004):

1. Practicability.
2. Can be carried out by the researcher or by any number of people with limited effect on its validity and reliability.
3. The results of the questionnaires can usually be quickly and easily quantified by either a researcher or through the use of a software package.
4. Large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost-effective way.
5. Data can be analysed more “scientifically” and objectively than other forms of research.

6. When data has been quantified, it can be used to compare and contrast with other research and may be used to measure change.
7. Positivists believe that quantitative data can be used to create new theories and/or test existing hypotheses.

THE MEASURING INSTRUMENT

The measurement instrument examined factors such as social norm, perceived trust, perceived quality and user satisfaction: these were the independent variables. MBCI was the dependent variable and the reasons behind the choice of a device size constituted the control variables tested. The reasons for preferring a particular device size were considered for evaluation on the performance of the structural model, since these have the potential to offer an alternative outcome of the result. These were derived from the third part of the questionnaire (Table 5.2).

Participants were asked to rate their responses using a five-point Likert scale, ranging from (1) strongly disagree to (5) strongly agree, to measure the relative importance of various constructs. The instrument, in a form of the structured model, adopted pre-tested items from various authors summarised below. These items were carefully examined and reworded to ensure content validity and reliability for m-banking in South Africa.

Measures

Social Norm

Again, social norm was measured using a four-indicator scale for both interpersonal and external influences from Bhattacharjee (2002). The popularity of this scale item is proven by the number of studies which have sought to measure its impacts (Table 2.5). It is used as a reflective scale, reporting Cronbach's Alpha as 0.93. Sample indicators from these sets are: "My family thought I should continue using the e-file service", and "My colleagues thought I should continue using the e-file service" for interpersonal influence; and "Mass media reports convinced me to reuse the e-file service", and "Expert opinions depicted a positive sentiment for using the e-file service" for external influence.

Table 4.2: Social norm scale items

Interpersonal Influence	
1	My family thought I should continue using the e-file service.
2	My colleagues thought I should continue using the e-file service.
3	My friends thought I should continue using the e-file service.
4	People I knew thought that continuing to use the e-file service was a good idea.
External Influence	
1	I read/saw news reports that using the e-file service was a good way of filing tax.
2	The popular press depicted a positive sentiment for using the e-file service
3	Mass media reports convinced me to reuse the e-file service
4	Expert opinions depicted a positive sentiment for using the e-file service

Trust

The indicators in the trust category inquired about the users' degree of trust depending on three types of trust: trust in technology; trust in e-vendor; and trust in the third party. The measures were adopted from a variety of studies that made use of the same items, thus confirming the validity and reliability of these items. A multidimensional scale was developed to measure trust as it constituted three components (trust in technology, trust in the online bank (e-vendor) and trust in the third party). Trust in technology was adopted from Ratnasingam *et al.* (2002), Chen and Dibb (2010), and Zhou (2011). Trust in e-vendor was adopted from Hassanein and Head (2007), Gefen *et al.* (2003), McKnight *et al.* (2002), Silence *et al.* (2004), Teo and Lee (2010), Lowry *et al.* (2008), and Zhou (2012). Trust in the third party was adopted from Doney *et al.* (1998), Gefen *et al.* (2003), Hassanein and Head (2007), Zhou (2012), and Gefen *et al.* (2003).

Prior literature has supported the internal consistency of these scale items as evinced by Schoorman, Mayer, and Davis (2007), who noted that even though some studies have shown low reliabilities of about 0.60, they were revealed to be helpful in a number of ways, therefore: "...its conceptual clarity, test-retest reliability, and relationship with other variables in the nomological net" influences and supports the embracement of the construct (Schoorman *et al.*, 2007: 348). Items of this scale can be seen below in Table 4.3. Survey items showing reliability values are, however, presented in Chapter 5.

Table 4.3: Trust scale items

	Trust in technology
1	The Internet has enough safeguards to make me feel comfortable using it on my mobile device.
2	I feel assured that legal and technological structures adequately protect me from problems on the Internet.
3	I feel confident that encryption and other technological advances on the Internet make it safer for me to do banking there.
	Trust in e-vendor (website)
1	This website is trustworthy.
2	This website seems to be honest and truthful to me.
3	This website can be trusted.
4	This m-banking vendor keeps promises and commitment
	Trust in the third party
1	There are many reputable third-party certification bodies for assuring the trustworthiness of Internet bankers.
2	I think third-party recognition bodies are doing a good job.
3	Existing third-party recognition bodies are adequate for the protection of m-banking users' interests.

User satisfaction

Users' satisfaction and MBCI were measured using four- and three-indicator scales respectively. The measures were adopted from Bhattacharjee (2001) and Oliver (1981), though a host of researchers has applied them in a variety of studies. As noted from the literature review, this scale is used to measure the psychological influence exerted by a latent variable, thus forming a dormant reflective variable. Samples from the overall user satisfaction scale are, "Generally, I am content with the use of my mobile device for banking transactions", and "Overall, I am delighted with the use of my mobile device for banking transactions".

Table 4.4: Satisfaction scale items

1	Generally, I am content with the use of my mobile device for banking transactions.
2	Overall, I am delighted with the use of my mobile device for banking transactions.
3	Overall, I am satisfied with the usage of my mobile device for banking transactions.
4	Overall, I am pleased with the use of my mobile device for banking transactions.

Perceived quality

Perceived quality was detailed into three sub measurements using four-indicator scales for each. Information and system quality were measured based on Lin (2008), while interaction quality was adopted from Caro and Garcia (2008), Sangeetha and Mahalingam (2011). Sample indicators from these sets are as follows: “Employees were willing to help when I contacted them”, “Employees were consistently courteous with me”, “Employees were competent in doing their job”, and “Employees gave me prompt services” for interaction quality. “This m-banking is reliable”, This m-banking provides fast responses to my inquiries”, “This m-banking is easy to use”, and “This m-banking provides good navigation functions” are indicators for system quality, and “The information provided by this m-banking is what I need”, “The information provided by this m-banking is accurate”, “The information provided by this m-banking is up-to-date”, and “The information provided by this m-banking is comprehensive” are indicators for information quality.

Table 4.5: Perceived quality scale items

	Interaction quality
1	Employees were willing to help when I contacted them.
2	Employees were consistently courteous with me.
3	Employees were competent in doing their job.
4	Employees gave me prompt service.
	System quality
1	This m-banking is reliable.
2	This m-banking provides fast responses to my inquiries.
3	This m-banking is easy to use.

4	This m-banking provides good navigation functions.
	Information quality
1	The information provided by this m-banking is what I need.
2	The information provided by this m-banking is accurate.
3	The information provided by this m-banking is up-to-date.
4	The information provided by this m-banking is comprehensive.

From question six downwards, the scales were structured according to the preference of the participants. They were made to choose either handheld (smaller devices) or laptops (bigger device) with reasons.

Table 4.6: Reasons for smaller devices scale items

	I prefer smaller devices because
1	It is easy to carry around.
2	It is portable, I can sit anywhere and do banking.
3	It is not heavy, I can stand anywhere and do banking.
4	Technologically, it is easier to use than a laptop.
5	I do not have a laptop.

The MBCIM scales are as follows for those who prefer smaller devices: “In future, I would not hesitate to use a handheld device for banking transactions”, “In future, I will consider handheld device for banking transactions as my first choice”, and “I intend to continue using handheld devices for banking transaction”.

Table 4.7: MBCIM with smaller devices scale items

	Continuance intention
1	In the future, I would not hesitate to use handheld device for banking transactions.
2	In the future, I will consider handheld device for banking transactions as my first choice.
3	I intend to continue using handheld devices for banking transactions.
	Continuance use
	I frequently use a handheld device in a day for the below activities:
1	SMS
2	MMS
3	Downloads of banking information
4	Java games
5	Browse banks’ websites
6	Mobile e-mail

For the participants who prefer laptops to handheld devices, the online questionnaire hides Table 4.7 from their view and takes them to question 11 (Table 4.8), where the following scale items were examined:

Table 4.8: Reasons for bigger devices scale items

	I prefer bigger device such as a laptop because
1	A larger screen and better resolution make it comfortable to use.
2	It is easy to key in data than with smaller devices.
3	I feel in-control when I use a laptop than with smaller devices.
4	When fully charged, laptops, last longer, which enables me to do banking at my own convenient time in the day anywhere.
5	Technologically, it is easier to use than a cellular telephone or other smaller device.

The continuance intention assessments were as follows:

Table 4.9: MBCIM with bigger devices scale items

1	In the future, I would not hesitate to use a laptop for banking transactions.
2	In the future, I will consider using a laptop for banking transactions as my first choice.
3	I intend to continue using a laptop for banking transactions.
	Continuance use
	I frequently use a laptop in a day for the below activities:
1	Downloads of banking information
2	Java games
3	Browse banks' websites
4	Mobile e-mail

THE PILOT STUDY AND DATA COLLECTION

The research agent sent the instrument to some members of his database and reported back some inconsistencies raised by these participants. Suggestions from this agent and his team were also taken into account as necessary comments from experts.

A pilot study was undertaken on 30 November 2016 by the researcher when an online questionnaire was sent to email addresses from the author's mailbox. Telephone calls and follow up emails were then administered, reminding respondents of the pending study. In all, about 164 emails were sent to addresses of participants known to be practicing m-banking. This represents

16.4 percent of the total population targeted for this study (1000+). The number of those who actually responded was 51 (31.1 percent).

Issues and suggestions that arose from this pilot study ranged from incorrect spelling and semantic errors to inappropriate questions for a m-banking study. For instance, some of the constructs borrowed from popularly known articles for e-learning were not correctly formulated for m-banking, thus making no sense of what they were enquiring. Other important comments were about the technological ability of the instrument. The instrument failed to hide sections of the questions from the respondents' view after they had chosen their preferred device. This had the potential of making respondents answer all questions, even though they were not expected to do so after showing a particular preference.

All these issues were taken into consideration, and the questionnaire was fine-tuned and sent back to the online research agent and a banker, who were amongst the first chosen on the list, for their final comments before re-sending to the new respondents.

Some respondents replied by emailing back to notify the researcher that they had already responded, but the vast majority just kept answering the questionnaire, as they had not attended to it during the pilot study. By the end of May 2015, this exercise was over.

Reliability and validity

Reliability is about the extent to which a measure is consistent and stable in measuring what it is intended to measure. Evidence of the reliability of a measure helps to determine the likelihood of differences or show relationships among variables that actually exist, as against being an object of the unreliability of the measure (Sampson, 2012: 39).

Validity is concerned with the gathering of evidence about the extent to which an instrument actually measures what it is meant to measure. Evidence of the validity of an instrument helps to determine the probability that differences or relationships among variables actually exist, as opposed to being an object of intrinsic mistake in the measure (Sampson, 2012: 39). The various forms of validity that were available to the current study include:

(a) Face validity: Examining face validity helps to know the main concerns that individuals have regarding an instrument or questionnaire. The pilot study revealed many issues the respondents had regarding the instrument. These were taken into account and used to correct

the instrument before sending online. A specialist banker also gave feedback and made some recommendations regarding the instrument distribution.

(b) Content validity: This measures the extent to which a measure appears to measure the characteristic it is supposed to measure. That is, how well do the items in the instrument represent the entire creation of items? The key to content validity lies in the procedures used to develop the instrument used. As Hair, Bush and Ortinau (2006: 650) state, content validity has the property of a test which indicates that the entire domain of the subject or construct of interest was properly sampled. This study used constructs from already tested studies and reworded them to fit the current study. The already tested constructs ensured content validity.

(c) Construct validity: Construct validity is concerned with the similarity between what an instrument actually measures and what it is designed to measure (Sampson, 2012: 40). The study examined discriminant and convergent rationality (Chin, Gopal and Salisbury, 1997). Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. *Information systems research*, 8(4), pp.342-367.), which is defined as the degree of hypotheses that hypothetically must be connected to each other, and the degree of hypotheses that hypothetically must not be connected to each other, respectively. The two of them work together as subcategories; neither of them is adequate for creating hypothesis validity (Chin, 1998a). Accordingly, the suitable level is when all factor loadings are greater than 0.50 (Wixom and Watson, 2001), and the items of each hypothesis load onto just one element with an eigenvalue larger than 1.0, which serves a good convergent validity. Sampson (2012) further considers the below validities as also applicable:

(d) Factorial validity: This tests the evidence that clusters of empirically associated items can be recognised and replicated across norm groups in a way that is consistent with the conceptual or theoretical basis of the measure. Initial evidence for factorial validity is normally contained in the professional manual of the measure.

(e) Convergent validity: This provides confirmation that the total, content, or factor-derived scale scores of the measure are associated with other measures of similar, or somewhat similar, constructs in a theoretically consistent direction; for instance, in either a direct or negative correlation. Convergent validity is concerned with evidence supporting a hypothesised relationship between content or factor-derived scale scores of the measure and other measures of

the constructs. Once again, it is mentioned here that this study adopted constructs from similar studies.

(f) Discriminant or divergent validity: Discriminant validity confirms that the total or content, or factor-derived scale scores, of the measure are not associated with measures of dissimilar constructs in a theoretically consistent direction. Evidence of discriminant validity can further define the meaning of a scale by identifying important concepts that are not relevant to understanding a scale score.

(g) Criterion validity: This provides evidence that the extent to which the total score or content, or factor-derived scale scores, of the measure accurately discriminate between groups of people. This type of validity can make important contributions to an interpretation by relating the specific characteristics of a group of individuals with particular scale scores.

DATA ANALYSIS

This study is quantitative research and, as such, inferential statistics were used to analyse the data. Quantitative research is empirical research where the data are in the form of numbers, as opposed to qualitative research which is empirical research where the data are not in the form of numbers (Punch, 1998: 4).

Descriptive Statistics

Descriptive statistics involve the conversion of raw data into a form that provides information to describe a set of factors in a situation. This is done through ordering and management of the raw data collected. This form of statistics is provided by frequencies, measures of central tendency, and dispersion (Sekaran, 2003: 394).

Inferential Statistics

Inferential statistic infers meaning from the data through analysis of: 1) the relationship between two variables; 2) differences in variety amongst different subgroups; and 3) how several independent variables might explain the variance in a dependent variable.

- **Reliability**

The scale validation method was kept to Henseler, Hubona and Ray (2016) proposal to plan an acceptable online survey. Thus, all of the ideas and matching measurement were based on

previous research studies where their reliability was shown to be acceptable (Limayem *et al.*, 2007) Data analysis was performed to validate the measurement model, and because the hypotheses in this study were philosophical, the valuation of the dimension model sought to estimate internal consistency, and the validity of discriminant and convergent of hypotheses (Bollen, 1989). This was done with the help of Fornell's composite reliability measure and Cronbach's Alpha test (Fornell and Larcker, 1981). Accordingly, the composite reliability was expected to be greater than the cut-off point of 0.7 to have been deliberated satisfactorily (Fornell and Larcker, 1981).

- **Validity**

The validity of the study's instrument was established since it made use of measures already tested in similar studies by the authors cited above. These measures have been consistently applied by numerous other studies with the help of PLS, because PLS offers the opportunity to assess the reflective measurement model's validity, focusing on convergent validity and discriminant validity. These afford the chance to examine the average variance extracted (AVE). For instance, convergent validity of the measures is established when the item scores measuring the same construct are highly correlated (Henseler, Hubona and Ray, 2016).

RATIONALE FOR SELECTED STATISTICAL APPROACH

By conducting a further literature study, a number of existing research methods were reviewed, after which it was decided to select the PLS-SEM method to evaluate the MBCI for financial transactions.

PLS-SEM is a strong approach for work intended to develop and refine theories. By contrast to techniques for structural modelling, such as those of Amos and Lisrel, PLS makes less severe assumptions about theoretical closure in models (Chin and Newsted, 1999, Gefen *et al.*, 2003). Whereas Amos and Lisrel are strong approaches to testing the fit of fully developed models, PLS is a superior approach to developing and refining theoretical models (Table 4.1).

PLS is an advanced statistical method which allows optimal empirical assessment of a structural (theoretical) model, together with its measurement model (Gefen *et al.* 2003). It first estimates loading of indicators on constructs, and then iteratively estimates casual relationships among constructs (Fornell and Larcker, 1981).

SEM is a second-generation multivariate analysis technique which combines features of first-generation techniques, such as principal component and linear regression analysis (Fornell and Larcker, 1981). SEM is particularly useful for the process of developing and testing theories, and has become a quasi-standard in research (Hair *et al.*, 2011; Ringle *et al.*, 2012). When estimating structural equation models, researchers must choose between two different statistical methods: CB-SEM and variance-based PLS path modelling, also referred to as PLS-SEM (Hair *et al.*, 2011; Chin and Newsted, 1999).

These two approaches to SEM differ greatly in their underlying philosophy and estimation objectives (Henseler *et al.*, 2009). CB-SEM is a confirmatory approach which can test a model's theoretically established relationships. By contrast, PLS-SEM is a prediction-oriented, variance-based approach which focuses on endogenous target constructs in the model and aims at maximising their explained variance (i.e., their R^2 value).

For instance, WarpPLS software specifies nonlinear relationships amongst latent variables. It can perform a standard PLS regression, robust path analysis, or a WarpPLS regression analysis, and allows for the use of three alternative resampling algorithms, namely: bootstrapping, jack-knifing, and blindfolding (Kock, 2010).

Table 4.10: Comparison of partial least square and covariance-based structural equation modelling

Criterion	PLS	CB- SEM
Objective	Prediction oriented	Parameter oriented
Approach	Variance-based	CB
Assumptions	Predictor specification (nonparametric) Robust to deviations from a multivariate distribution	Multivariate, normal distribution and independent observations (parametric)
Parameter Estimates	Consistent as indicators and sample size increase	Consistent
Latent variable scores	Explicitly estimated	Indeterminate

Latent variables	Can be modelled in a formative or reflective mode	Typically, can only be modelled with reflective indicators
Implications	Best for prediction accuracy	Best for parameter accuracy
Model complexity	Large complexity	Small to moderate complexity
Model comparison	Does not provide statistics to compare alternative models	Provides statistics to compare alternative, CFA models
Sample size	A power analysis based on the portion of the large number of predictors. Minimal recommendations range from 30 to 100 cases	Ideally based on a power analysis of the specific model. Minimal recommendations range from 200 to 800
Theory base	Supports exploratory and confirmatory research	Requires sound theory base; supports confirmatory research

(Adapted from Chin and Newsted, 1999 and Gefen *et al.*, 2003)

The PLS-SEM tool also allows for different approaches when the model is a hierarchical multidimensional one, as in this study. In this sense, the three main approaches which can be used to estimate the parameters are: 1) the repeated indicator approach (Lohmöller, 1989; Wold, 1982); 2) the two-stage approach (Wentzel *et al.*, 2009; Ringle *et al.*, 2012); and 3) the hybrid approach (Wilson and Henseler, 2007).

a) For the repeated indicator approach, a higher-order latent variable is constructed by specifying a latent variable that represents all the manifest variables of the underlying lower-order latent variables (Lohmöller, 1989; Noonan and Wold, 1983; Wold, 1982). If a second-order latent variable consists of five underlying first-order latent variables, for instance, each with four manifest variables, the second-order latent variables can be specified using all twenty (20) (i.e. $5 \times 4 = 20$) manifest variables of the underlying first-order latent variables. This means the

manifest variables are used twice: 1) for the first-order latent variable; and 2) for the second-order latent variable.

Having specified the outer model (measurement model) in this way, the inner model (structural model) accounts for the hierarchical component of the model, as the path coefficients between the first-order and second-order constructs represent the loadings of the second-order latent variable (Becker *et al.*, 2012). This approach presents a problem for other constructs on the nomological network, as there is a swampy effect. That is, it makes other latent variables not to matter or have any contribution to the second-order variable. Because the manifest variables are used twice in this approach, it can lead to artificially correlated residual (Becker *et al.*, 2012: 366).

However, it has the advantage of being able to estimate all constructs simultaneously instead of estimating lower- and higher-order dimensions at two-stages. In this manner, confusion can be prevented in the interpretation of the results of the model. It has also proven to be the most reliable approach amongst the three (Becker *et al.*, 2012: 372).

b) The two-stage approach is about latent variable scores being determined separately without the second-order constructs present to obtain latent variable scores for lower-order latent variables (Chin, 1998a; Lohmöller, 1989; Tenenhaus *et al.*, 2005). Thereafter, it estimates these first-stage construct scores as indicators for the higher-order latent variable in a separate second-stage analysis (e.g. Wentzel *et al.*, 2009; Wilson and Henseler, 2007).

c) The hybrid approach splits the indicators of each first-order construct and uses one half to estimate the first-order construct and the other half to estimate the second-order construct, therefore avoiding the repeated use of indicators in the model (Wilson and Henseler, 2007).

d) The three-stage approach: Recently, Van Riel *et al.* (2017) have come up with a fourth method which seeks to address all shortfalls in the above three, and provides two main advantages over them:

- Firstly, it calculates consistent estimates, thus enabling loadings, weights and path coefficients to be reliable.
- Secondly, it permits two assessments of goodness of fit index, thus facilitating the answering of the proposed research models' usefulness as a second-order construct.

Since the current study is modelled as a second-order construct, showing some of the constructs as first-order and others as second-order, the three-stage approach becomes the obvious choice.

ABUSE OF ONLINE INSTRUMENT

The researcher removed duplicate responses (send button clicked twice), and multiple responses in succession that had identical data in every field by the inbuilt “filter by properties” of the Google Drive software. The “filter by properties” includes response dates, status, email address, gender, and IP address. A check for missing data was also carried out, and this recorded very few such cases. This could be attributed to the fact that the online Google Drive instrument developed by the investigator required almost all fields to be filled in compulsorily, signalling such requirements with a highlighted asterisk (*). This prevented the instrument from moving to the next page by taking respondents to spots where they had left out values or filled in responses with incorrect values. However, there were a total of 26 missing data which constitutes only 2 percent, thus not affecting the data integrity (Kline, 2005).

The questionnaire was then segregated into smaller and bigger device preferences, with 1 representing smaller devices and 2 representing bigger devices. The mean data replacement procedure was then carried out to fill in the missing values during the analysis without compromising the integrity of the responses (Kline, 2005) or data set. SmartPLS 3.0, the software used in this study mechanically standardises the data and replaces the missing values with the column mean (Van Riel *et al.*, 2017).

ETHICAL CONSIDERATIONS

“The goal of ethics in research is to ensure that no one is harmed or suffers adverse consequences from the research activities” (Cooper and Schindler, 2003: 120). To achieve a sizable response; a survey agent was utilised to recruit participants. In this case, the survey model checked for participant IP addresses issued to make sure they really are m-banking clients of South African banks. Through the web link address, the survey instrument is able to sort, print and monitor respondents by the IP addresses which accompany their responses to ensure they are within the targeted group.

A letter of informed consent was built into the model, introducing and explaining the purpose of the study to each participant for their participation. A mandatory combo box was inserted into the instrument requiring the respondent to tick either “yes” or “no” for participation before allowing them to proceed to the next page. By checking the box, participants agreed to be part of the study, otherwise they could not proceed. Physical evidence in the form of printouts of responses was collected online and filed for reference, analyses and write up.

SUMMARY OF THE CHAPTER

In this chapter was presented a detailed account of the research design, philosophy and methodology followed to conduct this research. The author placed the research in both the positivist and the interpretivist quarters, utilising a mixture of an online survey and physical contact (questionnaire) approaches. Previous literature describing similar studies was valuable in identifying the client points of the methodology, as well as illustrating the weaknesses associated with earlier research. While fewer materials concerning the case study are readily available, the study explained how it relied on similar studies around the world to achieve its research objectives.

This included a substantial literature review, the enhancement of earlier research models and the development of a research instrument. These were explained in much detail elsewhere in this study. Finally, the study detailed the operationalisation of the research instrument – recounting how the study identified suitable instruments for its purpose, and detailing the broad procedures for modification, data analysis and software intervention. In Chapter 5, the study revisits the research methodology, analysing it in the context of this study and discussing its appropriateness for this type of research.

CHAPTER 5

DATA ANALYSIS AND INTERPRETATION

INTRODUCTION

In this chapter, a presentation of experimental results and various methods followed to calculate and interpret research models are outlined. Starting with the main theories from which various factors were taken to develop the research hypotheses (Table 5.1), it continues to the research instrument, data collection procedures, descriptive statistics, empirical findings, PLS results of the measurements and structural models before concluding with a summary of findings.

Table 5.1: Summary of derived constructs

Theory	Constructs	Prediction
ECT (Bhattacharjee, 2001; Oliver, 1999)	Users' satisfaction, m-banking continuance intention	M-banking continuance intention and behaviour
TPB (Ajzen, 1985)	Social norm	M-banking continuance behaviour
PQ (Grounaris <i>et al.</i> , 2007; Balaji, 2009)	Perceived service quality (SERVQUAL)	M-banking continuance intention and behaviour
TST (Castelfranchi and Falcone, 2010)	Trust	Estimate trustworthiness of unknown trustees based on an ascribed membership to categories and quality of services
This study	External and internal influence of social norm and m-banking continuance behaviour (from TPB)	M-banking continuance intention and behaviour
	Perceived trust (from TST with modified reasons)	

	Interaction quality, systems quality, information quality and m-banking continuance behaviour (SERVQUEL)	
	Users' satisfaction and m-banking continuance behaviour (from ECT)	
	M-banking continuance intention and actual usage (from ECT)	

MODEL ASSESSMENT

The items for the constructs were formulated based on pre-validated studies and tailored to fit the m-banking environment. The questions were formulated to appeal to clients who have ever used any form of MD, be it a cellular telephone or laptop, to undertake banking transactions. The survey model asked a series of pre-established questions and gave a limited set of response categories, that ensured only respondents within the said samples could find it meaningful. A total of 1 800 lists were surveyed and 1 262 responses received, representing a 70 percent response rate.

The 5-point Likert scale rating which was used, ranging from (1) strongly disagree to (5) strongly agree, measured the relative importance of constructs. The model was mainly made up of three parts. The first part was made up of demography (Table 5.2), the second multidimensional (psychological) constructs and the last, psychological factors (Table 4.4 and Table 4.5) that impact the users' choice for the size of MD for m-banking continuance intentions. The third part was the point of departure, where respondents were asked to choose between SD (Table 4.6 and Table 4.7) or BD (Table 4.8 - 4.9) as their preferred device for banking. The hierarchical modelling constructs were used to assess the model, as they allowed for more theoretical parsimony and reduced model complexity. They also allowed matching the level of abstraction for predictor variables in conceptual models (Becker *et al.*, 2012).

DESCRIPTIVE STATISTICS

Table 5.2 gives a summary of the descriptive statistics of participants in the current study. 1 262 valid responses were received, of which 56 percent were from males. With the exception of 34

percent of respondents, who indicated that they have no formal education, all the participants were educated with 2 percent mentioning that they have PhD degrees. A reasonable percentage of 36 have associate degrees. Most of the respondents (42 percent) fall within the ages between 36 and 45, followed by that of the 26 to 35-year age group (30 percent). This revelation supports a recent study by the Pew Research Centre (2015), which notes that there has been a drastic change in technological usage patterns amongst senior adults as compared to some years ago. The study notes that there continues to be a 69-point bulge amongst the age group between 30 and 49 to 77 percent today from 8 percent in 2005. This group is the working class, spending between 0-15 minutes per week on m-banking (65 percent).

However, this study showed that, only 2 percent of participants were of the age 65 and above. A conversation with a few such older people gave a hint as to why they prefer going to the banking premises to m-banking, as they normally add zeros to intended figures when filling in figures at banks, the question arose of “how much more if these were done with MD”? Another reason could be that, in South Africa, the elderly, pregnant women and the sick or physically challenged are given preferential treatment in banks over able-bodied men and women. Such individuals will obviously prefer going to banking halls when they perceive m-banking to be more risky or not trustworthy. Despite the above, 88 percent of participants prefer m-banking because of its convenience.

Table 5.2: Descriptive statistics of demographic variables

Variables	Characteristics	Small Device (SD)	Big Device (DB)	Pooled samples
Gender	Male	327 (54%)	382 (58%)	79 (56%)
	Female	276 (46%)	277 (42%)	277 (44%)
Age	Between 16 and 25	29 (4 %)	8 (1%)	19 (3%)
	Between 26 and 35	162 (27%)	213 (32%)	188 (30%)
	Between 36 and 45	300 (50%)	214 (33%)	257 (42%)
	Between 46 and 55	55 (9%)	126 (19%)	91 (14%)
	Between 56 and 65	51 (9%)	83 (13%)	67 (11%)
	Above 65	6 (1%)	15 (2%)	11 (2%)

Location	Urban	560 (93%)	619 (94%)	590 (94%)
	Rural	17 (3%)	14 (2%)	16 (3%)
	Semi-Rural	26 (4%)	26 (4%)	26 (4%)
My highest Qualification	No degree	36 (6%)	32 (5%)	34 (34%)
	Matric/FET	207 (34%)	179 (27%)	193 (31%)
	Associate degree	200 (33%)	259 (39%)	230 (36%)
	Bachelor degree	78 (13%)	112 (17%)	95 (15%)
	Master's degree	75 (12)	62 (9%)	69 (11%)
	PhD holder	5 (1%)	12 (2%)	9 (2%)
	Post doctorate	2 (0%)	3 (0%)	3 (0%)
My m-banking company	Standard bank	97 (16%)	102 (15%)	100 (16%)
	First national bank	230 (38%)	201 (31%)	216 (35%)
	Ned bank	140 (23%)	177 (27%)	159 (25%)
	ABSA	92 (15%)	143 (22%)	118 (19%)
	Other	34 (6%)	23 (4%)	29 (5%)
My m-banking business experience	Just once	34 (6%)	96 (15%)	65 (11%)
	2-5 times	163 (27%)	215 (33%)	189 (30%)
	6-20 times	300 (50%)	234 (36%)	267 (43%)
	21-50 times	43 (7%)	45 (7%)	44 (7%)
	More than 50 times	63 (11%)	69 (11%)	66 (11%)
Reasons for doing m-banking	Convenience	568 (94%)	541(82%)	555 (88%)
	Product/Service not available offline	1 (0%)	16 (2%)	9 (1%)
	Better prices	7 (1%)	12 (2%)	10 (2%)
	Time-saving	27 (5%)	90 (14%)	59 (10%)
Time spent on m-banking	0-15 minutes	400 (66%)	420 (64%)	410 (65%)
	16-60 minutes	145 (24%)	161(24%)	153 (24%)
	1-3 hours	29 (5%)	70 (11%)	50 (8%)

per week	More than 3 hours	29 (5%)	8 (1%)	19 (3%)
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DATA PREPARATION

As alluded to in Chapter 4, the data were collected online. They were then subjected to a data cleaning process whereby responses with the same IP addresses were removed. The questionnaire, arriving at the latter sections, becomes two different models requiring respondents to indicate their preference for the size of MD they use when doing m-banking. Since the online questionnaire will not allow respondents to proceed unless they have filled in all required fields, it was discovered that they had entered zeroes in places they did not wish to complete. It was found that respondents who had indicated a preference for smaller devices did not complete ten (10) of the questions, as against thirteen (13) for those who preferred bigger devices. Since the total of these two values was far below 10 percent, these were replaced through the column's means procedure without any problem (Kline, 2005). A total of 603 responses were recorded for smaller device preferences, and 659 for bigger device preferences.

DATA NORMALITY

The normality of the SD and BD data was inspected through the indicator analysis. These are provided in Table 5.3 and Table 5.4 respectively. Data means and standard deviations (Std Dev), together with manifest variables' excess kurtosis and skewness are shown in the tables.

Table 5.3: Descriptive statistics for the SD data

Constructs	Question	Mean	Std Dev	Median	Min	Max	Kurtosis	Skewness
Internal influence	IntInflu1	3.549	1.268	4	1	5	-0.484	-0.658
	IntInflu2	3.527	1.226	4	1	5	-0.472	-0.589
	IntInflu3	3.522	1.201	4	1	5	-0.420	-0.588
	IntInflu4	3.640	1.151	4	1	5	-0.091	-0.770
External influence	ExtInflu1	3.647	1.048	4	1	5	0.167	-0.704
	ExtInflu2	3.547	1.071	4	1	5	-0.056	-0.566
	ExtInflu3	3.179	1.179	3	1	5	-0.731	-0.223
	ExtInflu4	3.541	1.041	4	1	5	0.113	-0.612

Overall satisfaction	OvalSat1	4.196	0.915	4	1	5	3.195	-1.621
	OvalSat2	4.202	0.917	4	1	5	2.323	-1.420
	OvalSat3	4.259	0.899	4	1	5	3.552	-1.712
	OvalSat4	4.245	0.928	4	1	5	3.389	-1.716
Interaction quality	IntacQ1	3.932	0.892	4	1	5	1.219	-0.961
	IntacQ2	3.892	0.920	4	1	5	0.724	-0.824
	IntacQ3	3.877	0.947	4	1	5	0.991	-0.962
	IntacQ4	3.799	0.986	4	1	5	0.303	-0.764
Systems quality	SysQ1	4.172	0.788	4	1	5	2.594	-1.214
	SysQ2	4.055	0.867	4	1	5	1.402	-0.994
	SysQ3	4.312	0.816	4	1	5	4.300	-1.713
	SysQ4	4.177	0.862	4	1	5	2.236	-1.300
Information quality	InfoQ1	4.146	0.844	4	1	5	2.582	-1.312
	InfoQ2	4.234	0.794	4	1	5	3.757	-1.500
	InfoQ3	4.235	0.797	4	1	5	3.447	-1.455
	InfoQ4	4.050	0.904	4	1	5	1.171	-1.031
Trust in technology	TrTech1	3.675	0.978	4	1	5	0.163	-0.668
	TrTech2	3.599	1.007	4	1	5	0.045	-0.658
	TrTech3	3.748	0.919	4	1	5	0.840	-0.866
Trust in e-vendor	TrEven1	3.997	0.825	4	1	5	1.751	-0.990
	TrEven2	4.043	0.778	4	1	5	2.151	-1.007
	TrEven3	3.998	0.813	4	1	5	1.847	-0.979
	TrEven4	3.884	0.826	4	1	5	1.442	-0.806
Trust in third party	TrThPt1	3.574	0.824	4	1	5	0.407	-0.246
	TrThPt2	3.509	0.809	3	1	5	0.356	-0.011
	TrThPt3	3.463	0.834	3	1	5	0.477	-0.165
Reasons for small device	SDRes1	4.473	0.689	5	1	5	6.241	-1.883
	SDRes2	4.508	0.663	5	1	5	7.594	-2.038
	SDRes3	4.406	0.749	5	1	5	4.197	-1.655
	SDRes4	3.808	1.097	4	1	5	-0.363	-0.656

	SDRes5	2.088	1.386	1	1	5	-0.390	1.019
M-banking continuance intention	MBCI1	4.252	0.881	4	1	5	2.928	-1.537
	MBCI2	4.169	0.880	4	1	5	0.723	-0.995
	MBCI3	4.370	0.756	4	1	5	3.691	-1.562
Actual Usage	ActUsg1	2.164	0.709	2	1	4	1.837	1.239
	ActUsg2	1.564	0.704	1	1	4	1.900	1.307
	ActUsg3	1.774	0.669	2	1	5	2.954	1.066
	ActUsg4	1.444	0.734	1	1	5	3.450	1.836
	ActUsg5	1.730	0.713	2	1	5	1.943	1.080
	ActUsg6	2.498	0.950	2	1	4	-0.916	0.361

Table 5.4: Descriptive statistics for the BD data

Constructs	Question	Mean	SD	Median	Min	Max	Kurtosis	Skewness
Internal influence	IntInflu1	3.187	1.249	3	1	5	-0.74	-0.320
	IntInflu2	3.086	1.237	3	1	5	-0.776	-0.242
	IntInflu3	3.105	1.213	3	1	5	-0.715	-0.273
	IntInflu4	3.235	1.217	3	1	5	-0.691	-0.417
External influence	ExtInflu1	3.410	1.111	4	1	5	-0.133	-0.78
	ExtInflu2	3.363	1.077	4	1	5	-0.064	-0.731
	ExtInflu3	2.862	1.110	3	1	5	-0.771	-0.199
	ExtInflu4	3.270	1.089	3	1	5	-0.238	-0.544
Overall satisfaction	OvalSat1	3.877	1.053	4	1	5	1.311	-1.245
	OvalSat2	3.748	1.073	4	1	5	0.393	-0.861
	OvalSat3	3.909	1.009	4	1	5	1.749	-1.336
	OvalSat4	3.869	1.020	4	1	5	1.418	-1.217
Interaction quality	IntacQ1	3.730	0.912	4	1	5	0.576	-0.716
	IntacQ2	3.792	0.884	4	1	5	0.927	-0.798
	IntacQ3	3.683	0.922	4	1	5	0.611	-0.761
	IntacQ4	3.514	1.030	4	1	5	-0.130	-0.586
Systems	SysQ1	3.882	0.886	4	1	5	1.43	-1.015

quality	SysQ2	3.707	0.930	4	1	5	0.332	-0.633
	SysQ3	3.992	0.849	4	1	5	2.787	-1.328
	SysQ4	3.825	0.877	4	1	5	1.171	-0.938
Information quality	InfoQ1	3.842	0.847	4	1	5	1.590	-1.004
	InfoQ2	3.968	0.779	4	1	5	2.534	-1.101
	InfoQ3	3.970	0.780	4	1	5	2.425	-1.060
	InfoQ4	3.804	0.857	4	1	5	1.114	-0.846
Trust in technology	TrTech1	3.463	0.985	4	1	5	-0.01	-0.745
	TrTech2	3.413	0.976	4	1	5	0.049	-0.736
	TrTech3	3.621	0.899	4	1	5	0.946	-0.985
Trust in e-vendor	TrEven1	3.942	0.727	4	1	5	1.589	-0.744
	TrEven2	4.003	0.689	4	1	5	2.231	-0.788
	TrEven3	3.954	0.710	4	1	5	0.986	-0.545
	TrEven4	3.675	0.774	4	1	5	1.004	-0.509
Trust in third party	TrThPt1	3.475	0.772	3	1	5	0.717	-0.293
	TrThPt2	3.392	0.741	3	1	5	0.908	0.037
	TrThPt3	3.308	0.808	3	1	5	0.796	-0.236
Reasons for small device	SDRes1	4.205	0.696	4	1	5	1.100	-0.762
	SDRes2	3.856	1.069	4	1	5	0.225	-0.942
	SDRes3	4.020	0.874	4	1	5	0.582	-0.832
	SDRes4	3.794	0.945	4	1	5	0.029	-0.596
	SDRes5	3.710	1.010	4	1	5	-0.206	-0.653
M-banking continuance intention	MBCI1	4.250	0.737	4	1	5	3.050	-1.255
	MBCI2	4.086	0.861	4	1	5	0.663	-0.883
	MBCI3	4.250	0.707	4	1	5	2.165	-0.993
Actual usage	ActUsg1	1.807	0.586	2	1	4	2.668	0.699
	ActUsg2	1.119	0.414	1	1	5	24.066	4.398
	ActUsg3	1.615	0.593	2	1	4	0.363	0.554
	ActUsg4	2.448	1.057	2	1	4	-1.165	0.296

Though non-normal distribution may cast some doubts on the result of a test, Boomsma *et al.* (2001: 14) point out that the theory of normal likelihood only works well under “practical” non-normality. Maximum likelihood solutions are robust to skewness with only small effects on the parameter estimation and standard errors (Jacard and Wan, 1996).

Suffice it to note that the PLS-SEM covariance analysis does not require normally distributed data to perform analysis (Gefen, Straub and Boudreau, 2000; Henseler *et al.*, 2009). This therefore exonerates the result of this study from any doubt. However, since the rule of thumb requires kurtosis and skewness to fall within the range +/- 1.0 (Schumacker and Lomax, 2004), the two dataset statistics are provided for the curious reader in Table 5.3 and Table 5.4. The ratio of 1:15 suggested by research regarding sample size in relation to manifest variables, especially in view of the covariance matrix, again clears this study from any doubt given its sample size of $n = 1262$.

THE THREE-STAGE ANALYSIS

Step 1: Estimation of the model without second-order composite

First-order or lower-level constructs are shown with oval shape on the nomological net with a weighting scheme of “A”, and are reflectively modelled directly to the dependents or endogenous constructs without the second-order construct in the first step of the three-stage approach experiment. The PLS3 algorithm is used to evaluate the model and the results shown below (Figure 5.1 and Figure 5.2).

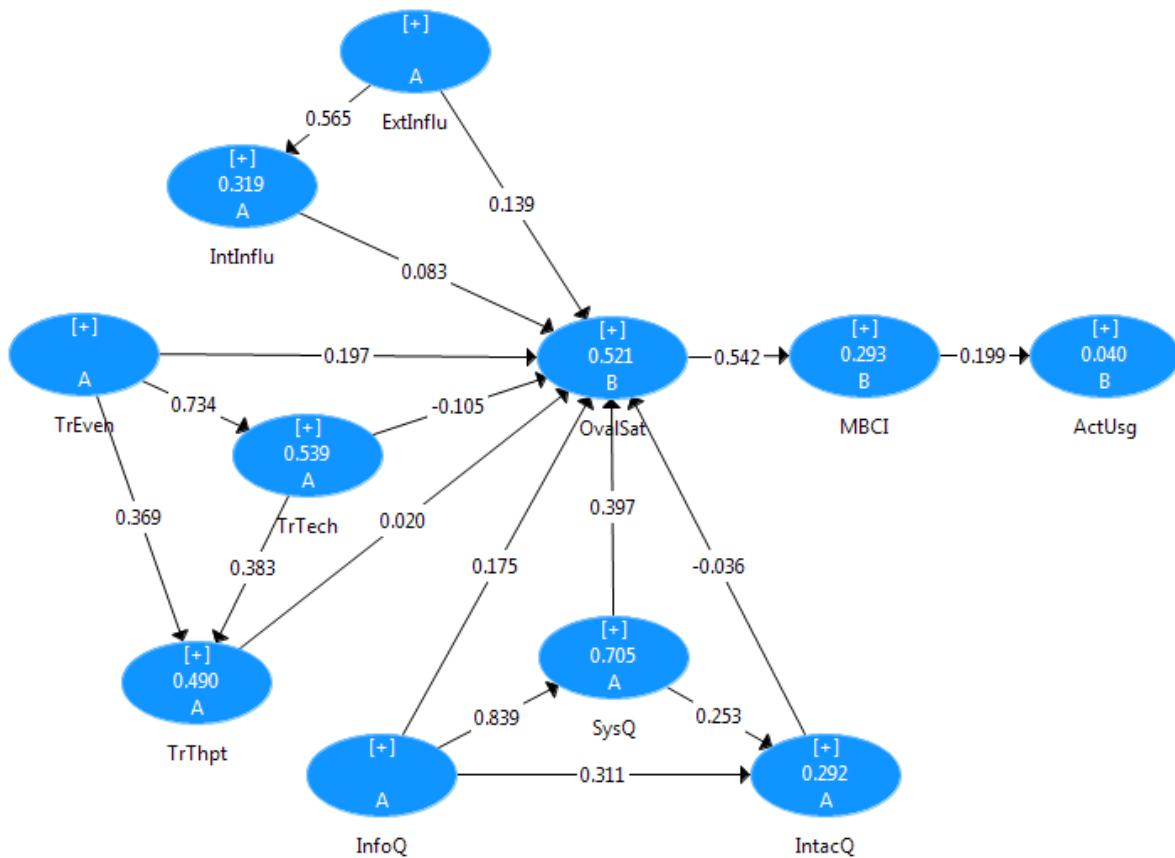


Figure 5.1: Model without second-order composites for SD

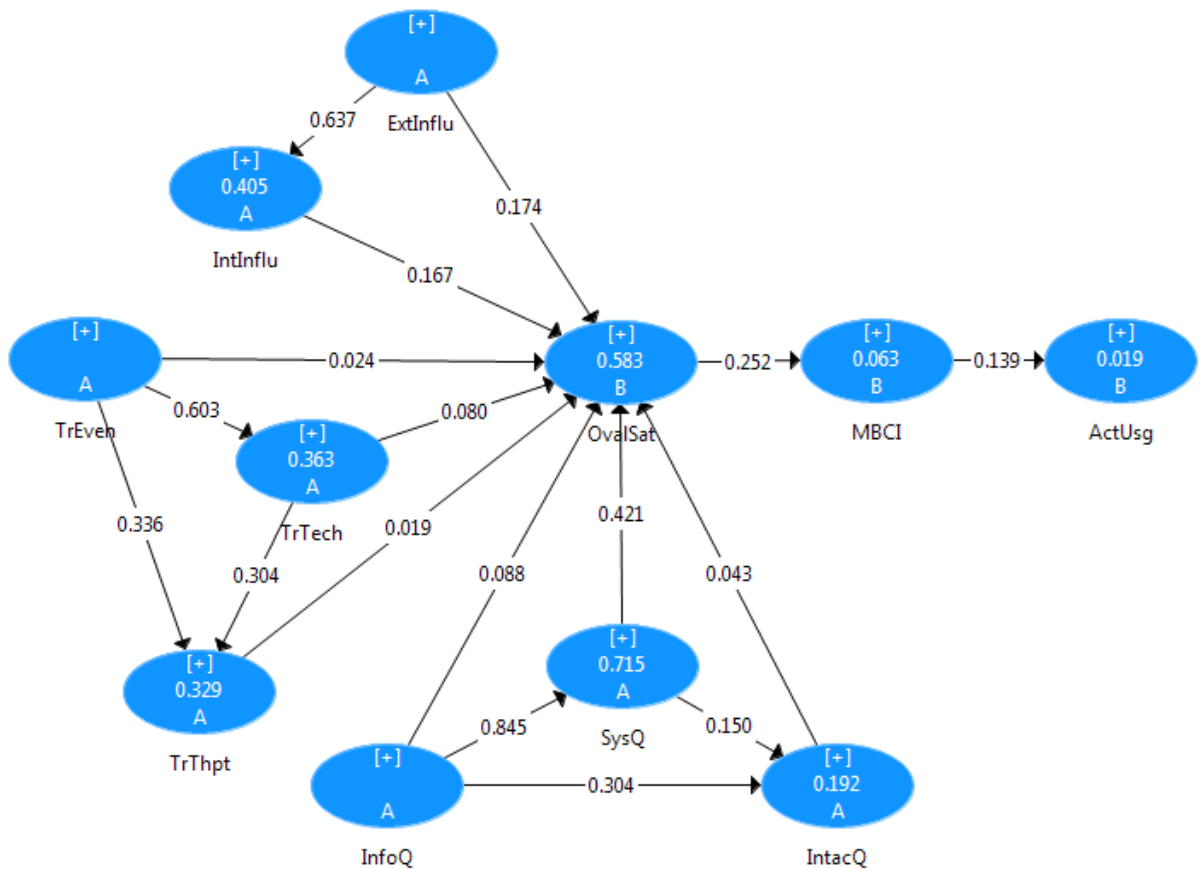


Figure 5.2: Model without second-order composites for BD

Since the model contains the first-order constructs of common factors, modelled with reflective indicators, they were evaluated with the weighting scheme “Mode A”. OvalSat, MBCI and ActUsg were evaluated with the “Mode B” weighting scheme (Van Riel *et al.*, 2017).

From the above results, it is observed that all the first-order constructs in both cases are positively associated with OvalSat and MBCI. However, while satisfaction amongst SD users tends to be ($\beta=0.521$), between these groups of users it is as high as ($\beta=0.583$) amongst BD users. The scenario is nonetheless reversed when it comes to MBCI. The SD users show good intention of ($\beta=0.293$) as against that of the BD users at ($\beta=0.063$). The former scenario could be explained as being the influence SD users exert on their colleagues, who are in the majority youngsters. SDs, all things being equal, cost less than BDs, which makes them affordable for these youngsters to acquire with the intention of performing m-banking. Once the group norm is to conform for group acceptance, intention to perform m-banking will be guaranteed. However,

both users met the minimum criteria for composite analysis to make the model sensible when the model fit was inspected.

Step 2: Assessment of model fit

Table 5.5: Results of the confirmatory composite analysis for SD and BD

	Overall saturated model fit evaluation		
Difference	SD	BD	Evaluation
SRMR	0.038	0.048	Accepted
d_ULS	1.168	1.549	Accepted
d_G	1.309	1.184	Accepted
Chi-Square	2,924.421	2,594.554	Accepted
NFI	0.808	0.643	Accepted

The model’s fit index refers to the ability of the model to reproduce the data, usually in the variance-covariance matrix. The smaller the model’s parameters, the better the “good fit” (Bollen and Long, 1993). The standardised root mean residual (SRMR) is the standardised difference between the observed covariance and the predicted covariance. A value of zero indicates perfect fit, and even in the case of larger sample sizes such as this study’s, a value less than 0.08 is considered a good fit (Bollen and Long, 1993). Both the Squared Euclidean Distance (d_ULS) and the geodesic distance (d_G) are all less than zero in support of the model.

Chi-square: For models with between 75 and 200 cases, the Chi-square test is a reasonable measure. However, the Chi-square test is affected by the size of the correlations in the model, whereby the larger the correlation the poorer the fit. The cases in the current study are over 500 for both sets of data, hence the values witnessed in the tables. The normed fit index (NFI) defines the null model as a model in which all of the correlations or covariance are zero. A value between 0.90 and 0.95 is acceptable, and above 0.95 is good. NFI values below 0.80 indicate a need to re-specify the model. However, this could be affected by a small sample size (Ullman, 2001). Since the model’s fit of SRMR, d_ULS and d_G (the most critical ones) are all within the acceptable range, the model should be considered a good fit for the data obtained (Benitez-Amado *et al.*, 2017).

Step 3: Extraction of construct scores

(The measurement model)

An exploratory analysis, having been undertaken from the extant literature to identify constructs and theories for this study, the current study is henceforth interested in confirming these factors to present additional knowledge. The SmartPLS3 software provides the ability to confirm these selected constructs to highlight undisclosed areas of knowledge, thus CFA with the software was more appropriately performed.

Since the current study uses hierarchical modelling techniques, whereby values of the lower levels form proxies for values on each higher level, and are defined by these lower levels, the hierarchical structure can be tested using CFA (Cieciuch, Davidov and Vecchione, 2015: 179).

For instance, Schwartz *et al.* (2012) tested a second-order model using CFA in which 19 values in the refined theory of basic human values were grouped into the original 10 values. This study, based on the CFA values and various recommendations, dropped some items from further analysis. This is because they failed to meet the minimum cut-off points.

To assess reliability and validity, the CFA helped to establish whether the widely accepted criteria were met in the current study. Reliability is the extent, to which factors measured with a multiple item scale reflect the true scores on the factors relative to the error (Hulland, 1999; Aibinu and Al-Lawati, 2010). This was measured by the estimate of (i) internal consistency through Cronbach's alpha (α) (Cronbach, 1951) as follows:

$$\alpha = \frac{N - \bar{r}}{1 + (N - 1) - \bar{r}} \dots\dots\dots (1)$$

The composite reliability (CR) offered a more retrospective approach of the overall reliability measure of a factor in the measurement model and estimated consistency of the factor itself for stability and equivalence (Roca *et al.*, 2009; Suki, 2011). The CR estimated also represented correlations between the item and the factor (Henseler *et al.*, 2009) and it was computed as follows:

$$CR = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum (1 - \lambda_i^2)} \dots\dots\dots (2)$$

However, the model validity indicates whether a measuring instrument measures what it was supposed to measure (Raykov, 2011). The validity was measured by the estimate of convergent validity and discriminate validity. Convergent validity shows the extent to which items of a specific factor represent the same factor, and is measured using standardised factor loading, which should be above 0.5 (Fornell and Larcker, 1981). As its evident from Table 5.6, all items exhibited loadings higher than 0.5 on their respective factors, with the highlighted items in table 5.7 (0.592^{**}) being the least. This provides evidence of acceptable convergence validity.

Table 5.6: Construct scores, Cronbach's (α), rho_A, CR and AVE for SD

	Loadings	Weight	VIF	Cronbach's Alpha (α)	rho_A	CR	AVE
Internal influence				0.933	0.935	0.953	0.834
IntInflu1	0.878 ^{***}	0.253 ^{***}	2.947				
IntInflu2	0.941 ^{***}	0.277 ^{***}	5.456				
IntInflu3	0.938 ^{***}	0.281 ^{***}	5.218				
IntInflu4	0.894 ^{***}	0.283 ^{***}	3.026				
External influence				0.863	0.873	0.906	0.708
ExtInflu1	0.861 ^{***}	0.325 ^{***}	2.400				
ExtInflu2	0.887 ^{***}	0.330 ^{***}	2.694				
ExtInflu3	0.824 ^{***}	0.251 ^{***}	2.103				
ExtInflu4	0.791 ^{***}	0.279 ^{***}	1.827				
Trust in technology				0.916	0.917	0.947	0.857
TrTec1	0.914 ^{***}	0.349 ^{***}	3.011				
TrTec2	0.943 ^{***}	0.368 ^{***}	3.982				
TrTec3	0.920 ^{***}	0.362 ^{***}	3.140				
Trust in e-vendor				0.941	0.941	0.958	0.850
TrEve1	0.939 ^{***}	0.277 ^{***}	5.611				
TrEve2	0.940 ^{***}	0.260 ^{***}	5.707				
TrEve3	0.954 ^{***}	0.279 ^{***}	6.676				
TrEve4	0.852 ^{***}	0.268 ^{***}	2.293				

Trust in third party				0.939	0.939	0.961	0.891
TrTpt1	0.934 ^{***}	0.355 ^{***}	3.852				
TrTpt2	0.961 ^{***}	0.352 ^{***}	5.869				
TrTpt3	0.937 ^{***}	0.353 ^{***}	4.164				
Interaction quality				0.929	0.930	0.950	0.825
IntaQ1	0.905 ^{***}	0.287 ^{***}	3.111				
IntaQ2	0.904 ^{***}	0.275 ^{***}	3.154				
IntaQ3	0.921 ^{***}	0.276 ^{***}	3.785				
IntaQ4	0.904 ^{***}	0.263 ^{***}	3.324				
System quality				0.891	0.898	0.925	0.755
SysQ1	0.840 ^{***}	0.267 ^{***}	2.171				
SysQ2	0.826 ^{***}	0.264 ^{***}	2.053				
SysQ3	0.907 ^{***}	0.309 ^{***}	3.673				
SysQ4	0.901 ^{***}	0.308 ^{***}	3.550				
Information quality				0.940	0.941	0.957	0.847
InfoQ1	0.911 ^{***}	0.287 ^{***}	3.398				
InfoQ2	0.938 ^{***}	0.273 ^{***}	6.087				
InfoQ3	0.938 ^{***}	0.270 ^{***}	6.072				
InfoQ4	0.894 ^{***}	0.256 ^{***}	3.152				
Overall satisfaction				0.945	1.249	0.956	0.845
OvalSat1	0.840 ^{***}	0.175 ^{ns}	2.679				
OvalSat2	0.826 ^{***}	0.525 ^{***}	3.858				
OvalSat3	0.907 ^{***}	0.307 ^{***}	8.238				
OvalSat4	0.901 ^{***}	0.065 ^{ns}	9.240				
M-banking continuous intention				0.844	0.987	0.899	0.750
MBCI1	0.766 ^{***}	0.184 ^{ns}	1.834				
MBCI2	0.882 ^{***}	0.396 ^{***}	2.063				
MBCI3	0.940 ^{***}	0.542 ^{***}	2.419				
Actual Usage				0.655	0.656	0.812	0.590

ActUsg1	0.756***	0.484***	1.173				
ActUsg3	0.754***	0.379***	1.379				
ActUsg5	0.793***	0.439***	1.396				

*The values of CR and Cronbach's alpha are above 0.7, indicating that the factors have good reliability (Fornell and Larcker, 1981; Henseler *et al.*, 2009; Bagozzi and Yi, 2012). ^{ns} (non-significant) weights were not deleted to keep content and face validity of the concerned constructs (Benitez-Amado, Henseler and Castillo, 2017).

Table 5.7: Construct scores, Cronbach's a, rho_A, CR and AVE for BD

	Outer loadings	Weight	VIF	Cronbach's Alpha (α)	rho_A	CR	AVE
Internal influence				0.941	0.943	0.958	0.850
Influ1	0.859***	0.262***	3.006				
Influ2	0.867***	0.263***	6.364				
Influ3	0.865***	0.264***	6.749				
Influ4	0.971***	0.297***	3.037				
External influence				0.876	0.877	0.915	0.729
ExtInflu1	0.838***	0.311***	2.160				
ExtInflu2	0.783***	0.289***	2.435				
ExtInflu3	0.780***	0.280***	2.084				
ExtInflu4	0.794***	0.291***	2.124				
Trust in technology				0.910	0.913	0.944	0.848
TrTec1	0.838***	0.343***	3.240				
TrTec2	0.877***	0.359***	3.900				
TrTec3	0.919***	0.384***	2.646				
Trust in e-vendor				0.882	0.880	0.920	0.743
TrEve1	0.738***	0.288***	3.204				
TrEve2	0.766***	0.273***	4.285				
TrEve3	0.764***	0.290***	4.647				
TrEve4	0.912***	0.319***	1.376				
Trust in third party				0.889	0.902	0.932	0.820
TrTpt1	0.732***	0.329***	2.072				

TrTpt2	0.852 ^{***}	0.364 ^{***}	4.033				
TrTpt3	0.979 ^{***}	0.410 ^{***}	3.307				
Interaction quality				0.926	0.930	0.947	0.817
IntaQ1	0.930 ^{***}	0.283 ^{***}	2.926				
IntaQ2	0.929 ^{***}	0.274 ^{***}	3.163				
IntaQ3	0.818 ^{***}	0.271 ^{***}	3.999				
IntaQ4	0.791 ^{***}	0.269 ^{***}	3.296				
System quality				0.904	0.906	0.933	0.776
SysQ1	0.849 ^{***}	0.283 ^{***}	2.254				
SysQ2	0.795 ^{***}	0.264 ^{***}	2.318				
SysQ3	0.876 ^{***}	0.301 ^{***}	3.642				
SysQ4	0.830 ^{***}	0.287 ^{***}	3.109				
Information quality				0.932	0.932	0.952	0.831
InfoQ1	0.916 ^{***}	0.283 ^{***}	3.447				
InfoQ2	0.889 ^{***}	0.274 ^{***}	4.365				
InfoQ3	0.977 ^{***}	0.271 ^{***}	3.803				
InfoQ4	0.859 ^{***}	0.269 ^{***}	3.136				
Overall satisfaction				0.964	1.018	0.969	0.886
OvalSat1	0.860 ^{***}	-0.015	4.236				
OvalSat2	0.943 ^{***}	0.273 ^{***}	5.730				
OvalSat3	0.966 ^{***}	0.449 ^{***}	9.287				
OvalSat4	0.961 ^{***}	0.326 ^{***}	10.318				
M-banking continuous intention				1.000	1.000	1.000	1.000
MBCI1	1.001 ^{***}						
MBCI2	0.592^{**}	1.000 ^{***}	1.000				
MBCI3	0.756 ^{***}						
Actual Usage				1.000	1.000	1.000	1.000
ActUsg3	1.000 ^{***}	1.000 ^{***}	1.000				

*The values of CR and Cronbach's alpha are above 0.7, indicating that the factors have good reliability (Fornell and Larcker, 1981; Henseler *et al.*, 2009; Bagozzi and Yi, 2012).

Since the model in Step 1 of the study is combined with the “Mode B” formative, multicollinearity and weights should be assessed (Cenfetelli and Bassellier, 2009; Benitez-Amado and Ray, 2012). Multicollinearity is the determination used to assess if there are unnecessary repetitions of items amongst constructs measures. It is assessed by examining the variance inflation factor (VIF) values. VIF values greater than 10 indicate multicollinearity and are a source of grave concern for any study. As observed from the above results, Table 5.7 results of OvalSat (red) exhibited slightly higher values. Nonetheless, only OvalSat4 crossed the cut-off point of 10. Thus, multicollinearity is not a problem among the constructs, and as such in the current study could be ruled out as being problematic (Cenfetelli and Bassellier, 2009; Benitez-Amado and Ray, 2012).

Weights, on the other hand, measure the relative contribution of an indicator to its construct where composite constructs are involved. The indicator weights are supposed to be significant. However, where this is not possible, those that are insignificant can still be kept to maintain the content validity of the particular constructs, for the sake of conceptualisation and understanding of the concept (Benitez-Amado and Ray, 2012; Becker *et al.*, 2012).

Step 4: Record reliability indices and produce consistent correlation matrix

Average variance extracted (AVE) is the most accepted measure of convergent validity for factor models. AVE greater than 0.500 means that reflective constructs are unidimensional (Fornell and Larcker, 1981). Factor loadings should be greater than 0.707 and are significant at 95 percent.

Discriminate validity is used to test the reliability of measures, and it is the extent to which a given construct is truly distinct from other constructs (Suki, 2011). A commonly used statistical measure of discriminant validity is a comparison of the AVE with the correlated squared root (Fornell and Larcker, 1981). In order to pass the test of discriminant validity, the AVE of a construct must be greater than the square root of the inter-factor correlations (Fornell and Larcker, 1981). This is calculated as below (Henseler *et al.*, 2009) and the results displayed in Table 5.8 and Table 5.9.

$$AVE = \frac{\sum \lambda_i^2}{\sum \lambda_i^2 + \sum (1 - \lambda_i^2)} \dots\dots\dots (3)$$

and discriminate validity (r) (Spiegel, 1972):

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 (y_i - \bar{y})^2}} \dots\dots\dots (4)$$

Table 5.8: Fornell and Lareker (1981) criteria for SD

-	ActUsg	Ext Influ	InfoQ	Int Influ	IntacQ	MBCI	Oval Sat	SysQ	Tr Even	Tr Tech	Tr Thpt
ActUsg	0.768										
ExtInflu	0.225	0.842									
InfoQ	0.164	0.320	0.920								
IntInflu	0.200	0.565	0.230	0.913							
IntacQ	0.136	0.246	0.523	0.225	0.908						
MBCI	0.199	0.335	0.556	0.269	0.319	0.866					
OvalSat	0.108	0.385	0.639	0.311	0.369	0.542	0.919				
SysQ	0.155	0.313	0.839	0.240	0.513	0.563	0.675	0.869			
TrEven	0.131	0.278	0.668	0.213	0.433	0.504	0.562	0.684	0.922		
TrTech	0.148	0.334	0.523	0.236	0.340	0.425	0.421	0.563	0.734	0.926	
TrThpt	0.219	0.435	0.493	0.272	0.359	0.408	0.440	0.515	0.650	0.654	0.944

Note: Values in a bold along the diagonal is the square root of AVE for each factor.

Table 5.9: Fornell and Larcker (1981) criteria for BD

	ActUsg	Ext Influ	InfoQ	Int Influ	IntacQ	MBCI	Oval Sat	SysQ	Tr Even	Tr Tech	Tr Thpt
ActUsg	1.000										
ExtInflu	0.097	0.854									
InfoQ	0.178	0.322	0.912								
IntInflu	0.120	0.637	0.283	0.922							
IntacQ	0.051	0.210	0.431	0.185	0.904						
MBCI	0.139	0.115	0.334	0.063	0.201	1.000					
OvalSat	0.190	0.493	0.623	0.491	0.356	0.252	0.941				

SysQ	0.181	0.353	0.845	0.365	0.407	0.278	0.695	0.881			
TrEven	0.129	0.182	0.531	0.196	0.407	0.305	0.435	0.534	0.862		
TrTech	0.117	0.232	0.464	0.236	0.279	0.185	0.440	0.484	0.603	0.921	
TrThpt	0.053	0.211	0.414	0.193	0.245	0.070	0.380	0.458	0.520	0.507	0.905

Note: Values in a bold along the diagonal is the square root of AVE for each factor.

From the above tables, it is evidenced that all the AVEs (values on the diagonal) are greater than the square root of the inter-factor correlations, thus proving reliability for the measures used in this study.

Recent research providing a more reliable discriminant validity, the Heterotrait-Monotrait (HTMT) ratio, was advanced. This maintains that the scores of discriminant validity should be <0.85 amongst the square root of the inter-factor correlations. From the test results provided in Table 5.10 and Table 5.11, it is again proven by this study that this criterion is met with the exception of the correlation between the SysQ and InfoQ in both Table 5.10 and Table 5.11. It is therefore not in doubt that the factors in the research instrument are truly distinct from each other (Henseler *et al.*, 2016).

Table 5.10: Heterotrait-Monotrait ratio (HTMT) SD

-	ActUsg	Ext Influ	InfoQ	Int Influ	IntaeQ	MBCI	Oval Sat	SysQ	Tr Even	Tr Tech	Tr Thpt
ActUsg											
ExtInflu	0.297										
InfoQ	0.209	0.353									
IntInflu	0.251	0.623	0.246								
IntaeQ	0.168	0.275	0.559	0.242							
MBCI	0.274	0.394	0.612	0.313	0.357						
OvalSat	0.135	0.428	0.667	0.331	0.382	0.589					
SysQ	0.206	0.357	0.912	0.266	0.565	0.638	0.725				
TrEven	0.167	0.306	0.710	0.228	0.464	0.555	0.582	0.746			
TrTech	0.192	0.374	0.563	0.256	0.368	0.480	0.439	0.624	0.790		

TrThpt	0.280	0.483	0.524	0.290	0.384	0.461	0.466	0.563	0.691	0.705	
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Table 5.11: Heterotrait-Monotrait ratio (HTMT) for BD

	ActUsg	Ext Influ	InfoQ	Int Influ	IntacQ	MBCI	Oval Sat	SysQ	Tr Even	Tr Tech	Tr Thpt
ActUsg											
ExtInflu	0.103										
InfoQ	0.184	0.356									
IntInflu	0.124	0.698	0.301								
IntacQ	0.053	0.232	0.461	0.196							
MBCI	0.139	0.121	0.347	0.064	0.207						
OvalSat	0.192	0.535	0.646	0.516	0.370	0.254					
SysQ	0.190	0.396	0.920	0.396	0.444	0.293	0.730				
TrEven	0.135	0.203	0.578	0.211	0.447	0.324	0.451	0.591			
TrTech	0.122	0.259	0.503	0.255	0.304	0.193	0.469	0.533	0.668		
TrThpt	0.056	0.234	0.448	0.206	0.268	0.074	0.402	0.505	0.581	0.558	

Another test that could be followed to determine discriminant validity of the constructs is that of cross-loading. This is evaluated to check that each indicator loading has a greater correlation with its own constructs than that of other constructs. This enables the determination of the appropriate item to its factor (Henseler *et al.*, 2016). The cross-loadings of the current study in Table 5.12 meet the above requirements of indicators having a greater correlation with their own constructs than that of other constructs. The same is observed for the BD in Table 5.13. This provides evidence of content validity, reliability and convergent validity, and discriminant validity for the reflective constructs of this study.

Table 5.12: Discriminant validity based on cross-loadings evaluation for SD

	Act Usg	Ext Influ	InfoQ	Int Influ	IntaQ	MBCI	Oval Sat	SysQ	Tr Even	Tr Tech	Tr Thpt
ActUsg1	0.756										
ActUsg3	0.754										
ActUsg5	0.793										
ExtInflu1		0.861									
ExtInflu2		0.887									
ExtInflu3		0.824									
ExtInflu4		0.791									
InfoQ1			0.911								
InfoQ2			0.938								
InfoQ3			0.938								
InfoQ4			0.894								
IntInflu2				0.941							
IntInflu3				0.938							
IntInflu4				0.894							
IntInflu1				0.878							
IntacQ1					0.905						
IntacQ2					0.904						
IntacQ3					0.921						
IntacQ4					0.904						
MBCI1						0.766					
MBCI2						0.882					
MBCI3						0.940					
OvalSat1							0.847				
OvalSat2							0.962				
OvalSat3							0.934				
OvalSat4							0.930				
SysQ1								0.840			

SysQ2								0.826			
SysQ3								0.907			
SysQ4								0.901			
TrEven1									0.939		
TrEven2									0.940		
TrEven3									0.954		
TrEven4									0.852		
TrTech1										0.914	
TrTech2										0.943	
TrTech3										0.920	
TrThPt1											0.934
TrThPt2											0.961
TrThPt3											0.937

Table 5.13: Discriminant validity based on cross-loadings evaluation for BD

	Act Usg	Ext Influ	InfoQ	Int Influ	IntacQ	MBCI	Oval Sat	SysQ	Tr Even	Tr Tech	Tr Thpt
ActUsg4	1.000										
ExtInflu1		0.855									
ExtInflu2		0.872									
ExtInflu3		0.841									
ExtInflu4		0.847									
InfoQ1			0.911								
InfoQ2			0.926								
InfoQ3			0.911								
InfoQ4			0.898								
IntInflu2				0.942							
IntInflu3				0.947							
IntInflu4				0.904							
IntInflu1				0.893							

IntacQ1					0.898						
IntacQ2					0.907						
IntacQ3					0.919						
IntacQ4					0.891						
MBCI1						1.000					
OvalSat1							0.867				
OvalSat2							0.940				
OvalSat3							0.978				
OvalSat4							0.977				
SysQ1								0.856			
SysQ2								0.856			
SysQ3								0.918			
SysQ4								0.893			
TrEven1									0.880		
TrEven2									0.910		
TrEven3									0.915		
TrEven4									0.730		
TrTech1										0.915	
TrTech2										0.938	
TrTech3										0.909	
TrThPt1											0.850
TrThPt2											0.941
TrThPt3											0.922

Thus far, the measurement model's strength is demonstrated through measures of convergent and discriminant validity (Hair *et al.*, 2011). The convergent validity is assessed using three tests: reliability of the questions; composite reliability of the constructs; and variance extracted by constructs (Fornell and Larcker, 1981). The discriminant validity, as already seen above, is assessed by looking at correlations amongst the questions (Fornell and Larcker, 1981), as well as variances and co-variances amongst the constructs (Igbaria, Badawy and Parasuraman,

1994). Since the instrument is demonstrated to be reliable, the study now moves on to assess the structural model as a rule of thumb for PLS-SEM.

Step 5: Estimate the model without first-order constructs

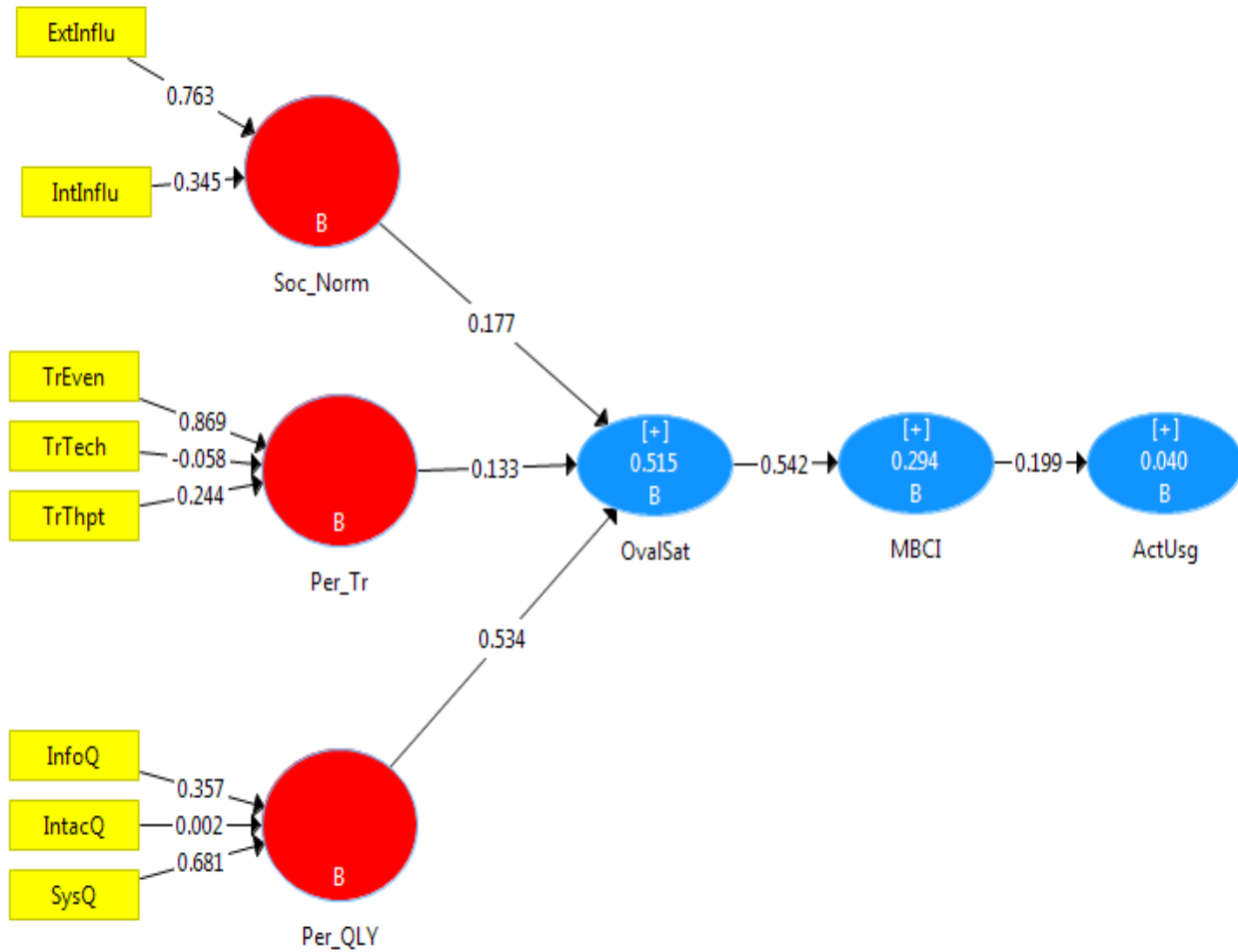


Figure 5.3: Model without first-order constructs for SD

(The MVs of OvalSat, MBCI and ActUsg are hidden for the sake of clarity.)

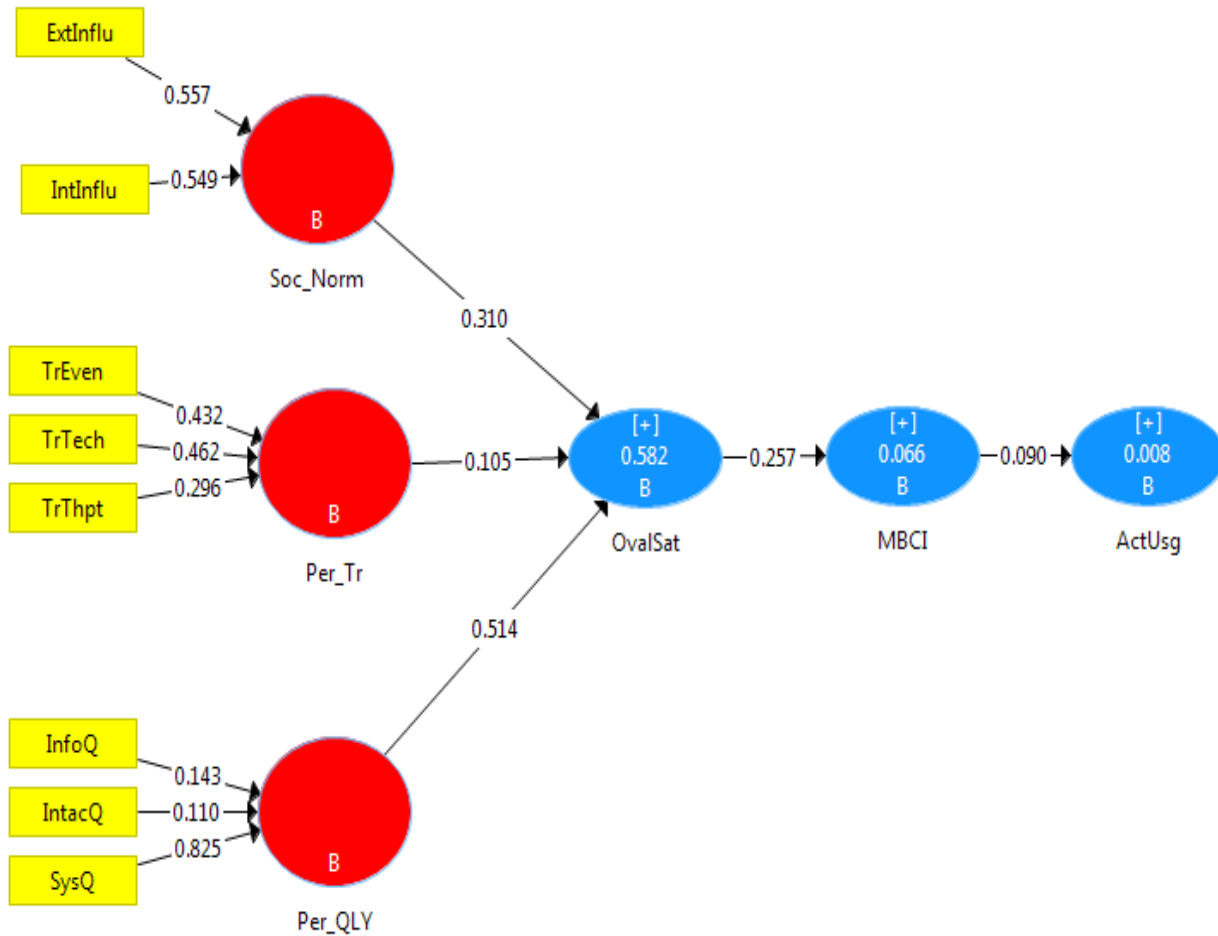


Figure 5.4: Model without first-order constructs for BD

(The MVs of OvalSat, MBCI and ActUsg are hidden for the sake of clarity.)

The research model is made up of fourteen (14) constructs (excluding the control variable). The first eight (8) of these are exogenous constructs and the rest (6) endogenous. The 8 exogenous constructs are all operationalised as first-order constructs which form into three second-order constructs (Soc_Norm, Per_Tr and Per_QLY). The hierarchical multidimensional models are characterised by: (1) the number of levels in the model, which are normally restricted to second-order models (Ringskopf and Rose, 1988), just as in the current study; and (2) the relationship shown as reflective-formative (Wentzel *et al.*, 2009; Ringle *et al.*, 2012; Becker *et al.*, 2012), as in the case of this study.

The theoretical rationale and application of the three-stage approach have been used to evaluate the structural model. In order to test the structural relationship, the hypothesised causal

paths, together with their underlying dimensions were estimated, and the variance (R^2) of each dependent construct shows how well the model fits the data. R^2 shows the variance explained as a dependent construct in the research model, and it is computed as follows (Cornell and Berger, 1987):

$$R^2 = 1 - \frac{\sum (y_i - \bar{y})^2}{\sum (y_i - \bar{y})^2} \dots\dots\dots (5)$$

The scores of these first-order constructs in Step 1 above (with the exception of OvalSat, MBCI and ActUsg) are copied and pasted into the standardised data set for the current Step 5. These become the items for Soc_Norm, Per_Tr and Per_QLY as second-order dimensions. Hence, Soc_Norm has 2 MVs from the two underlying constructs, Perc_Tr (3) and Per_QLY (3). This is then estimated without the underlying first-order constructs.

When the model is specified in this manner, the structural model accounts for the hierarchical components because the path coefficients between the first-order and second-order dimensions stand for the weights of the second-order constructs (Becker *et al.*, 2012). All three of the second-order dimensions are then modelled with a “Mode B” weighting scheme to impact OvalSat, MBCI and ActUsg, as shown in Figure 5.3 and Figure 5.4. OvalSat, MBCI and ActUsg however maintained their old weighting scheme.

The higher or second-order constructs are formative, being a combination of the 8 first-order constructs (IntInflu, ExtInflu, TrTech, TrEven, TrThpt, IntacQ, SysQ, InfoQ) into their general respective concepts (Edwards, 2001; Wentzel *et al.*, 2009), and the rest modelled as reflective to serve as functions of the latent constructs (Edwards, 2001; Wentzel *et al.*, 2009; Hair *et al.*, 2011).

Step 6: Assessment of model fit

Table 5.14: Fit Summary for Step 5 for SD and BD

	Estimated Model	
	SD	BD
SRMR	0.046	0.063
d_ULS	0.357	0.546

d_G	0.334	0.275
Chi-Square	921.740	696.884
NFI	0.268	0.217

This measure of goodness of fit evaluates the discrepancy between the empirical correlation matrix and the model-implied correlation matrix, and as already indicated, the lower the values, the better the fit between the proposed model and the data (Bollen and Long, 1993). Overall, the SRMR value should be lower than 0.080 to accept the fit between the proposed model and the data. The model fit indices at this second stage are again all good, with better fits compared to that of the first stage analysis (Table 5.5). This is a justification for showing the conceptual model of this study as being a hierarchical one.

All the path coefficients of the SD are higher than that of the BD, with the exception of Soc_Norm to OvalSat where SD recorded ($\beta=-0.177$) against ($\beta=0.310$) respectively. The detailed scores are recorded in Table 5.15 and Table 5.16, all with satisfying cut-off points. This justifies the modelling of a second-order in a nomological net of abstraction for this study (Van Riel *et al.*, 2017).

Step 7: Determining the reliability of the Second-Order composite

Table 5.15: Construct reliability and validity of SD

Constructs	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
ActUsg	0.655	0.656	0.812	0.590
MBCI	0.844	0.990	0.899	0.749
OvalSat	0.945	1.294	0.956	0.844
Per_QLY		1.000		
Per_Tr		1.000		
Soc_Norm		1.000		

Table 5.16: Construct reliability and validity of BD

Constructs	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
ActUsg	1.000	1.000	1.000	1.000
MBCI	0.840	-0.705	0.756	0.529
OvalSat	0.964	1.020	0.969	0.885
Per_QLY		1.000		
Per_Tr		1.000		
Soc_Norm		1.000		

The highlighted values failed the test of reliability in both cases. This is the essence of Step 8: to revalue the model again after the necessary adjustment.

Step 8: Re-estimate the model with reliability-adjusted single indicators

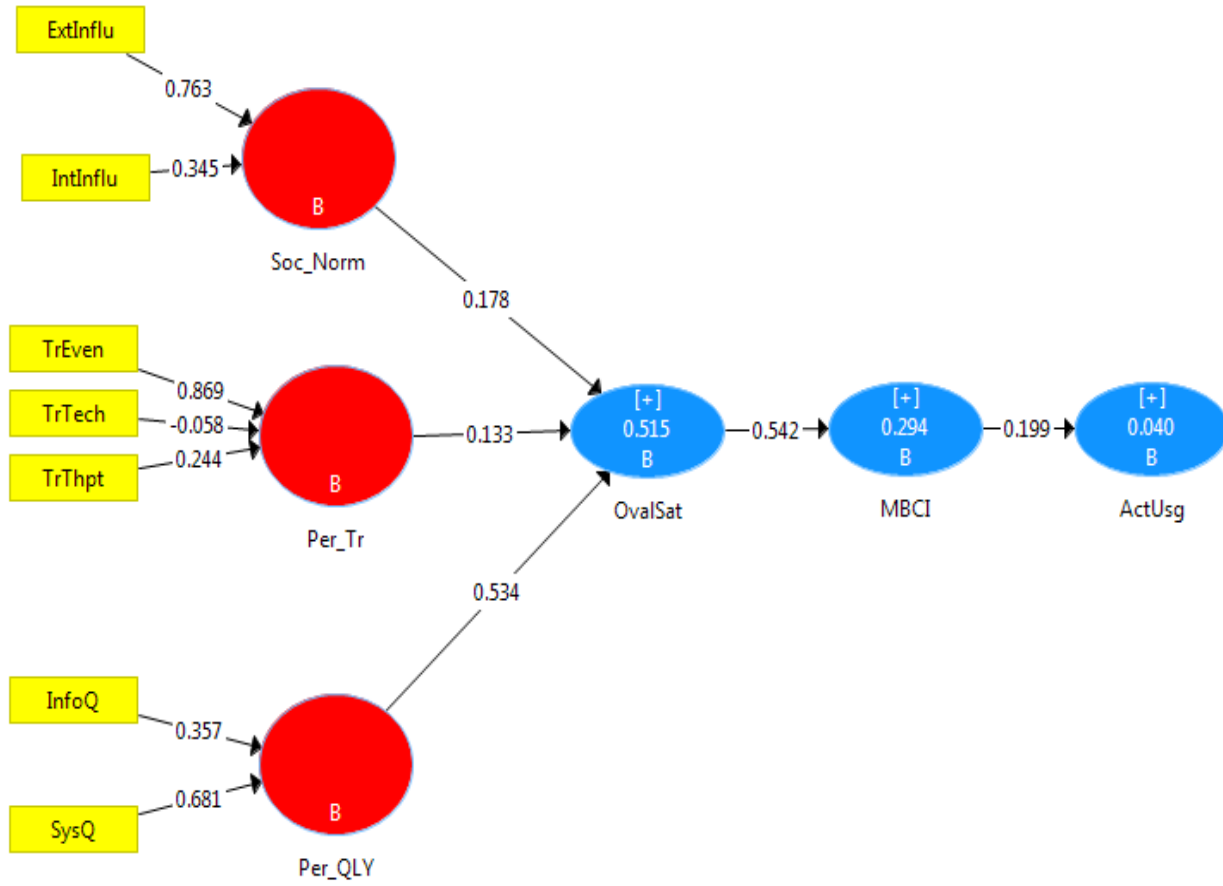


Figure 5.5: Experimental results for SD reliability adjusted single-indicators

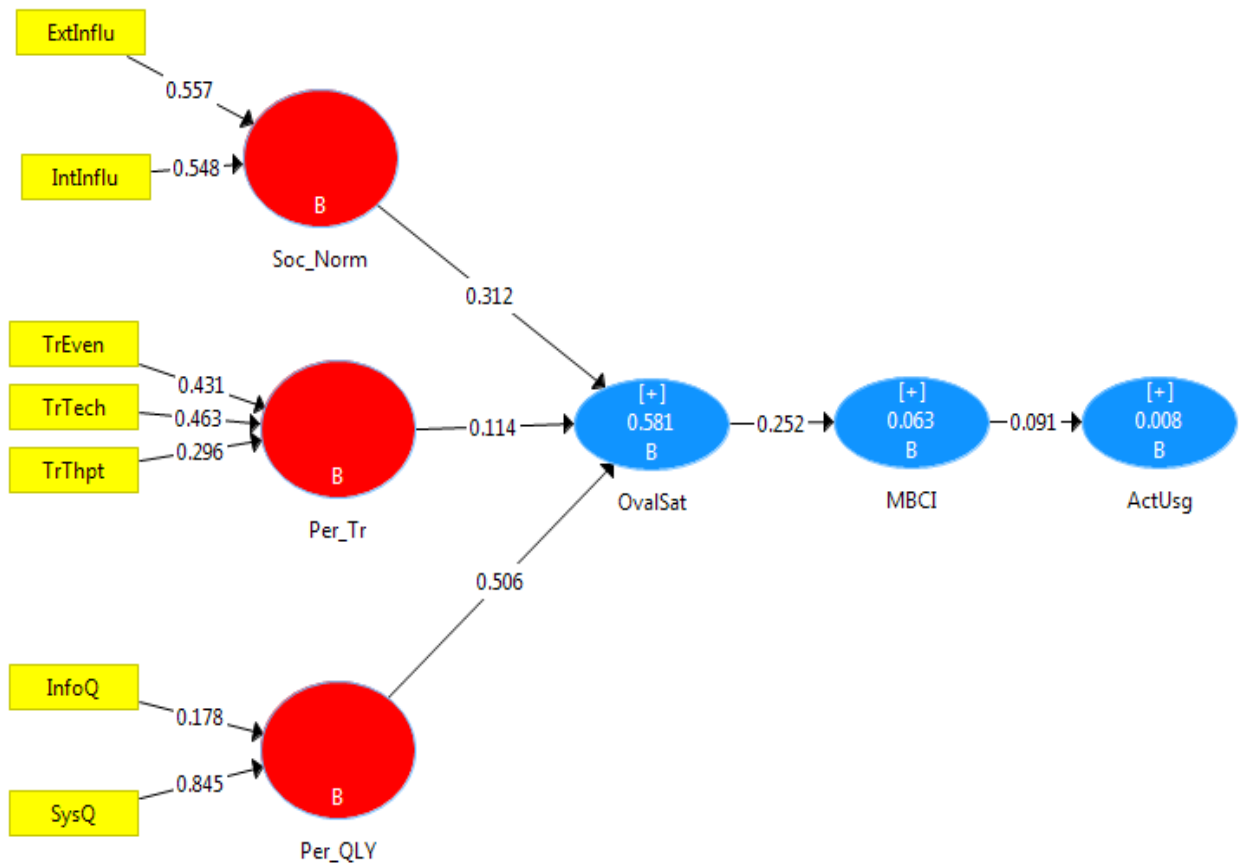


Figure 5.6: Experimental results for BD reliability adjusted single-indicators

As could be seen below, the results tended to be good after re-estimating the models with reliability-adjusted single indicators in both cases. Evidence of this is provided in Table 5.17 and Table 5.18 respectively.

Table 5.17: Construct reliability and validity of SD

Constructs	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
ActUsg	1.000	1.000	1.000	1.000
MBCI	0.844	1.163	0.898	0.747
OvalSat	0.945	1.273	0.955	0.843

Per_QLY		1.000		
Per_Tr		1.000		
Reasons for SD		1.000		
Soc_Norm		1.000		

Table 5.18: Construct reliability and validity of SD

Constructs	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
ActUsg	1.000	1.000	1.000	1.000
MBCI	1.000	1.000	1.000	1.000
OvalSat	0.964	1.002	0.969	0.885
Per_QLY		1.000		
Per_Tr		1.000		
Soc_Norm		1.000		

After this stage, the model is re-estimated with all sub-models, especially control variables, placed together on the nomological net to evaluate their complete effects.

(Controlled analysis)

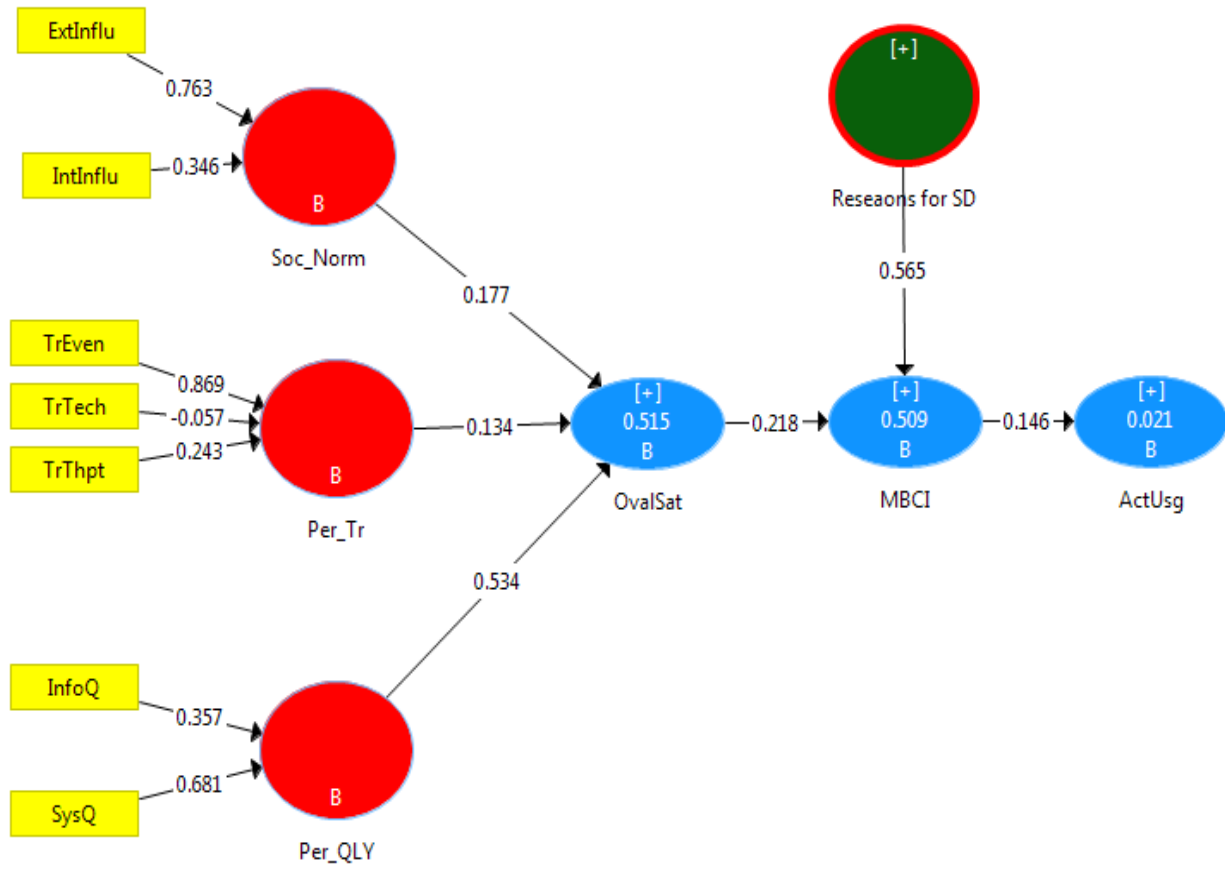


Figure 5.7: Experimental results for SD moderating effect

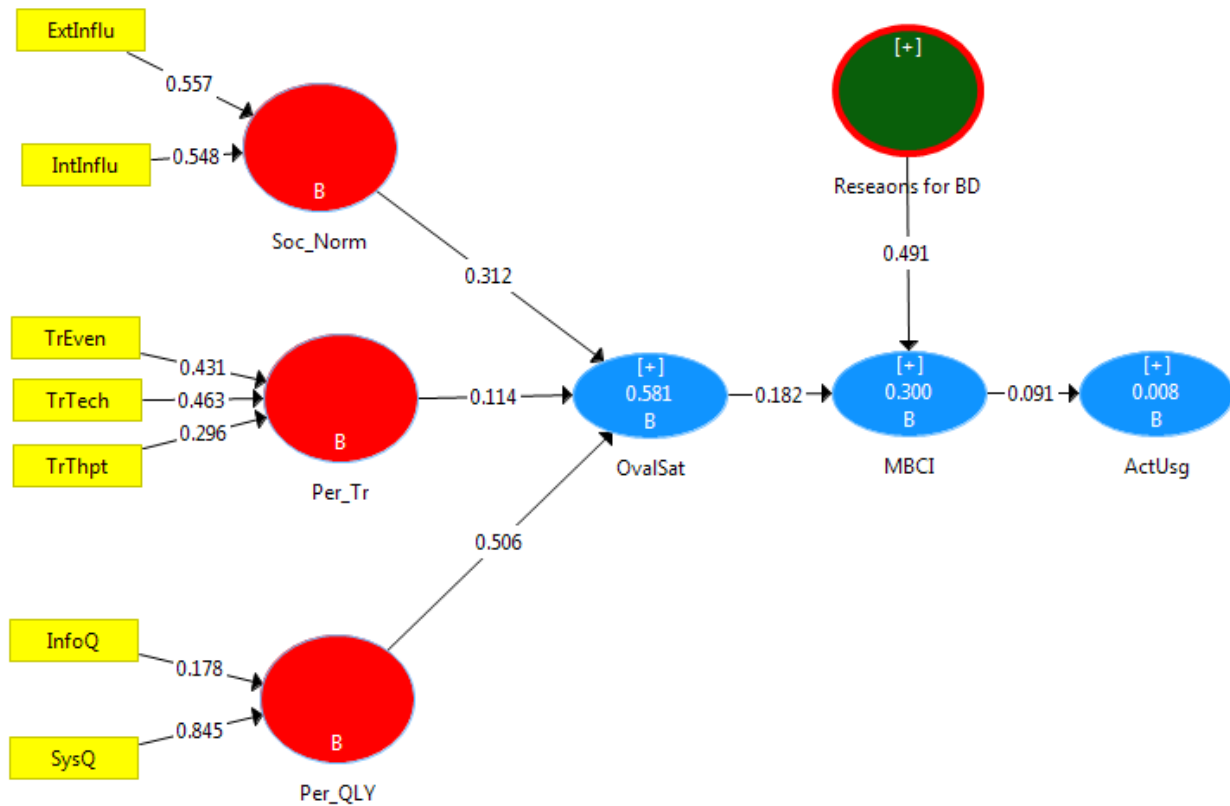


Figure 5.8: Experimental results for BD moderating effect

The control variables are then imposed to assess any moderating outcome. OvalSat together with all the other first-order constructs are reflectively modelled. Their general concepts are manifested by several specific unobserved dimensions (Edwards, 2001; Jarvis *et al.*, 2003; Wentzel *et al.*, 2009; Ringle *et al.*, 2012). All three second-order dimensions are formative because they are created by combinations of their respective first-order constructs and form part of a greater nomological model, thus serving as both antecedent and consequent (Becker *et al.*, 2012).

The model was assessed by inspecting the combined loadings and cross loadings. Though the loadings were above the threshold of 0.7 (Nunnally and Bernstein, 1994), the weights showed some indicators to be below 0.40. These were removed to improve upon the reflective scales (Hair *et al.*, 2011: 146), and also because there was no justification to retain them. Most of them were questions assessing the same second-order variables. Again, the redundancy test was used to justify multicollinearity (Cassel *et al.*, 1999; Diamantopoulos and Winklhofer, 2001;

Grewal *et al.*, 2004). The degree of multicollinearity was also very low within the threshold of 5 (Kock, 2010; Hair *et al.*, 2011).

Reasons for users preferring one size device over the other were controlled on the research experiment. As seen from Figure 5.7 and Figure 5.8, the reason for SD increased the variance explained of the MBCI from 0.294 to 0.509 amongst the SD users, and from 0.063 to 0.300 in the case of BD users when modelled formatively. The underlying concept is that users using SD to perform m-banking may show changes which easily reflect in their manifest variables, while changes in users of BD can be gauged out by practitioners through manifest variables which measure different aspects of the device. The results shown in Figure 5.7 and Figure 5.8 appear so after the low loadings of reasons 2, 3, 4 and 6 were removed from the moderating variable in SD and 2, 4 and 5 from the BD control variable.

Step 9: Obtain consistent path coefficients and confidence intervals

The values for this Step (9) were obtained from the Step 8 experiment.

Table 5.19: Structural model evaluation SD

Relationship	Beta coefficient
Social_Norm → Overall Satisfaction (H1)	0.177 ^{***} (4.263) [0.100, 0.256] Supported
Perceived_Trust → Overall Satisfaction (H2)	0.134 ^{***} (2.923) [0.053, 0.220] Supported
Perceived_Quality → Overall Satisfaction (H3)	0.534 ^{***} (11.007) [0.442, 0.627] Supported
Overall Satisfaction → Mobile Banking Continuous Intention (H4)	0.218 ^{***} (4.416)

	[0.128, 0.314]	Supported
Mobile Banking Continuous Intention → Actual Usage (H5)	0.146 ^{***} (3.452) [0.064, 0.228]	Supported
Reasons for Small Device → Mobile Banking Continuous Intention (control variable)	0.565 ^{***} (10.613) [0.460, 0.666]	
Endogenous variable	R²	Adjusted R²
Oval all Satisfaction	0.515	0.513
Mobile Banking Continuous Intention	0.509	0.507
Actual Usage	0.021	0.020
SRMR value	0.051	
d_{ULS} value	0.448	
d_G value	0.314	
Chi-Square value	775.206	
NFI value	0.912	
f²		
Social_Norm → Overall Satisfaction (H1)	0.056	
Perceived_Trust → Overall Satisfaction (H2)	0.018	
Perceived_Quality → Overall Satisfaction (H3)	0.288	
Overall Satisfaction → Mobile Banking Continuous Intention (H4)	0.065	
Mobile Banking Continuous Intention → Actual Usage (H5)	0.022	
Reasons for Small Device → Mobile Banking Continuous Intention (control variable)	0.435	

Note: ^{ns} (not significant), *p<0.05, **p<0.01, ***p<0.001 (two tailed t tests)

Note: t values are presented in parentheses. Confidence intervals are presented in brackets.

Table 5.20: Empirical Correlation Matrix-SD

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1.																
2	.323	1.															
3	.340	.498	1.														
4	.172	.150	.194	1.													
5	.141	.126	.109	.320	1.												
6	.175	.120	.158	.565	.230	1.											
7	.128	.133	.119	.281	.431	.239	1.										
8	.163	.160	.179	.313	.436	.265	.574	1.									
9	.116	.115	.121	.293	.560	.222	.655	.701	1.								
10	.066	.039	.084	.386	.536	.267	.348	.394	.413	1.							
11	.061	.066	.117	.353	.615	.290	.401	.453	.512	.737	1.						
12	.074	.058	.096	.359	.602	.305	.376	.412	.484	.765	.823	1.					
13	.082	.059	.105	.347	.583	.291	.367	.447	.504	.765	.847	.933	1.				
14	.109	.130	.120	.313	.839	.240	.451	.425	.574	.556	.646	.642	.632	1.			
15	.100	.096	.107	.278	.668	.213	.389	.397	.508	.487	.544	.520	.482	.684	1.		
16	.108	.127	.108	.334	.523	.236	.343	.344	.417	.336	.410	.402	.368	.563	.734	1.	
17	.157	.174	.176	.435	.493	.272	.346	.346	.383	.390	.413	.419	.407	.515	.650	.654	1.

1. ActUsg1, 2. ActUsg3, 3. ActUsg5, 4. ExtInflu, 5. InfoQ, 6. IntInflu, 7. MBCI1, 8. MBCI2, 9. MBCI3, 10. OvalSat1, 11. OvalSat2, 12. OvalSat3, 13. OvalSat4, 14. SysQ, 15. TrEven, 16. TrTech, 17. TrThpt

Table 5.21: Structural model evaluation BD

Relationship	Beta coefficient
Social_Norm → Overall Satisfaction (H1)	0.312 ^{***} (7.162) [0.229, 0.404] Supported
Perceived_Trust → Overall Satisfaction (H2)	0.114 ^{***} (3.133)

	[0.048, 0.188]	Supported
Perceived_Quality → Overall Satisfaction (H3)	0.506*** (10.976) [0.412, 0.584]	Supported
Overall Satisfaction → Mobile Banking Continuous Intention (H4)	0.182*** (4.419) [0.106, 0.265]	Supported
Mobile Banking Continuous Intention → Actual Usage (H5)	0.091*** (2.385) [0.016, 0.165]	Supported
Reasons for Small Device → Mobile Banking Continuous Intention (control variable)	0.491*** (12.927) [0.416, 0.564]	
Endogenous variable	R²	Adjusted R²
Oval all Satisfaction	0.581	0.579
Mobile Banking Continuous Intention	0.300	0.298
Actual Usage	0.008	0.007
SRMR value	0.040	
d_{ULS} value	0.189	
d_G value	0.143	
Chi-Square value	361.011	
NFI value	0.946	
f²		
Social_Norm → Overall Satisfaction (H1)	0.196	
Perceived_Trust → Overall Satisfaction (H2)	0.020	

Perceived_Quality → Overall Satisfaction (H3)	0.357
Overall Satisfaction → Mobile Banking Continuous Intention (H4)	0.046
Mobile Banking Continuous Intention → Actual Usage (H5)	0.008
Reasons for Small Device → Mobile Banking Continuous Intention (control variable)	0.338

Note: ^{ns} (not significant), *p<0.05, **p<0.01, ***p<0.001 (two-tailed t-tests)

Note: t-values are presented in parentheses. Confidence intervals are presented in brackets.

Table 5.22: Empirical Correlation Matrix-BD

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	1.														
2.	.108	1.													
3.	.117	.440	1.												
4.	.108	.100	.139	1.											
5.	.075	.203	.148	.322	1.										
6.	.151	.091	.142	.637	.283	1.									
7.	.091	.444	.433	.115	.334	.063	1.								
8.	.089	.132	.042	.441	.530	.440	.220	1.							
9.	.092	.142	.099	.484	.576	.510	.220	.840	1.						
10.	.091	.148	.066	.477	.613	.462	.245	.848	.868	1.					
11.	.083	.161	.083	.471	.611	.465	.262	.837	.891	.937	1.				
12.	.081	.189	.115	.353	.845	.365	.278	.590	.641	.686	.679	1.			
13.	.062	.297	.154	.182	.531	.196	.305	.354	.393	.438	.420	.534	1.		
14.	.030	.201	.122	.232	.464	.236	.185	.407	.391	.442	.432	.484	.603	1.	
15.	.008	.172	.108	.211	.414	.193	.070	.326	.366	.367	.370	.458	.520	.507	1.

1. ActUsq1, 2. BDRes1, 3. BDRes3, 4. ExtInflu, 5. InfoQ, 6. IntInflu, 7. MBCI1, 8. OvalSat1, 9. OvalSat2, 10. OvalSat, 11. OvalSat4, 12. SysQ, 13. TrEven, 14. TrTech, 15. TrThpt

~~The results of the path coefficients, together with their statistical significance, determine whether a particular hypothesis is supported or not. This is determined with the bootstrapping techniques of the PLS analytical tools which also show the t-values for the bootstrapped test.~~

Each hypothesis (H1 to H5) corresponded to a path in the structural model (Figure 3.2), whereby support for each hypothesis could be determined by examining the β values and statistical significance of the t-value for its corresponding path (Table 5.19 and Table 5.21). With a significance level of 0.01, the acceptable t-value should be greater than 2.0 (Keil *et al.*, 2000) for the hypothesis to be supported. All the results outlined in Table 5.19 and Table 5.21 exhibit t-values greater than the 2.0 cut off point to support the hypothesised paths.

For instance, the study's first hypothesis (H1) was that, social norm positively influences m-banking users' overall satisfaction towards continuance intention. Looking at Tables 5.19 and 5.21, the result recorded for these paths are ($\beta=0.177^{***}$, $t=4.263$) and ($\beta=0.312^{***}$, $t=7.162$) for SD and BD respectively. These therefore causes H1 for both devices to be supported at a 10 percent significance level meaning, and social norm influences overall satisfaction from using m-banking at this level (10 percent). Whether these supports are derived from the underlying internal or external dimensions can be seen from the important performance map analysis (IPMA) (Figure 6.1 and Figure 6.2) in the next chapter.

The last hypothesis (H5), users' MBCI positively influences their m banking actual usage, comes with surprising results, as the outcome for SD ($\beta=0.146^{***}$, $t=3.452$) proved to be significant for both SD and BD ($\beta=0.091^{***}$, $t=2.385$). Thus, from these results, one could say that intention might be positively influenced by the device characteristics used to moderate this intention. The study identified the reasons for choosing a SD or a BD for m banking as a control variable. This again revealed a surprising outcome, as it recorded a significant increase in the influence it wielded on the two kinds of users. The results recorded were ($\beta=0.565^{***}$, $t=10.613$) for SD and ($\beta=0.491^{***}$, $t=12.927$) for BD.

Direct (Total) effect sizes (f^2)

The effect of each of the predictive factors of the dependent factors is derived by computing the R^2 values for independent factors, when each factor is excluded $R^2(e)$ and included $R^2(i)$ to test for its significance. The effect size f^2 is calculated thus (Helm, Eggert and Garnefeld, 2010) and also shown as the last segments in Table 5.19 and Table 5.21.

$$f^2 = \frac{R^2(i) - R^2(e)}{1 - R^2(i)} \dots\dots\dots (6)$$

The tables show the quality of effect sizes which are measured by the path coefficients as small, medium or large, according to these recommended values: 0.02, 0.15 or 0.35 respectively (Kock, 2010). Values below 0.02 are too weak to be considered effective (Kock, 2010). Thus, looking at the tables for instance, the effect of Per_Tr on OvalSat for SD (0.18) and (0.020) are slightly higher than medium, hence highlighted (red) by the software. However, MBCI on ActUsg for BD (0.008) is below 0.02, and hence too weak to be considered effective. Table 20 and Table 22 present the correlation matrixes of the model to highlight how well the proposed theory in the current study is supported by the data. Hence there is no need to take any action for Step 10 (calculation of consistent weights).

Step 10: Calculation of consistent weights

If the associations amongst the lower-order constructs and their higher-order constructs are of any concern, then this step is only required to examine the weights which these lower-order constructs contribute (Van Riel *et al.*, 2017). These are provided in Table 5.7. Again, the important performance map analysis helps for readers to understand the ideal of this requirement.

INDIRECT EFFECT SIZES

Indirect effect sizes give an indication of the strength of a particular mediation construct with regard to a dependent one in the structural model. In this regard, the estimation is used to gauge out the effects of both the first-order and the second-order constructs on their dependent variables, and evidence presented in Table 6.1 and Table 6.2 gives an indication of such impacts.

Thus, the indirect effects from OvalSat to ActUsg and Soc_Norm to MBCI amongst the SD users in Table 6.1 are large, while the others range between weak and medium (except for the moderation variable).

Table 5.23: Indirect effect: SD

	ActUsg	MBCI	OvalSat	Per_QLY	Per_Tr	Reasons for SD	Soc_Norm
ActUsg							
MBCI							
OvalSat	0.032						
Per_QLY	0.017	0.116					
Per_Tr	0.004	0.029					
Reasons for SD	0.083						
Soc_Norm	0.006	0.039					

In the case of the tabled BD users, Per_QLY through OvalSat to MBCI, and Soc_Norm mediated by OvalSat recorded a large effect on MBCI, while the rest ranged from weak to medium (except for the moderation variable) in Table 6.2.

Table 5.24: Indirect effect: BD

	ActUsg	MBCI	OvalSat	Per_QLY	Per_Tr	Reasons for BD	Soc_Norm
ActUsg							
MBCI							
OvalSat	0.016						
Per_QLY	0.008	0.092					
Per_Tr	0.002	0.021					
Reasons for BD	0.045						
Soc_Norm	0.005	0.057					

CHAPTER 6

RESULTS

INTRODUCTION

This chapter presents the results of findings made so far. As hinted earlier, many adjustments were made to the dataset by removing underperforming manifest variables for both SD and BD, to arrive at the present important performance map analysis (IPMA) (Figure 6.1 and Figure 6.2).

Table 6.1: Final cross loadings used for SD

	Soc_Norm	MBCI	OvalSat	Reasons for SD	Per_QLY	Per_Tr	ActUsg
ExtInflu (1,2,3,4)	0.958						
IntInflu (1,2,3,4)	0.777						
MBCI1		0.777					
MBCI2		0.851					
MBCI 3		0.956					
OvalSat1			0.840				
OvalSat2			0.963				
OvalSat3			0.934				
OvalSat4			0.931				
Res1				0.880			
Res2				0.994			
Res3				0.877			
InfoQ (1,2,3,4)					0.929		
SysQ (1,2,3,4)					0.981		
TrEven (1,2,3,4)						0.985	
TrTech (1,2,3)						0.739	
TrThpt (1,2,3)						0.770	
ActUsg1							1.000

Table 6.2: Final cross loadings used for BD

	Soc_Norm	MBCI	OvalSat	Reasons for SD	Per_QLY	Per_Tr	ActUsg
ExtInflu (1,2,3,4)	0.906						
IntInflu (1,2,3,4)	0.903						
MBCI1		1.000					
OvalSat1			0.865				
OvalSat2			0.940				
OvalSat3			0.977				
OvalSat4			0.977				
Res1				0.859			
Res3				0.838			
InfoQ (1,2,3,4)					0.892		
SysQ (1,2,3,4)					0.995		
TrEven (1,2,3,4)						0.864	
TrTech (1,2,3)						0.873	
TrThpt (1,2,3)						0.755	
ActUsg4							1.000

The unstandardised data after this process was used to investigate significant differences between the two sets of data through the IPMA.

Important performance map analysis (IPMA)

The descriptive statistics presented in Chapter 5 were based on the unstandardised data to determine the distinctiveness of the two different datasets. This can provide an important lead for investigating the different physiognomies of the two different m-banking users for appropriate actions. In light of this, the IPMA was carried out and it came to light that these two sets of users are different, based on the peculiar devices they use to perform m-banking. The relative importance of the paths is depicted by the thickness of the lines and values in the constructs (Figure 6.1 and Figure 6.2).

From the IPMA diagram, it can be seen by looking at the thickness of the lines that users of small devices consider trust to be their critical factor. However, they see service quality to be the issue that leads them to satisfaction. This is agreed upon by the big device users, though to them everything is about quality, which eventually leads them to attain satisfaction (Figure 6.2). They see the quality of service provided by their bankers as the most influencing consideration. It should be noted that these paths are thicker than the others on the nomological nets. As already indicated, the thicker lines in Figure 6.1 and Figure 6.2 highlight the critical paths for users when deciding on important influencing factors, and the bigger the value of a particular construct, the more importance users attach to that construct. Hence, consistent with the result of this study so far, it can be seen that users consider SD for m-banking as their preferred device (81.302), as against BD (81.259) after moderation.

The figures also prove that SD users actually use their devices to perform m-banking more than their BD counterparts (38.806 for SD and 26.909 for BD). This is a discovery consistent with what m-banking is all about, as the ability to do banking anywhere anytime is enhanced by the smaller devices, which are more portable than bigger devices.

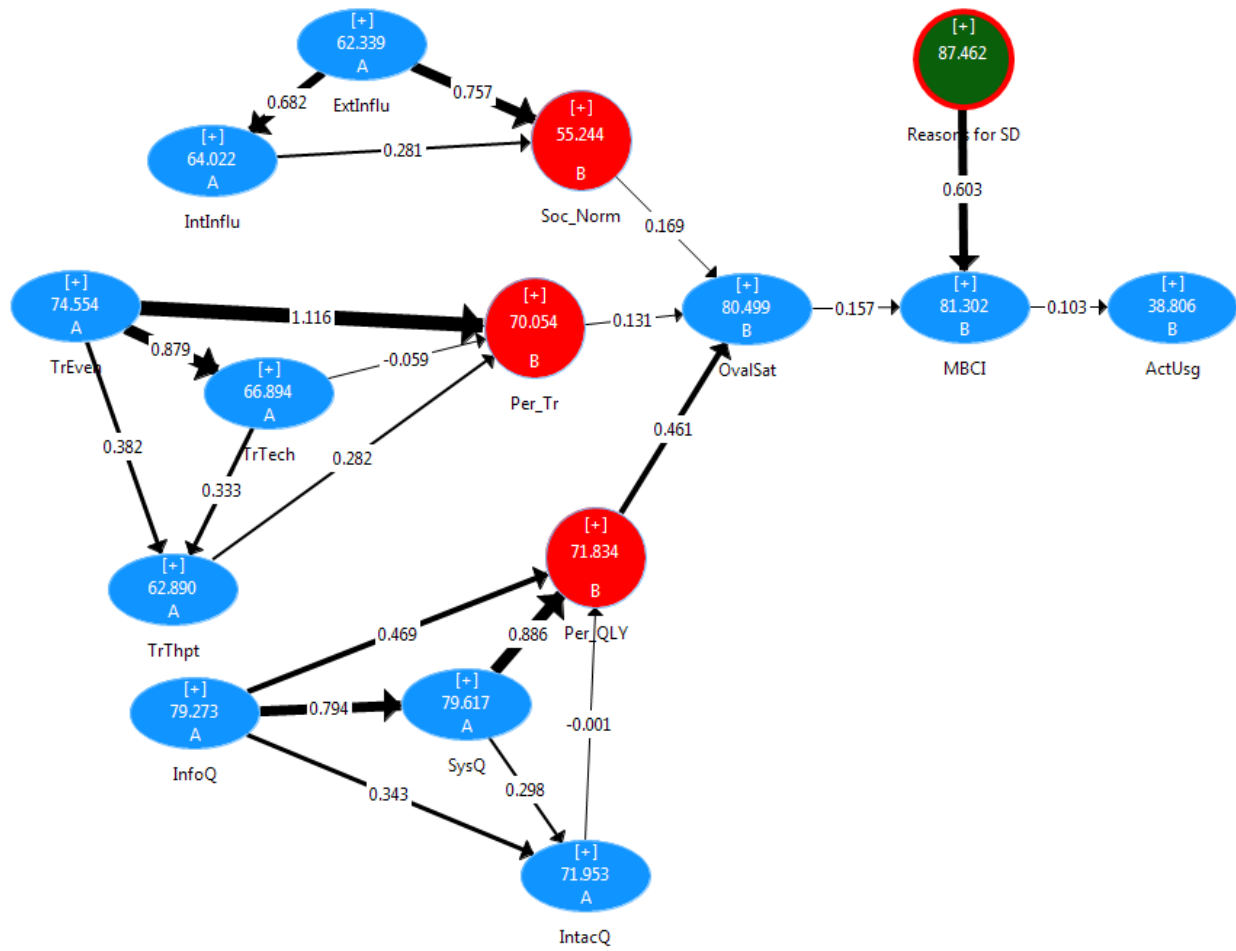


Figure 6.1: The IPMA of SD users

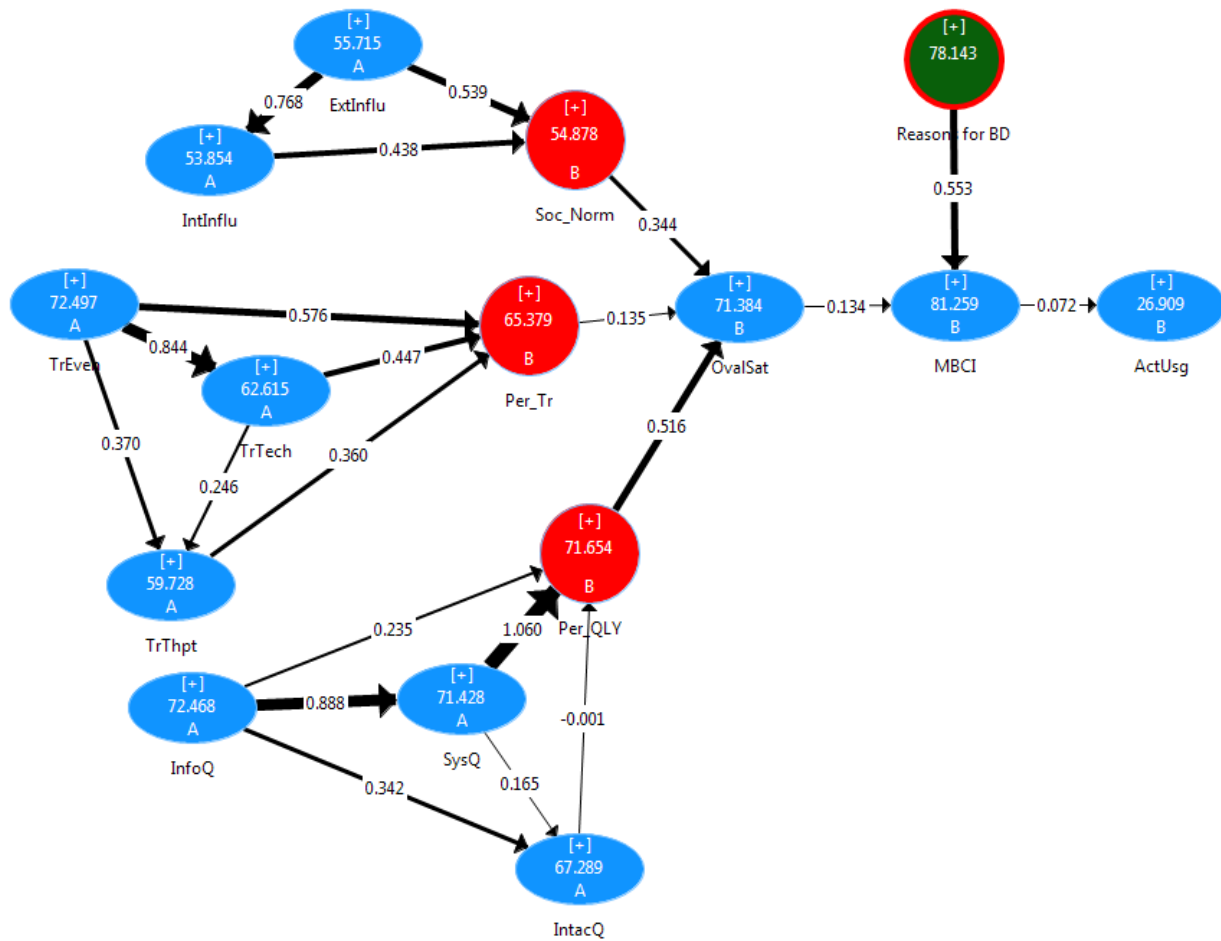


Figure 6.2: The IPMA of BD users

Factor analysis of measurement model

After the IPMA, the study then standardised the data for the rest of the analysis. As a standard way of performing SEM with PLS, the first step is to assess the measurement model. When this is confirmed to be valid, then only the structural modelling is permitted to be carried out.

The following comments were observed from the result of the CFA:

- The CFA of all the first-order dimensions were loaded with their corresponding values for both SD and BD during stage one and two of the three-stage approach. However, during stage three these values were loaded on the second-order constructs according to theory and method.
- The two subjective questions asking about internal and external pressures perfectly explained the latent variables, and are loaded on the same factor. Notice should be taken here that

initially these indicators measuring Soc_Norm (a formative indicator) were four each. In such instances of a high number of indicators, it is possible for one or more of these indicators to have low or even no significant weights (Hair *et al.* 2011: 147). However, this was not the case for this study.

- The factor analyses of the trust items are placed in three different factors, confirming trust in technology, e-vendor and third parties. These three were placed together in the hierarchical modelling.
- For the perceived service quality factors, it was observed that one each from each cluster was confirmed, with system quality being the best. The other two of the three loadings were weak, especially IntacQ. This was removed completely from both SD and BD categories, since both the loadings and weights were of little significance. Future studies may experiment with one question each from each cluster for content validity.
- The three named OvalSat, MBCI and ActUsg appeared distinctly in the factor analysis.
- In short, the following were deleted from the factor analysis before arriving at the final models: for SD (IntaQ, ActUsg 2, 3, 4 and Reasons for SD 4, 5), and for BD (IntacQ, MBCI 2, 3, ActUsg 2, 3, 4, 5 and Reasons for BD 1, 2, 3).

GRAPH OF STRUCTURAL MODEL

The structural model consists of a number of sub-models as the building pillars of the whole nomological net and were modified following the suggestions and modification guides provided by Van Riel *et al.* (2017). During stage 3 nested model analysis, some first-order constructs were eliminated (see Table 6.1 and Table 6.2) to allow for the correction of attenuation. This was done if: 1) the formative indicators' outer weights were not adequately different from zero; and 2) the remaining indicators sufficiently captured the domain of the second-order constructs being considered (Cassel *et al.*, 1999; Diamantopoulos and Winklhofer, 2001; Grewal *et al.*, 2004). Hence, "*The dataset was tortured, until it confessed*".

Inclusion of some error covariance was allowed with justified explanations. In order to test the structural relationship, the hypothesised causal paths were estimated. The variance (R^2) of each dependent factor is an indication of how well the model fits the data, with R^2 showing the amount of variance in a dependent factor that is explained by the research model.

R² value of 0.20 is considered high in studies such as this (consumer behaviour) and 0.75 perceived as high enough in success driver studies (Hair *et al.*, 2011: 147). However, in marketing research studies, R² values of 0.75, 0.50 or 0.25 for endogenous latent variables, as a rule of thumb, are described as substantial, moderate or weak respectively. Table 5.19 and Table 5.21 indicate the R² values for the research model. However, Figure 6.3 and Figure 6.4 depict the graphical results of the final structural models for both small and big device preference holders respectively. The taller the bars, the greater the significant relationships on the nomological net. As already asserted, the assessment of the structural model is to validate the model fitness, which is a measure of model validity. The overall fit and explanatory power of the structural model are however examined in Chapter 5, together with the relative strengths of the individual causal path.

The complete research questionnaire, comprising 22 items for SD and 33 for the BD users is provided in Appendix B.

Graphical path coefficients – SD

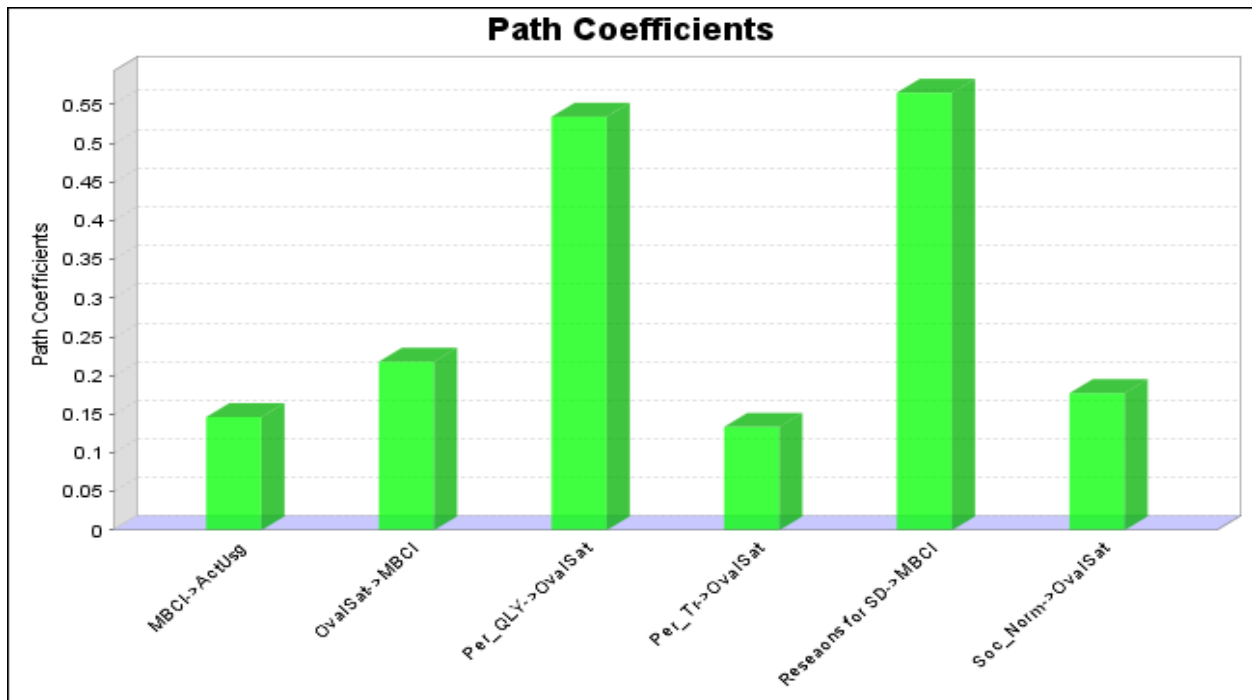


Figure 6.3: Graphical presentation of structural model for SD

Graphical path coefficients – BD

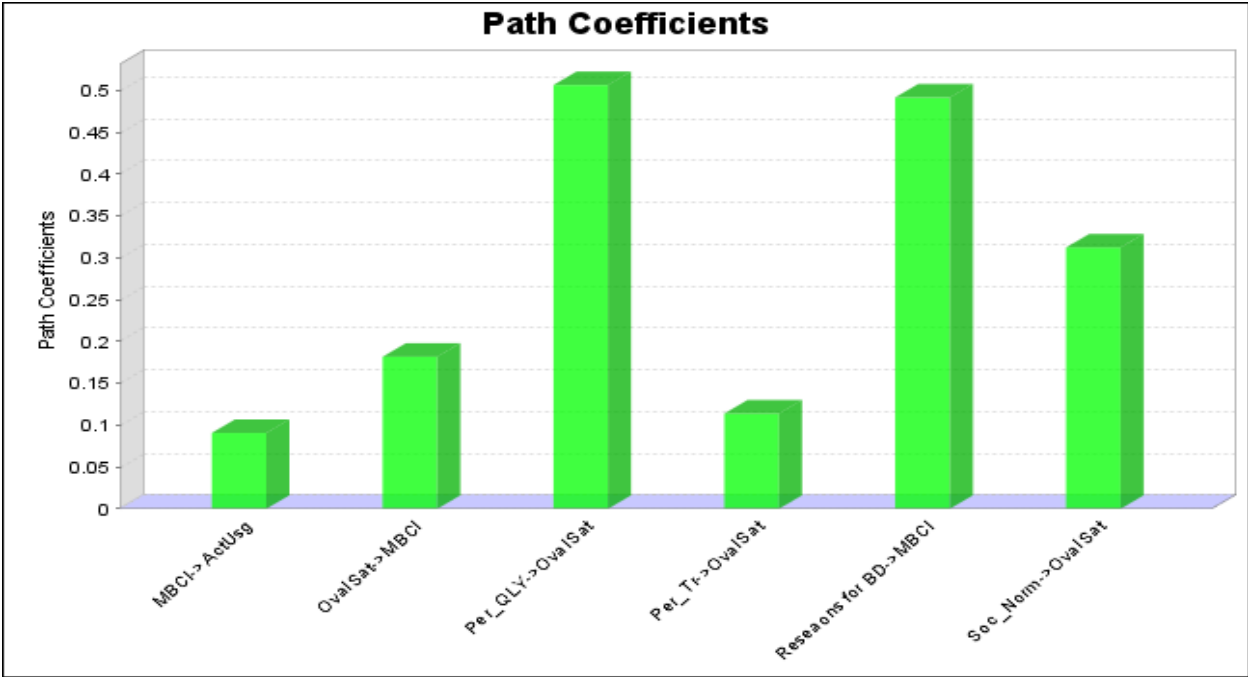


Figure 6.4: Graphical presentation of structural model for BD

EVALUATION OF TWO COMPARING MODELS

Mobile Banking: A Comparative Study of South Africa and Nigeria

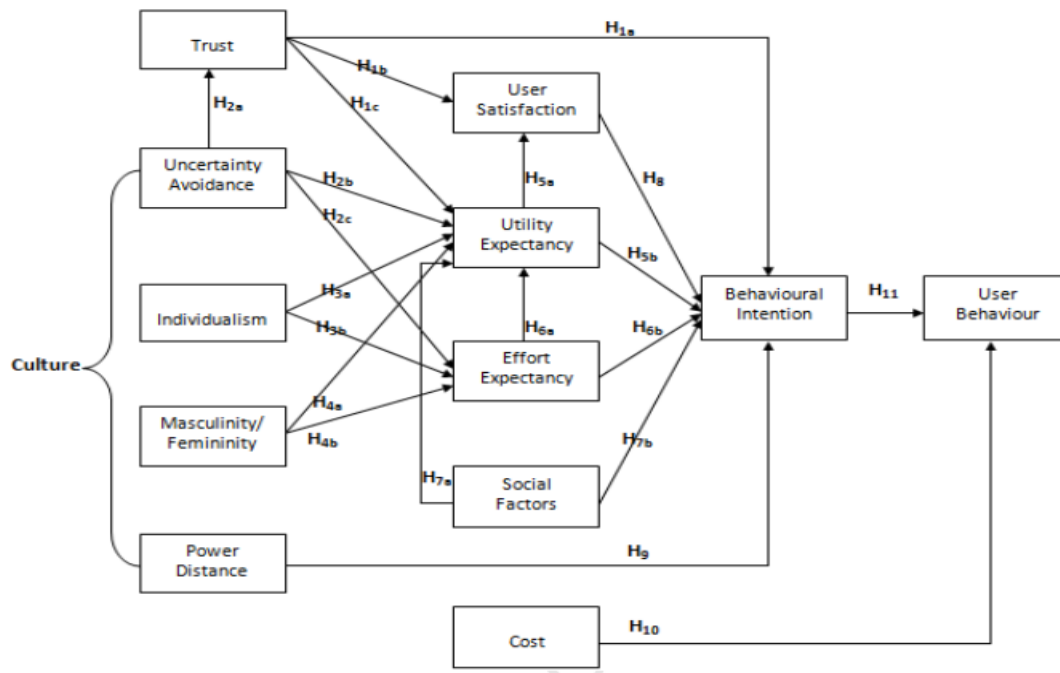


Figure 6.5: Conceptual model (Source: Bankole and Cloete, 2011)

Multidimensional Constructs of Mobile Banking Continuance Intention in South Africa

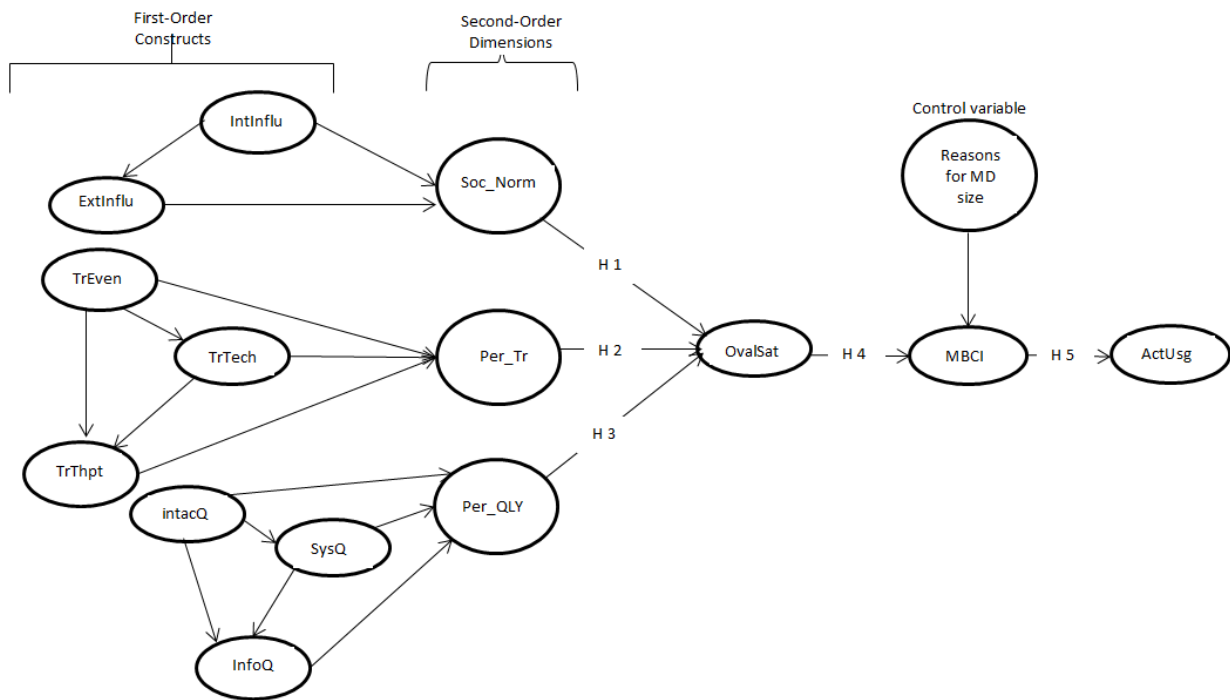


Figure 6.6: Conceptual model – The current study

Diamantopoulos and Siguaw's (2000) structural modelling steps mention cross model validation as the last step in the series of development method. The researcher therefore searched for a similar model to that of the current study and found that of Bankole and Cloete (2011) to be the closest match.

The parsimonious nature of the current study is immediately established upon a quick glance at the two comparing models. Though the current study used as many as fifteen (15) constructs to investigate m-banking in South Africa, it hypothesised only five (5) logical paths to unravel the mysteries surrounding the phenomenon as the rule of thumb for conceptualising hierarchical studies. Bankole and Cloete (2011) use as many as twenty hypotheses to investigate only twelve (12) constructs. This is likely to make their study cumbersome and difficult to follow. Thus, the current study's higher-order modelling is justified and warranted.

The high abstraction nature of the current study notwithstanding, it used 1 262 responses and was able to explain 0.515 of the satisfaction construct at a confidence interval of 97.5 percent in the case of SD and 0.581 of the satisfaction construct for BD.

CHAPTER 7

DISCUSSION

INTRODUCTION

This study has made an unusual move by putting together very large SEM. Though based on sound theories found in the extant literature, the number of constructs examined from the start of the study, and experimented on until the final model, surpasses what is normally found in most studies. Thus, the study's model springs from gauging out the influence to acceptance, and possible continuance intentions to actual usage.

OUTLINE OF FINDINGS

The study has supported that it is always not in the best interest of the research community to only investigate a few concentrated constructs and expertise to succeed when dealing with human behaviour. The sub-models, together with their final models' fit, are practically acceptable looking at the quantum of the size of the data, and the constructs used compared to what is found in the extant literature.

Literature regarding m-banking in South Africa (Table 2.7) has only used between 162 and 394 responses across the country and concludes that relative advantage, perceived risk, consumer banking needs, PU, ease of use, and attitude are the main factors which encourage acceptance of m-banking in the country (Brown *et al.*, 2003; Masinge, 2010; Wentzel *et al.*, 2013). This study has used over a thousand responses and concluded that overall satisfaction regarding this phenomenon is the main influencing factor for m-banking in South Africa. The construct used in the current study are found to be very consistent with that used by the research community the world over (see Chapter 2).

FINDINGS OF RESEARCH OBJECTIVES

Objective 1: Social norm positively influences m-banking user's in South Africa

Social norm, being the influence exerted on individuals within the same social settings by those who wield the power of influence, was discovered to play an important role in creating satisfaction for both small and big device users to perform m-banking. While this discovery could be attributed to the "band wagon" effect of group norms, whereby satisfaction amongst a few

individuals in the group can influence others psychologically to also feel satisfied, it turns out that, it is a very powerful influence that could be taken advantage of by m-banking service providers. Here, the strategy could be that the few powerful individuals amongst the group who are influential could be treated specially and used to influence their members for continuous usage.

This was not however the case when it comes to creating MBCI amongst the groups of both small and big device users. The intention to continue m-banking could not be generated through social norm, and the reason could be that the same few powerful influencers could not be made to harbour this intention to influence the group. Thus, negative results were witnessed in all instances. This outcome is not surprising, as the concept of social norm has succeeded in generating conflicting results in many instances. Hence social computing scholars are devoting efforts to understanding the complex social behaviour of clients using m-banking services, so as to inform the design of human-centred and socially aware systems of this phenomenon.

Lower-order dimensions

Both lower-order dimensions for both small and big devices, however, proved to have a significant relationship with their higher-order constructs, though external influence was the most influential. External influence is due to public advertisements, such as on television, in newspaper, and these days in social media and any other influence which is outside the referent group of the user. This outcome could be attributed to the fact that, at a certain point in the social relationship, members of the social group become dissatisfied with their influencers, and want to rely on something more official to take decisions. At this stage, the external influence of social media becomes more effective and more capable of influencing users than the “band wagon” effect of group norm.

Objective 2: Trust positively influences users’ perception towards m-banking in South Africa

Trust was able to create satisfaction amongst big device users, but not small device users. This could be attributed to the technological differences between these two devices. While users agreed that big devices have larger screens and better resolution, which makes them more comfortable to use than smaller devices, it also came to light that such devices make it easy to

key in data, which in turn makes users feel more in control when using them than when using smaller devices. Again, big device users agree that, when fully charged, such devices last longer than smaller devices, all of which creates satisfaction amongst users than smaller devices.

However, trust is able to create m-banking intentions amongst smaller devices more than bigger devices, as users realise that they are easy to use, portable and not as heavy to carry around as bigger devices. If the issues of privacy, PU and social impact which have been identified as some of the challenges faced by m-banking (McCole *et al.*, 2010) are addressed correctly, the concept of m-banking could go a long way to achieving its aim.

Lower-order dimensions

All three lower-order dimensions for both SD and BD had significant relationships with their higher-order constructs. This means that the issue of trust is of higher importance to users of m-banking than might probably be considered. The choice to trust a particular online vendor, and the search for “good reasons” to grant such trust, suggest a process whereby m-banking users determine that an individual, group or organisation is trustworthy. Therefore, the issue of trust may be even more important in the m-banking concept than in traditional commerce because it is based on the user’s risk taking which is induced by trust. It is therefore no surprise that trust of e-vendors in both cases had the most impactful relationship with their higher-order constructs. E-vendor is the designation which represents the name of the bank providing the m-banking service. Such trust is usually generated by the banks over the time by ongoing existence and practice.

Objective 3: Perceived quality positively influence m-banking in South Africa.

Perceived quality was able to create satisfaction amongst small device users, but not big devices users. This was again due to the fact that small device users tend to carry their device around more than big device users, and therefore perceived the services they receive on their devices as being of higher quality than their counterparts who scarcely use their devices. In such instances, it is more reasonable for frequent users to be satisfied than those who scarcely use their devices.

Coming to continuance intention generated by the perceived quality of m-banking services, both user groups reported intention to use due to the expectation of interaction quality, system quality and information quality from service providers. This outcome is consistent with

what is reported in the extant literature, whereby it is known that the issue of quality is hard to judge because it is based on the individuals' expectations and satisfaction levels (Asubonteng *et al.*, 1996).

Lower-order dimensions

Information quality and system quality had a significant relationship with their higher-order constructs for both device types. System quality was nevertheless perceived to be the most important pathway influencing m-banking in both cases in South Africa. This indicates that, after e-vendors have done what they can to command the trust of their m-banking clients, another important agenda that needs to be looked at is the provision of well-trained employees who know how to take care of customers online by providing the right kind of answers to meet customers' queries. The provision of high-tech gadgets, together with these well-trained employees, will constitute the system by which m-banking is enabled. This will ensure that mobile customer connections to bank servers for information is excellent, whilst the response time for any generated query or waiting time for online service providers is expurgated when appropriate.

Objective 4: M-banking overall satisfaction positively influences users' continuance intention in South Africa

Under this objective, it was discovered that both types of user were happy with the overall satisfaction levels derived from the services they receive from their banks. This means that their satisfaction levels with both internal and external social influences, interactions, systems and information quality, trust in technology, and website/e-vendor and third parties were more than anticipated, or were confirmed and surpassed in situations where they had problems. This is an important hint that should be taken seriously by the banks, as satisfaction goes beyond just the expression of approval to a psychological implication. However, small device users were more satisfied than their bigger user counterparts, and this led to higher usage levels than big device users. This could again be attributed to the fact that small devices are portable and easy to carry around to perform m-banking anywhere and anytime. This enables small device users to use their devices more than their big device counterparts, and they therefore receive more service attention from their service providers.

Objective 5: MBCI in South Africa leads to actual usage

Here, it was witnessed that the effect of m-banking continuance intention for both devices was able to translate into actual usage even, after the bootstrapping effects of the two models used. In the case of small devices, the continuance intention's effect was consistently greater than for big device actual usage after the bootstrapping effect. Users of small devices found it more comfortable using their devices to perform m-banking when compared to big device users, unless controlled by one or more external factors. Generating m-banking acceptance intentions amongst users should therefore be the strategy at the initial stage of service provision, before concentrating on inducing actual usage. It should once again be emphasised that initial acceptance is not enough, but that actual and the continuance usage, as already alluded to in the literature review, are also necessary.

Sub-objective: Control variable(s) that influence MBCI in South Africa

When the reasons for preferring a particular device were used to control MBCI, it came to light that both types of user will respond significantly to actual usage. It stands to reason therefore that what makes both types of user actually perform m-banking significantly after their good intention of continuance is due to their realisation of the reasons why they prefer their kinds of device. It is therefore advised that, when service providers investigate what actually motivates users to utilise their devices for banking, they should do all that they can to provide such users with these motivating issues to enable them carry out their good intention of using m-banking.

The phenomenon of m-banking has come to stay, and it is about time all stakeholders perform serious research before investing in this concept. If banks find it prudent to finance the purchase of cars, furniture and other household appliances for their clients, all in the name of the business, then it is equally important that they begin looking at the possibilities of financing mobile devices for these clients to enable them carry out m-banking. The financed devices should, however, be well-researched to ensure that they are what clients desire for performing m-banking.

Again, as a loss leader strategy, social groupings should be identified and group leaders lured into m-banking by providing them with mobile devices to whip up their interest in these services. This can go a long way to creating a "band wagon" effect amongst social groupings to also accept m-banking.

EMPIRICAL FINDINGS

Multidimensional constructs

The higher-order constructs used in the study are indeed multidimensional but are used mostly by researchers to serve as unidimensional. This precludes us from a wealth of scientific knowledge and rationalisation. For a parsimonious model that is capable of explaining concepts at a higher abstraction level, this study concludes that a fifteen (15) construct model could be used to highlight the very salient points in m-banking. This nevertheless comprises lower-order constructs which epitomise first-order behaviour, to higher-order constructs which symbolise second-order thinking. This is however made possible by the size of the mobile devices that are used to carry out m-banking. This ranges across the below categorisation details, even though the current study simply grouped them into two distinct sizes for reasons of simplicity.

Device size

Since 1979, mobile computing has undergone many changes, from laptops to PDAs in the 1990s, to today's smartphones, tablets, and pocket-sized mini computers. The current study found that small devices are preferred to carry out m-banking, though the statistical significance of laptops has overshadowed this result. The types of mobile device used to perform m-banking, which this study has categorised into two main sizes and their peculiar characteristics, and which most probably makes them preferable to others, are:

Laptops

Laptops are the obvious portable computing device, since they are intended to do everything a desktop computer can do from different locations. The smallest and most portable ones can weigh between less than 3 to 5 pounds, and have screen sizes of around 13". While laptops have the most computing power of the mobile devices listed here, they can be very burdensome to carry around most of the time. They are actually the least portable of mobile device options, and many users are replacing or supplementing their usage with smaller, more mobile devices.

Notebooks

Most notebooks have a more compact format factor, with typically 10" screen sizes, and can weigh as little as 2 pounds. They are inexpensive compared to laptops, have long battery lives,

and can perform the tasks PCs perform, like surfing the web and banking. Depending on how mobile one is and one's social grouping, notebooks can trade these benefits for the less robust performance of PCs and laptops.

Tablet PCs

The tablet, as a category of mobile device, is less dependent on size or weight than on input. They take input from a stylus and/or touchscreen, and when they happen to be convertible tablets, can come with a keyboard. More recently, tablets are moving away from running the same operating systems as desktop and laptop PCs, to mobile iOS and Android. As a result, they may not run traditional desktop software, but are capable of excellent cloud computing with many mobile applications available which make m-banking more accessible.

Ultra-mobile PCs (UMPCs)

For mobile computing in the smallest package, UMPCs may be the most obvious choice. UMPCs can be described as mini tablets (with touch screen/stylus/keyboard input options). With a screen size of about 7" or less, and weighing less than 2 pounds, UMPCs are truly pocket-sized devices. UMPCs offers broader m-commerce or general-purpose application support than smartphones, and are much smaller than laptops or notebooks. They have less battery lifespan, smaller screen and are cheaper due to their small size and lower market demand.

Mobile Internet devices (MIDs)

Mobile Internet devices are habitually even smaller than UMPCs, with smaller displays of around 5", and are thus easy to carry around. Designed to serve as "Internet in the pocket", MIDs usually do not have keyboards, are cheaper than UMPCs, and exhibit low power usage. They are best for Internet surfing, and are therefore also suitable for m-banking.

Smartphones

Smartphones, having the ability to connect to the Internet, and with Wi-Fi capability as well as cellular communication capabilities, are perhaps *the* most popular devices motivating m-banking today. iPhones and Android smartphones are very popular amongst users, with almost every household in South Africa possessing one. It is on record that African smartphone consumption is second highest in the world after China. With smaller screen sizes than MIDs and UMPCs,

many smartphones lack computing features like sizable keyboards, making it difficult to work performing m-banking for extended periods of time. They are ideal as communication devices, however, and for Internet surfing “on the go”. With the appropriate research to determine exactly what m-banking users expect from these devices, they could be the machines used to drive m-banking to its successful end.

***PDA*s**

Though PDAs are losing popularity, as compared to smartphones, because the latter can do what PDAs do plus telephone functionalities, PDA users utilising the advantages of a PDA over smartphones still abound. Many smartphones require, for instance, a periodic subscription data plan, whereas one can use a PDA at a Wi-Fi hotspot for free. There is also a lot of business-oriented PDA software still available, since the earliest PDA adopters were business users, thus making them user friendly for m-banking. The number of PDAs on the market is gradually diminishing, however, which means its accessories to make it easy-going for potential m-banking users could also suffer from future drawbacks.

THEORETICAL CONTRIBUTIONS

Theoretically, it has been established in the extant literature that m-banking users are youth, and also normally people with higher education. This study has established that this scenario is changing, though, and the quicker m-banking service providers change their mindsets when designing contents and transaction-based activities, the better it will be for all. There are also some mixed findings as to the demographic dispensation of users of technology, particularly that of m-commerce. This study adds to the extant literature, which has noted male users as the most technologically savvy group. This, however poses a challenge to stakeholders in a country like South Africa, where the female population surpasses that of their male counterparts by far. More m-banking awareness needs to be created amongst the country’s female population, who are always in the majority at shopping malls and banks. Investigations regarding the female population sector’s device-size preference will go a long way in formulating targeted marketing strategies specifically aimed at them.

This study once more discovered that the majority of m-banking users in South Africa are people with matric and further education training (FET) qualifications. This should again inform

the kind of message that is used to create awareness amongst them, with the influence of social norm probably being the obvious strategy.

BUSINESS IMPLICATIONS

Businesswise, the current study has shown two issues: 1) the factors that really influence m-banking users to accept the concept with intentions to perform the act; and 2) what device size influences their actual usage of such services.

The factors influencing m-banking usage, as discovered by this study, are users' overall satisfaction, which stems from a trust from their service providers, and service quality. In South Africa, a brief look at the scambuster.co.za website reveals at a first-hand how prevalent payment crime and fraud is. This has been echoed by other studies and writers in the country. For instance, in a 2014 survey by global firm PricewaterhouseCoopers (PwC), 69 percent of South African respondents said that they had been victims of some form of financial crime in the two years preceding the study, compared to 37 percent of global respondents (Staff Writer, 2015).

Security gaps of this nature impact negatively on trust towards this innovative and low-cost banking channel, and in turn slows down acceptance, which has consequences for the success of any mobile strategy. According to Kaspersky Lab (2016), the volume of malware targeting mobile users increased threefold from 2014 to 2015. The South African Online Fraud Resource Centre (SAOFRC) has also estimated that a phishing attack takes place every minute, with one in four of these attacks originating from mobile channels (banking.org.za, 2018).

The truth is that hacking has become a business. Attackers move from region to region until the market is saturated. Hacking as a service is now a reality, with hackers even having service-level agreements with their customers. Malware is created and sold on the "dark web". This escalation of payment crime and fraud has put fear into many would-be m-banking users. Nevertheless, this has also made it possible for escrow services (third party warrantors) to begin mushrooming in South Africa recently.

This service (escrow) is a payment arrangement which is meant to protect against payment fraud, non-payment and the problem of chasing payments after business or financial transactions. It is meant to add an extra level of security and convenience for both buyer and seller. Hence, if

the problem of trust could be given the needed redress through this third-party warranty, m-banking in South Africa could be the world's most enviable banking model.

On a practical note, service providers should train their employees on service delivery principles for them to be well-informed on how to interact with clients. This is very important, as by definition m-banking is a concept of non-physical contacts with employees, and therefore the impression created through the device used to transact goes a long way towards instilling loyalty and continuance usage. Regarding system qualities which also surfaced under service quality, it is advised that banks work closely with their system and network providers to supply their clients with state of the art technologies. Banking clients are social beings, and are bound to be looking around for competitive services from other banks which better meet their expectations. When such banks are found, customers will switch at the least provocation from their existing banks.

The second issue that the study intends to contribute to is the practical implications of mobile device preference. There are a lot of m-banking studies in the extant literature, but scarcely do any of these studies hint at the device size that users normally use to carry out m-banking. This study discovered that users prefer smaller devices, since they are portable and easy to carry around. In light of this, banks are advised to enter into collaboration with telecommunication and device developers to tailor-make their devices for banking clients. This will serve as a booster for users to actually perform the act of m-banking. The reasons why some users prefer smaller devices are outlined above in the device-size section of this study. A careful look at these issues should reveal a wealth of information for the banks in providing appropriate devices and content to their customers.

Also of particular interest to banks should be the act of financing mobile devices for their clients, just as they provide finance for vehicles and other items for these clients, if they desire to see m-banking at peak usage in the country.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Traditionally, every study is required to provide self-criticism for correction in future study considerations, and so does this particular one. The first such introspection is the sample size, which the author wishes had been larger for a country of about 46 million in population size. The second is the size of the respondent group during the pilot study. Given the limited number of participants, it became clear during data analysis that this number alone could not point out many

of the issues which needed to be corrected before the actual data collection. This subjected the analysis phase to a back-and-forth deletion and re-specification process for the research model, and made the data suffer torture.

There are a number of different methods of performing multidimensional analysis with the software used in this study – SmartPLS 3.0. These include the two-stage approach, the repeated indicator approach, the hybrid approach, and as currently used, the three-stage approach. Though an exercise to confirm the best approach could have proven worthwhile in this study, the amount of confusion regarding the best tactic to use, and the quantity of publications produced daily (with the exception of the latest approach), did not permit this study to distinctly establish this fact. The latest approach (the three-stage approach), as followed in this study, has only one publication in support of its use from proponents (at press) at the time of this examination, and no research which had shadowed this approach could therefore be identified for comparison purposes. The Bankole and Cloete (2011) study used to prove the parsimonious nature of the current model is limited in scope and approach, since this former study did not use the three-stage approach. Future research would do well to compare studies on the three-stage approach to highlight its strength and weaknesses.

Again, trust in e-vendors has been raised as an important ingredient which customers look for before utilising m-banking. It is therefore recommended that bank representatives join the social networks of their clients, or create pages on social media whereby they can interact and assure their clients of practices in place to make their m-banking experience problem free. Such assurances could be based on Fries' (2016) suggestion that financial institutions should protect their m-banking customers from cyber-attacks by adding another layer of security before customers log into their accounts from mobile devices. Fries assert that device analytics work behind the scenes to assess devices for risk before customers access their m-banking application, protecting the financial institution and the customer from cyber criminals simultaneously. Banks should interact with service participants to obtain the actual reasons why they do not wish to accept or continue with m-banking, and provide individuals with the appropriate advice. Bank representatives assuring clients of policies to mitigate any misfortunes which may occur to them can be highly influential in building confidence in both current and potential clients. It might take a while before the message gets down to them, but continuous interaction and promotion of m-banking on social networks certainly pays off (Assensoh-Kodua, 2015) in the long run.

CHAPTER 8

CONCLUSION

INTRODUCTION

This study has followed a systematic methodology from the literature reviewed as a technique for analysing data and interpreting its findings. In this manner, sub-models have been analysed before integrating them to form a more comprehensive one. The final model has proven to be parsimonious and capable of explaining human behaviour at a higher abstraction. Inter-constructs' influence on one another has also been significant, and outcomes very practical for consumption. These represent several types of conclusions:

EMPIRICAL CONCLUSIONS

Practically, it is better to explore large numbers of constructs and items to fine-tune a model before arriving at a convincing one. In this manner, consistency of approach can lead to factual outcomes which can be relied on as correcting the flaws in earlier research methods.

In South Africa, studies on m-banking have only concentrated on acceptance rather than actual usage. The current study has proven that acceptance is not always the same as actual usage; hence research is warranted to investigate why people accept the concept but are found wanting when it comes to actual usage. In light of this, the type of device size preferred and the reasons behind this provide a good lead for a finer research strategy. This study has advanced a m-banking model which goes beyond acceptance and intention to actual usage with a vast number of practical constructs and empirical facts, thus providing a framework to help formulate action for the concept in future.

The outcome from the study also adds to the existing knowledge that “we cannot investigate human behaviour in social science with few constructs and win”. We need all relevant factors in focus simultaneously; therefore, deploying multidimensional modelling for such an venture should not be ruled out.

METHODOLOGICAL CONCLUSIONS

Deploying consistent PLS-SEM in a three-stage approach in this study has assisted in achieving clarity on a number of issues: 1) The model fits have been twice-proven to show that at each stage a better model fit is attained, and hence it is useful to model theories with higher-order abstractions; 2) Consistent estimates in the form of loadings, weights and path coefficients are provided. These overcome the shortfalls in other methods in SEM (Van Riel *et al.*, 2017). The multidimensional nature of the constructs used in the study is easily proven and grasped. These constructs are also useful in exposing the hidden truth in a multi-group analysis, such as showing the IPMA for different groups in populations.

PRACTICAL CONCLUSIONS

The study is based on practical knowledge which is meant to be useful to practitioners and all affected stakeholders. M-banking has become a compulsory defector practice in most countries in the world, as for instance payment of employees is not physically handed down to them but into their bank accounts. This makes it imperative for these employees to find a way of being notified whenever there is a deposit or withdrawal from their accounts, thus already practising m-banking as the obvious channel of notification takes place through their mobile devices. It is therefore advised that banks take the constructs investigated in this study and its outcomes seriously, as they encompass most issues faced by m-banking users.

Lastly, it is advised that banks should reduce the waiting times for clients whenever they call in for various issues. Longer waiting periods irritate customers, which make them wish to visit the banking premises. Such actions in the long run will defeat the purpose of m-banking, if not actively identified and controlled.

THEORETICAL CONCLUSION

Hypotheses in the study to achieve its objectives are proven by the sound theoretical arguments underpinning the reasoning, or otherwise. This creates a good sense of direction for further research and knowledge development. All theories in the study are supported with sound literature review references, which allow for easy checking for further refinements.

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ANNEXURES

ANNEXURE A: LETTER OF INFORMATION



LETTER OF INFORMATION

Title of the Research Study:

Multidimensional Constructs Influencing Mobile Banking Continuance Intention in South Africa.

Principal Investigator/s/researcher: (Akvesi Assensoh-Kodua, MBA, M. Tech)

Supervisor: (Emmanuel Mutambara, PhD)

Dear Participant,

Thank you for being part of this Ph.D. research survey. Your participation is greatly appreciated. This survey is being conducted from the Durban University of Technology (DUT) Durban, in South Africa and will take approximately 5 minutes to complete. The purpose of this survey is to gather information from mobile banking customers who use their mobile devices for banking, and it is meant for academic research purposes. The results from this study will be used for research and publications purposes only and will be made available at the DUT library, in the form of a published thesis. Approximately 1000 participants are required.

Targeted audience: Anyone who has ever used his/her mobile device for banking before qualifies to participate in this study.

Confidentiality: We would like to assure you that the information that you offer in this survey is strictly confidential and that no personal details are required of you. Your name will not appear on the survey and the answers you give will be treated as strictly confidential. Answers on the

survey will be coded to ensure anonymity. You cannot be identified in person based on the answers you give.

Persons to contact in the event of any problems or queries: Please feel free to contact the supervisor, Dr. Emmanuel Mutambara 0745615083, the researcher, Akwesi Assensoh-Kodua (0782898210 / 0628565652) or the Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.

Kindly proceed with this survey if you have read this letter in its entirety in English, understand its contents and agree to voluntarily participate in this study. You are at liberty to withdraw from participation at any time, should you wish to do so.

Please answer the questionnaire as completely and honestly as possible, and do not answer it if you have already completed a copy of it anywhere.

Thank you for your kind assistance.

I have read the consent form and hereby agree to participate in this study *

YES

Month	▼	Day	▼	2014	▼
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ANNEXURE B: RESEARCH QUESTIONNAIRE

1. Demographic Information

(Please indicate by ticking the category that best describes your particular situation)

Note* **MB** means mobile banking and fields with (*) are compulsory to answer

Gender*

Age *

Location *

My level of education *

*Please indicate the banking institution(s) you are currently using

- Standard Bank
- First National Bank
- NedBank
- ABSA
- Other

*Please indicate your experience of doing MB from the following

Reasons for doing mobile banking *

- Convenience
- Product/service not available off MB
- Better fees
- Time saving
- All the above

Time spent on MB per week*

2. SOCIAL NORM *

2.1. Interpersonal Influence *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
My family thought I should continue using a mobile device for banking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My colleagues thought I should continue using a mobile device for banking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My friends thought I should continue using a mobile device for banking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People I knew thought that continuing to use a mobile device for banking was a good idea.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2.2. External Influence *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I read/saw news reports that using a mobile device for banking was a good way of doing banking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The popular press depicted a positive sentiment for using a mobile device for banking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mass media reports convinced me to use the mobile device for banking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Expert opinions depicted a positive sentiment for using a mobile device for banking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. OVERALL SATISFACTION *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Generally, I am content with the use of my mobile device for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, I am delighted with the use of my mobile device for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, I am satisfied with the usage of my mobile device for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, I am pleased with the use of my mobile device for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. PERCEIVED QUALITY*

4.1. Interaction quality*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Banking staff were willing to help when I contacted them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Banking staff were consistently courteous to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Banking staff were competent in doing their job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Banking staff gave me prompt service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4.2. System quality*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
This MB is reliable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This MB provides fast responses to my inquiries.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This MB is easy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This MB provides good navigation functions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4.3. Information quality*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The information provided by this MB is what I need.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information provided by this MB is accurate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information provided by this MB is up-to-date.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information provided by this MB is comprehensive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. PERCEIVED TRUST *

5.1. Trust in technology *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The Internet has enough safeguards to make me feel comfortable using it on my mobile device.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel assured that legal and technological structures adequately protect me from problems on the Internet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident that encryption and other technological advances on the Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Strongly disagree Disagree Neutral Agree Strongly agree

make it safer for me to do banking there.

5.2. Trust in e-vendor (Website)*

Strongly disagree Disagree Neutral Agree Strongly agree

My bank Website is trustworthy.

My bank Website seems to be honest and truthful to me.

My bank Website can be trusted.

This MB vendor keeps promises and commitment

5.3. Trust in third party*

Strongly disagree Disagree Neutral Agree Strongly agree

There are many reputable third-party certification bodies for assuring the trustworthiness of Internet bankers.

I think third-party recognition bodies are doing a good job.

Existing third-party recognition bodies

Strongly Disagree Neutral Agree Strongly
disagree agree

are adequate for the protection of MB
users' interest.

6. My preferred device for MB:

(Please choose only ONE from below)

6.1. SMALLER MOBILE DEVICE- complete **Q7-Q9 ONLY, page 6-7**

(E.g. Cellphone, PDA, etc.)

6.2. BIGGER MOBILE DEVICE-complete **Q10-Q12 ONLY, page 8-9**

(E.g., Laptops),

SMALLER DEVICES

(Continue from here if you chose 6.1 above)

7. I prefer smaller devices because *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
It is easy to carry around	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is portable, I can sit anywhere and do banking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is not heavy, I can stand anywhere and do banking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologically, It is easier to use than Laptop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not have a laptop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Continuation Intention *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
In the future, I would not hesitate to use handheld device for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the future, I will consider handheld device for banking transactions as my first choice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I intend to continue using a handheld device for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Continuous Use

I frequently use a handheld device in a day for the below activities

	Never in a day	0-15 min/day	16-60 Min/day	1-3 hrs/day	More than 3 hrs/day
SMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Downloads of banking information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Java games	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browse banks' Websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Never in a day	0-15 min/day	16-60 Min/day	1-3 hrs/day	More than 3 hrs/day
Mobile e-mail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

THANK YOU VERU MUCH!

SECTION FOR BIGGER MOBILE DEVICE

BIGGER DEVICES

(Please continue from here if you chose 6.2 above)

10. I prefer a bigger device such as a laptop because *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
A larger screen and better resolution makes it comfortable to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to key in data than with smaller devices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel in-control when I use a laptop than with smaller devices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When fully charged, laptops, last longer, which enables me to do banking at my own convenient time in the day anywhere.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologically, it is easier to use than cellular telephone or other smaller device.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Continuation Intention *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
In the future, I would not hesitate to use the laptop for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the future, I will consider using a laptop for banking transactions as my first choice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I intend to continue using the laptop for banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Continuous Use

*I frequently use a laptop in a day for the below activities

	Never in a day	0-15 min/day	16-60 min/day	1-3 hrs/day	More than 3 hrs/day
Downloads of banking information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Java games.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browse banks' Websites.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobile e-mail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

THANK YOU VERY MUCH!