



**EXAMINING ANTECEDENTS, MEDIATORS AND MODERATORS OF
CONSUMER BEHAVIOURAL OUTCOMES OF MOBILE BANKING**

BY

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A thesis submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the Degree of PhD in Management.

JOHANNESBURG, 2024

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ACKNOWLEDGEMENTS

I wish to express my gratitude to all the people who contributed to the successful completion of this thesis. Particular acknowledgement goes to:

- My supervisor, Prof Fanny Saruchera, for his exceptional mentorship, profound insights, and steadfast support, has been instrumental in shaping the course of this research journey. His unwavering commitment to academic excellence and meticulous attention to detail have not only enriched my understanding but also inspired me to strive for greater heights in my scholarly pursuits.
- The Bradlow foundation, for granting me a research award that covered my tuition fees, data collection expenses and data analysis software purchase.
- Dr Pia Lamberti, for always being available to provide feedback and input throughout the research journey on the thesis writing process.
- The Khoza clan - incredible kin, there when needed!
- My PhD kith, Priscah Kyalo and Edward M. Ngubane, who played valuable roles in the research journey.
- Nontobeko Masuku and Qoliswa Nzima, for their assistance with the data collection process. You literally travelled research miles!
- Sarchcot Professional Editors, for their meticulous attention to detail and dedication to linguistic precision, which helped significantly improve the clarity and coherence of this thesis.

ABSTRACT

Over the last two decades, the majority of research on mobile banking has concentrated extensively on understanding the factors influencing the adoption of this platform, indicating persistent behavioural stability even in mature markets. Recognising the limited scholarly attention given to the post-adoption phase within the context of mobile banking, the study adopts a comprehensive approach by integrating both attitudinal and behavioural drivers to comprehend the dynamics of usage, customer satisfaction levels, and resulting behavioural outcomes. The research methodology consists of two main phases. Firstly, a conceptual framework was synthesised, drawing from the unified theory of acceptance and use of technology, the innovation diffusion theory, the DeLone and McLean model of information systems success, and constructs derived from existing literature. This framework delineates the antecedents, mediators, and moderators of the proposed behavioural outcomes. Secondly, the research blueprint was implemented using a systematic approach. Adhering to a post-positivist research paradigm and deductive approach, a descriptive research design was operationalised. The survey method, employing paper-based self-administered questionnaires, was used to collect cross-sectional primary data. The target population was comprised of individual bank customers aged 18 and older in Gauteng and Mpumalanga provinces of South Africa. Purposive sampling was employed due to the absence of a banking population sampling frame. Data collected from a final sample of 453 participants underwent descriptive statistical analysis and was further subjected to partial least squares structural equation modelling (PLS-SEM), to test the proposed hypotheses. Empirical results validated the theoretical framework, confirming that quality dimensions, compatibility, performance expectancy, social influence, system use, and customer satisfaction are antecedents of mobile banking behavioural outcomes (loyalty, continuity, word of mouth). System use and customer satisfaction were identified as mediators, while perceived trust emerged as a moderator. This study transcends mere empirical model validation, illuminating the pivotal role of customer satisfaction in shaping behavioural outcomes. It highlights a refined understanding by unveiling the intricate impact of service and system quality as precursors to both usage and satisfaction, while revealing the dominance of information quality's antecedent role. As such, practitioners are urged to adopt strategic initiatives prioritising information quality and elevating customer satisfaction to unlock the full potential of mobile banking platforms. This would lead to enriched overall customer experiences and better organisational value propositions.

Keywords: *Mobile banking; Post-adoption; Customer satisfaction; Behavioural outcomes; Mediators; Moderators.*

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LIST OF ABBREVIATIONS AND ACRONYMS

AVE	Average Variance Extracted
BO	Behavioural Outcomes
CB-SEM	Covariance Covariance-Based Structural Equation Modelling
CFA	Confirmatory Factor Analysis
Comp	Compatibility
Cont	Continuity
Cred	Credibility
DMISS	Delone and Mclean's Model Of Information System Success
DOI	Diffusion Of Innovation
EFA	Exploratory Factor Analysis
GoF	Goodness of Fit
HTMT	Hetero-Trait-Monotrait
IDT	Innovation Diffusion Theory
Inforqual	Information Quality
IPMA	Importance Performance Map Analysis
KMO	Kaiser Mayer Olkin
Loy	Loyalty
m-banking	Mobile Banking
Perfex	Performance Expectancy
PLS	Partial Least Squares
PLS-SEM	Partial Least Squares Structural Equation Modelling
Qual	Quality
Satisfy	Satisfaction
SEM	Structural Equation Modelling
SERVQUAL	Service Quality
Socinf	Social Influence
Sysqual	System Quality
TAM	Technology Acceptance Model
UTAUT	Unified Theory Of Acceptance And Use Of Technology
VIF	Variance Inflation Factor
WOM	Word of Mouth

CHAPTER 1

INTRODUCTION AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

This chapter reflects on a practical dilemma by contrasting the documented transformative and inclusive potential of mobile banking with prevailing contexts of fragmented technology acceptance despite deep-rooted inefficiencies inherent in the traditional hard-cash transaction value chain. It then maps out the status quo on mobile banking research, identifying an exhaustive focus on antecedents of adoption and acute paucity of work on post-adoption customer experiences, especially behavioural outcomes. The empirical paradox and identified knowledge deficits provided the impetus for synthesising a theoretical model centred on customer satisfaction, culminating in an array of consumer behavioural outcomes.

1.2 BACKGROUND TO THE STUDY

“In the next 10 years, [mobile] technology is going to have more impact on the banking industry than we’ve seen for the last 100 years” (Casey, 2015:2). Five years later, Thusi and Maduku (2020:1) asserted: “Despite the numerous benefits of mobile banking apps, only a limited number of retail banking customers use this innovation” .

There has been growing research on mobile banking (m-banking) over the past decade (e.g. Abbas, Zaman, Ahmad, Nawaz, & Ahraf, 2019; Chawla & Joshi, 2018; Cudjoe et al., 2015; Permanasari & Munandar, 2022), mainly spurred by a narrative documented in the global Findex inclusion database highlighting that 23% of adults living on less than 2US\$/day have a bank account (Asongu & Nwachukwu, 2018) while mobile phone penetration is near or beyond saturation in many countries, at approximately 91% of the global population in 2022 (Turner, 2022). Such research has overwhelmingly focused on factors that influence customers’ attitude towards its adoption (Alalwan, Dwivedi, & Rana, 2017; McGovern, Lambert, & Verrecchia, 2019; Shareef, Baabdullah, Dutta, Kumar, & Dwivedi, 2018; Wessels & Drennan, 2010; Zhou, Lu, & Wang, 2010). For example, Alalwan et al. (2017) established that performance expectancy (PE), an inclination that transactions would be made easier

and convenient (Venkatesh, Morris, Davis, & Davis, 2003) through mobile banking, as well as perceived trust, influence customer disposition to adopt m-banking. Similarly, perceived usefulness, a proxy for performance expectancy (Venkatesh et al., 2003), was also confirmed to influence the intention to adopt m-banking, together with perceived trust (Fernandes & Frances, 2020; Shaikh, Glavee-Geo, & Karjaluoto, 2021; Siano, Raimi, Palazzo, & Panait, 2020).

Other studies echoed the positive effect of trust and social norms within the m-banking context (i.e. Bhardwaj & Aggarwal, 2016; Hassan & Wood, 2020; Malaquias & Hwang, 2019). Contextually, trust can be described as the customer's cognitive disposition to willingly undertake banking activities on their mobile devices with an expectation that the bank will meet its obligations without any oversight by the customer (Mayer, Davis, & Schoorman, 1995; Rousseau, Sitkin, Burt, & Camerer, 1998). Related to trust, the perceived credibility of m-banking, defined as perceptions of the strength of safeguards against the compromise of financial and personal information by third parties (Luarn & Lin, 2005; Wang, Wang, Lin, & Tang, 2003) was also established as impacting adoption intention (Bhatiasevi, 2016; Masrek, Halim, Khan, & Ramli, 2018). Culturally, compatibility of the interface with customers' social norms also played a decisive role in the uptake of m-banking (Koenig-Lewis, Palmer, & Moll, 2010; Lin, 2011). This skewed research focus, predominantly on adoption, was flagged by Albashrawi and Motiwalla (2017a). Significantly, extant studies do not reflect a marked shift from focusing on m-banking adoption and acceptance. Literature focusing on antecedents of adoption is vast (Alalwan et al., 2017; Bhatiasevi, 2016; Malaquias & Hwang, 2019; Solarz & Adamek, 2021; Yu, 2012) and far less focus on investigating determinants of customer satisfaction with its use, and subsequently behavioural outcomes. On face value, this suggests prevalence of adoption inertia in the research terrain, but deeper analysis of extant literature that skews heavily on the adoption aspect leaves the question of customer satisfaction unanswered.

Several of the recent studies on m-banking capture scholarly consensus about the high rates of adoption and use of m-banking in the developed economies (Hassan & Wood, 2020; Muñoz-Leiva, Climent-Climent, & Liébana-Cabanillas, 2017; Veríssimo, 2016) and a positive trend in developing countries, often in niche market segments and specific generational cohorts (Govender & Sihlali, 2014; Thusi & Maduku, 2020;

van Deventer, de Klerk, & Dye, 2018). These studies reflect a wide scope of exogenous variables (perceived usefulness, perceived ease of use, perceived risk, perceived credibility, trust and compatibility) and predominantly adoption as the endogenous variable, depending on the theoretical framework adapted (e.g. Elhajjar & Ouaida, 2019; Hoehle, Scornavacca, & Huff, 2012; Rehman, Omar, Zabri, & Lohana, 2019; Saji & Paul, 2018).

1.3 STUDY CONTEXT

In the case of South Africa, the following quote that is over a decade old is pertinent: *“Mobile banking is on the cusp of transformation from a niche service for the technologically elite to a mass-market service demanded by all customer segments”* (Deloitte, 2010:1). However, the preceding statement, when juxtaposed with an assertion that over 50% of transactions in South Africa in 2019 were cash-based (Deloitte, 2019), suggests a dilemma that persists in the banking industry: ubiquity of the service in those niche markets and a failure to break through into the mass market.

The preceding overview puts into focus the findings of Assensoh-Kodua, Migiro, and Mutambara (2016) that most studies on m-banking in South Africa focus on adoption dimensions and hardly go into the factors that influence continuance behaviour. The same focus on m-banking adoption and acceptance applies in the broader sub-Saharan African region (Pankomera & Van Greunen, 2018). Far less work in the body of knowledge addresses questions like: What is the retail bank customer’s attitude and experiences beyond adoption? What is the long-term outlook of the m-banking channel as currently constituted? This study’s purpose was to address this deficit in the South African context where extant studies predominantly focussed on antecedents of adoption intention (e.g. Koenaitse, Chuchu, & Venter de Villiers, 2019; Ntseme & Chukwuere, 2017; Slazus & Bick, 2022; Thusi & Maduku, 2020; van Deventer et al., 2018; Venter de Villiers, Chuchu, & Chavarika, 2020). These studies continued a trend evident in earlier studies on m-banking in the South African context in which the adoption drivers and adoption intention were the prevailing theme (e.g. Bankole, Bankole, Brown, & Cloete, 2012; Brown, Cajee, Davies, & Stroebel, 2003; Govender & Sihlali, 2014; Rammile & Nel, 2012).

Spurred by this background, this study utilised constructs derived from DeLone and McLean information systems success model (DMISS) (DeLone & McLean, 2016), the innovation diffusion theory (IDT) (Rogers, 1995) and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) to develop and empirically test a model that provided measures for analysing customer satisfaction with m-banking use in a developing country context, similar to studies by Aldholay, Isaac, Abdullah, and Ramayah (2018), Cidral, Oliveira, Di Felice, and Aparicio (2018), Ojo (2017) and Rana, Dwivedi, Williams, and Lal (2015). These measures may be extrapolated to encompass a bigger market segment than currently obtained in the South African banking industry. Unique insight lies in the country's socio-economic disparity that provides market segments with diametrically opposite perceptions of the platform: an educated middle and upper-middle-class segment with first-world uptake of the m-banking (Govender & Sihlali, 2014; Maduku & Mpinganjira, 2012; Ntseme & Chukwuere, 2017) in co-existence with lower living standards measure (LSM) categories that hardly make use of the service (Koenaitte et al., 2019; Rammile & Nel, 2012). Quite relevant for practitioners in a traditional banking ecosystem that is under threat from emerging banks and fin-techs that intend to radically reconfigure the industry, with digital transactions providing the contested terrain (Camarate & Brinckmann, 2017; Camarate & Maritz, 2018; Coetzee, 2019; Harvard Business Review, 2019). Hence this study focused on this banking interface, regarded by certain market segments as accessible, secure, convenient and authentic, yet viewed sceptically by a market segment that is too big to ignore. This underlying tension and inertia provided the study's *raison d'être*.

At a global level, despite the reported high rates of adoption in recent studies (Farah, Hasni, & Abbas, 2018; Foo-Wah, Fakhrorazi, & Islam, 2019; Malaquias & Silva, 2020; Orehovački, Blašković, & Kurevija, 2023; Shankar & Rishi, 2020; Zhang, Lu, & Kizildag, 2018), inconsistencies that reflect divergence not indicative of an outlier effect persist. As alluded to, the dichotomy is captured in studies showing strong respondent affinity to m-banking in tandem with other studies that assert scepticism from respondents. For example, Becker, Stolper, and Walter (2022), as well as Orehovački et al. (2023), highlight that m-banking has become a well-established transaction channel for a long time, and this has been characterised by a big shift from hard cash to cashless transaction methods. However, other studies signal that m-

banking is still not entrenched in many societies as a transacting mechanism, still subservient to other traditional banking mechanisms (e.g. Farah et al., 2018; Mashithoh & Rahmat, 2021). These contestations are further evident in studies by Abayomi, Zhang, Peng, and Zhao (2020), Chigada and Hirschfelder (2017), and Elhajjar and Ouaida (2019). These divergencies motivated this study to investigate customer satisfaction with m-banking from an information system perspective, as motivated by Chung and Kwon (2009).

1.4 KNOWLEDGE GAP AND RESEARCH PROBLEM

1.4.1 Knowledge gap

Researchers in various contexts have pitched m-banking as a panacea to uplift people with low incomes (Ahmad, Green, & Jiang, 2020; Chitungo & Munongo, 2013; Cruz, Neto, Muñoz-Gallego, & Laukkanen, 2010; Fall, Orozco, & Akim, 2020; Okello, Ntayi, Munene, & Malinga, 2018; Purohit & Arora, 2021), also replicated in South Africa (Deloitte, 2010; Ismail & Masinge, 2012; Masinge, 2010), due to the ubiquity of the cell phone compared to devices used for internet banking (Chitungo & Munongo, 2013; Maduku & Mpinganjira, 2012; Wentzel, Diatha, & Yadavalli, 2013). Consequently, pioneering work on m-banking in South Africa, like in the broader context, focused on the antecedents of adoption and factors influencing potential resistance (Brown et al., 2003; Brown & Molla, 2005).

While recent studies have primarily focused on antecedents of adoption of m-banking as previously outlined (performance expectancy, social norms, compatibility, credibility) (Agyei, Sun, Abrokwah, Penney, & Ofori-Boafo, 2020; Chawla & Joshi, 2018), there is emerging clarity in articulation of the convenience and accessibility of m-banking, spurred by the boom in mobile communication device ownership over the past decade (Lightico, 2020; Owusu et al., 2021; Ruano-Arcos, Rodríguez-Orejuela, & Solís-Molina, 2020; Shankar & Rishi, 2020). Some of the studies focused on customer perceptions of m-banking by contrasting the urban-rural divide (Malaquias & Silva, 2020; Njenga & Ndlovu, 2013; Pankomera & Van Greunen, 2018) while others juxtaposed the platform across national boundaries (Hassan & Wood, 2020; Malaquias & Hwang, 2019). Some recent studies tend to report varied rates of

acceptance of m-banking, from relatively low (Makanyeza, 2017; Muñoz-Leiva et al., 2017; Shaikh, Karjaluoto, & Chinje, 2015a) to relatively high (Foo-Wah et al., 2019; Islam et al., 2017; Ntseme & Chukwuere, 2017; Rabaa'i & AlMaati, 2021; Shaikh et al., 2021; Shankar & Rishi, 2020; Zhang et al., 2018). A case in point is the assertion by Becker et al. (2022) that m-banking has been the fastest growing banking channel in recent years.

The golden thread running through most of the extant studies across the evolution of m-banking is the theoretical focus of researchers on its adoption. What appears missing from this chronology is research work that focuses on the actual use of m-banking, and, more importantly, behavioural outcomes consequent to m-banking adoption and use (Ashique & Subramanian, 2022). Focusing on extant studies on online banking, “the post-adoption phase remains largely neglected” (Oertzen & Odekerken-Schröder, 2019: 1394). Post-adoption manifests through system use, for actual system use is a documented antecedent of customer satisfaction (Petter, DeLone, & McLean, 2013). Not much work is evident on the antecedents of customer satisfaction and outcomes (Souiden, Ladhari, & Chaouali, 2020).

Additionally, inclusive of the few studies that have gone beyond initial adoption and looked at actual m-banking use and continuance behaviour, there has been a lack of integration across these phases, leading to fragmentation and compartmentalisation (Humbani & Wiese, 2019). This motivated the inclusion of the DMISS quality dimensions in the study as they would impact retention and continued use of m-banking. The pyramidal hierarchy shown in Figure 1.1 captures this asymmetry as it depicts the intense research focus on the adoption phase of the m-banking spectrum (bottom of the pyramid). As shown in the diagram, this study is pitched at the middle of the pyramid, going up.

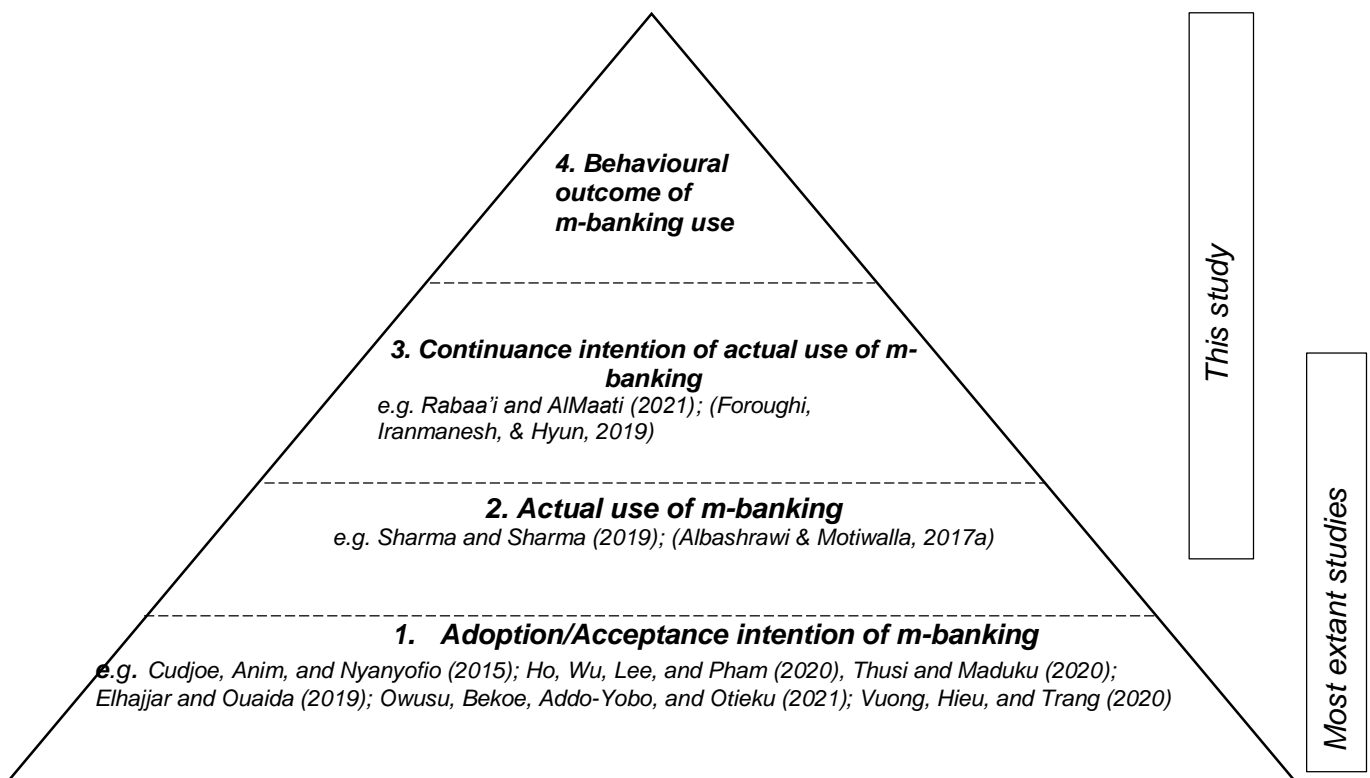


Figure 1.1: Pyramidal hierarchy of m-banking research focus to date Source: Developed for the current study

This gap in the scholarly work is not mundane. Addressing it potentially moves the m-banking academic discourse to where the emerging middle-class customer is. Beyond adoption. The emerging generation Y and Z customers have demonstrated willingness to adopt and thrive on everything tech (Moreno, Lafuente, Carreón, & Moreno, 2017; Sharp & Bevan-Dye, 2014). Their brand or service provider choice depends largely on customer satisfaction and convenience (Au-Yong-Oliveira, Gonçalves, Martins, & Branco, 2018; Moreno et al., 2017). Younger customers show less loyalty to brands that are slow to embrace new tech trends (Au-Yong-Oliveira et al., 2018; Moreno et al., 2017; Purani, Kumar, & Sahadev, 2019). Accordingly, this study joins into the theoretical discourse on m-banking by using a more holistic approach that looks at antecedents to actual use, customer satisfaction, and continuance use drivers, as well as spotlighting the behavioural outcomes. By intervening in this gap using an integrated theoretical framework, the study cumulatively shifts the m-banking research frontier up the pyramid annotated in Figure 1.1.

1.4.2 Financial inclusion from a mobile banking perspective

The transformative potential encapsulated by m-banking lies in its financial inclusion capability. M-banking can bring people with low incomes and who are unbanked into the formal financial system (Tchouassi, 2012). Financial inclusion refers to mechanisms that enable the economically disadvantaged members of the society to access the formal financial channels (banking, payments etc) at an affordable cost and sustainably (Bakari et al., 2019). In developing economies, studies have shown the nexus between the dissemination of mobile technologies and the reduction in financial exclusion and poverty (Asongu & Nwachukwu, 2018; Bending et al., 2015; Mlachila et al., 2013; Nan, Zhu, & Lynne Markus, 2021). Studies assert that, when fully utilised, m-banking reduces the inconvenience and cumbersome red tape that is prevalent in traditional financial access channels (Bhuvana & Vasantha, 2019; Mohapatra, Moirangthem, & Vishwakarma, 2020; Ndlovu & Ndlovu, 2013).

Hence, the attainment of the transformative potential of m-banking (Muzurura & Chigora, 2019) in the South African economy that is characterised by vast inequality and a very high Gini coefficient (Hassan & Meyer, 2021) would be by narrowing the gap between mobile phone ownership (which is beyond saturation in South Africa) (Chigada & Hirschfelder, 2017), and the effective access to banking services using these communication devices. Within the South African context, there are approximately 90 million mobile connections, greater than the estimated population of 60 million (Gillwald & Mothobi, 2019). This reflects saturation, which does not tally with the less than 15% of subscribers who are m-banking clients (Chigada & Hirschfelder, 2017; Gillwald & Mothobi, 2019).

The ideal situation obtains when m-banking transcends into an agency of financial transformation, in which people experiencing and those surviving on the periphery of the legacy economy gain access to main-stream financial services at an affordable cost (Anarfo, Abor, Osei, & Gyeke-Dako, 2019; Candy et al., 2022; Sanderson, Mutandwa, & Le Roux, 2018). Despite a lack of consensus around the figures, relevant examples include a situation in which the adoption and use of m-banking matches or becomes greater than the traditional banking channels, like in the United States where

m-banking adoption and use is projected to go above 60% in 2024 (Rajaobelina, Tep, Arcand, & Ricard, 2021) or 89% according to Business-insider (2020). In such markets, m-banking has been documented as the fastest disseminating and accessible channel for customers to access banking services (Shankar, Jebarajakirthy, & Ashaduzzaman, 2020).

Extensive uptake of m-banking can provide catalytic impetus for most economically active citizens to partake in the formal financial system (Mohapatra et al., 2020). This participation provides mainstream benefits and opportunities that transform families and economies at an accelerated rate. In western Europe and north America, m-banking was launched in the 1990s and its convenience led to rapid acceptance and dissemination (Alsmadi, Shuhaiber, Alhawamdeh, Alghazzawi, & Al-Okaily, 2022). This resulted in a major shift to cashless payment mechanisms after the adoption of m-banking (Becker et al., 2022). Developing countries have largely been late and fragmented in the adoption curve, with Kenya providing a positive outlier when the text-message-based M-PESA channel was launched in 2007 and took off at a rate not seen in developed countries that introduced m-banking prior (Alsmadi et al., 2022).

1.4.3 Mobile banking: research problem in context

The preceding discussion on the inherent financial inclusion potential in m-banking is not evident in many countries, including South Africa. The practical problem driving this study is the heavy reliance on hard cash transactions by a large segment of the banked South African population (Deloitte, 2019; Mastercard, 2017; Tech Financials, 2022). Hard cash usage continues to grow 6-10% per annum ahead of inflation in South Africa (Deloitte, 2019). This study delineates cash transactions as those conducted using notes and coins, hence excludes debit and credit card use. In South Africa's informal economy, hard cash is predominantly used as a means of payment (Deloitte, 2019; South African Reserve Bank, 2018) and not as a store of value (Bech, Faruqi, Ougaard, & Picillo, 2018). This is a problem due to the direct and indirect high cost of hard cash for the consumer, at approximately R23 billion per annum or 0.52% of the country's GDP (Deloitte, 2019; Mastercard, 2017). Direct costs include installation and maintenance of cash infrastructure: ATMs, branch costs, security personnel, costs of printing the cash, and cash back at points of sale (Deloitte, 2019;

Genesis Analytics, 2017; PASA, 2019). Indirect costs include travel costs, time-related costs, theft, robberies, inflation, and foregone interest, accentuated during high-interest rate macro-economic cycles. Crime often leads to cost in human lives lost in cash heists and hold-ups, which are not quantifiable financially (Mastercard, 2017; PASA, 2019). These costs are borne predominantly by low-income people who mostly transact in the informal economy (Deloitte, 2019; PASA, 2019; Tech Financials, 2022). Furthermore, the hard-cash economy tends to cost many customers in terms of the time-value of hard cash transactions. The opportunity cost of hard-cash transactions due to the deprivation of access to “anytime, anywhere” (McGovern et al., 2019) transactions available through digital options is substantial (Bech et al., 2018). Additionally, at a macro-level, an economy that heavily runs on hard-cash transactions deprives the fiscus of tax revenue if most occur in the informal sector, which is the case in South Africa (Finscope, 2019; PASA, 2019). This adversely impacts the country’s global competitiveness. Hard-cash transactions conducted in the informal sector cost the country’s fiscus nearly R88 billion per annum in tax revenue in the 2018-2019 financial year (Deloitte, 2019; PASA, 2019).

1.5 RESEARCH PURPOSE STATEMENT

The high levels of routinised acceptance and use of m-banking in developed countries since its inception in the 1990s (Zhang et al., 2018) is echoed by recent studies in South Africa in urban areas focusing on younger consumers (Thusi & Maduku, 2020; Van Deventer, 2019). The lack of recent studies in South Africa on m-banking system success, despite a background of apparent high levels of acceptance in specific market segments, mirrors the global scenario in which only a handful of studies have focused on the post-adoption landscape (Albashrawi & Motiwalla, 2017a), revealing a gap in the scholarly work. To address this deficit, the study operationalised a moderated-mediated framework derived from integrating constructs from the DMISS model, and the UTAUT and IDT theories. A moderated-mediated framework was implemented because previous studies on m-banking have established that some of the constructs have provided antecedent, consequent, mediation and moderation effects, varying according to the study. The extant studies show that the selected constructs play a role in the adoption, or use, or customer satisfaction, from m-

banking. Hence the implementation of a study that tests for both potential mediation and moderation within the same framework.

Motivated by Laukkanen (2016), Sanakulov and Karjaluoto (2015), Souiden et al. (2020) and Tam and Oliveira (2017a), who identify that most studies over the past decade focused on the antecedents of m-banking adoption, this study purposely deviated to the post-adoption landscape. Focusing on South African market segments in which the acceptance of m-banking is fragmented according to demographics, the study aimed to establish how performance expectancy, compatibility, perceived quality and social norms influence the adoption and use of m-banking, customer satisfaction and behavioural outcomes arising thereof. This orientation also provided a snapshot of customer feedback about m-banking. It also quantified the impact of postulated moderating effects of perceived trust and perceived credibility of m-banking.

1.6 THEORETICAL FRAMEWORK

The study is based on three theories: the unified theory of acceptance and use of technology (UTAUT), the DeLone and McLean information system success model (DMISS) and the diffusion of innovation theory (DOI/IDT). The three theories have been used extensively in previous studies on m-banking, predominantly focused on adoption and use (e.g. Tarawneh, Nguyen, & Fie, 2021; Thusi & Maduku, 2020). This background provided the rationale for invoking these theories in this study in an integrated manner because the main thrust was to transition to a post-adoption phase. This over-arching objective motivated the selection of specific constructs from each theory that contributed to conceptual resonance when the study model was brought together (Figure 1.2). Constructs that were adapted from the UTAUT and the IDT (performance expectancy, social influence, compatibility) provided the required adoption-driven grounding, while those from the DMISS model and extant studies (system, information and service quality, use, satisfaction, credibility, trust, behavioural outcomes) were relevant for the post-adoption spectrum of the study's blue-print. Furthermore, selected constructs had to address specific study objectives, outlined in the next sub-section of this thesis, as recommended by Burton-Jones, McLean, and Monod (2015). A brief exposition of each theory is given here, with greater theoretical discussion provided in Chapter 2 of the thesis.

1.6.1 The UTAUT theory

The UTAUT theory states that technology adoption and/or use is firstly depicted by behavioural intentions that depend on performance expectancy, facilitating conditions, social influence and effort expectancy (Venkatesh et al., 2003). The seminal theory posits that the stated relationships are moderated by gender, age, experience and voluntariness of use (Venkatesh et al., 2003).

1.6.2 The DMISS model

The DMISS model was postulated as specifying the measures and dimensions depicting how to evaluate the success of an information system by looking at how system quality, information quality and service quality influence its use and customer satisfaction, culminating in either positive or negative impacts at an individual or organisational level (DeLone & McLean, 2003), subsequently termed net impacts (DeLone & McLean, 2016).

1.6.3 The IDT (DOI) theory

The innovation diffusion theory was postulated to delineate the stages of consumers' uptake of new technologies. It stipulates the five attributes that catalyse the dissemination of the emergent innovation: relative advantage, compatibility, complexity, trialability and observability (Rogers, 1995).

1.7 RESEARCH OBJECTIVES

The primary research objective was to determine the predictors of the use of m-banking, and customer satisfaction with m-banking, leading to the behavioural outcomes of its use and satisfaction. Consequently, the following specific objectives were pursued:

- To establish the effect of compatibility, performance expectancy and social influence on the use of m-banking by customers in the South African banking context.

- To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with the use of m-banking and performance expectancy in the South African banking context.
- To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with satisfaction with m-banking and performance expectancy, trust and credibility with satisfaction with m-banking.
- To test and evaluate associations of the use of m-banking with customer satisfaction and the behavioural outcomes of m-banking.
- To test and evaluate associations of customer satisfaction from m-banking with the behavioural outcomes of m-banking.
- To examine the proposed mediation effect of use of m-banking in the relationship between the quality dimensions and customer satisfaction, and the mediation effect of customer satisfaction in the relationship between the use of m-banking and behavioural outcomes.
- To examine a proposed serial mediation effect of performance expectancy and use of m-banking on the associations between the quality dimensions and customer satisfaction with m-banking.
- To examine and empirically test proposed moderation effects of perceived credibility and perceived trust on the association between the use of m-banking and customer satisfaction, as well as the moderation effect of perceived trust on associations between service quality and customer satisfaction as well as information quality and customer satisfaction.
- To examine and empirically test proposed moderated mediation by trust on the association between service quality and the behavioural outcomes of m-banking use (WOM, loyalty, continuity).

1.8 RESEARCH QUESTIONS

Synthesised from the m-banking extant literature, the following main research question was the genesis of the study:

What role does performance expectancy, social norms and quality dimensions play in the use, and, customer satisfaction from m-banking and behavioural outcomes?

This was pursued by addressing the following specific research questions:

- To what extent do performance expectancy, compatibility, social influence and quality dimensions (information, service, system) influence customers' use of m-banking?
- How, and to what extent, does the use of m-banking mediate the effect of quality dimensions (information, service, system) on customer satisfaction with m-banking?
- How, and to what extent, does the nature of the use of m-banking affect customer satisfaction?
- How, and to what extent, does customer satisfaction with m-banking affect the behavioural outcomes that arise?
- How, and to what extent, is the effect of the use of m-banking on customer satisfaction from m-banking, moderated by perceived trust?
- How, and to what extent, is the effect of the use of m-banking on customer satisfaction from m-banking, moderated by its perceived credibility?

The preceding research questions are not exhaustive, as other mediation questions and possible hypotheses could have been drafted, emanating from the conceptual framework presented in figure 1.2. However, for the overall study objective, the aforementioned research questions were considered adequate in scope, depth and rigour.

1.9 PROPOSED CONTRIBUTION OF THE STUDY

The study's contribution is two-fold: theoretical and managerial. The theoretical contribution revolves around developing, testing and validating a model that clarifies the relationships between antecedents, mediators and moderators of customer satisfaction that culminates in identified behavioural outcomes in a m-banking context. Managerially, it clarifies strategies for reaching current and prospective m-banking customers by mainly addressing quality dimensions.

1.9.1 Theoretical contribution

Analysing prior literature that mostly terminated m-banking studies with adoption (or intention) or customer satisfaction, revealed a theoretical gap (Miles, 2017), leading to this study making a conceptual contribution (Summers, 2019) by proposing and

defining consumer behavioural outcomes as a quantifiable consequent of the use of mobile banking, as well as customer satisfaction. Furthermore, the study specifies the sub-dimensions reflected by behavioural outcomes (continuity, loyalty and word-of-mouth), which is not evident in previous studies on m-banking.

Upon identifying an empirical gap in previous m-banking studies (Miles, 2017; Müller-Bloch & Kranz, 2015), characterised by a lack of attention to how credibility and trust could impact the relationship between use and customer satisfaction from m-banking, this study makes an empirical contribution, as specified by Summers (2019) by proposing an examination of the effects of perceived credibility and trust as potential moderators of the interaction between use of m-banking and customer satisfaction in an m-banking context. Previous m-banking studies have mostly proposed these constructs as direct predictors or mediators of m-banking (e.g. Al-Ghazali, Rasli, Yusoff, & Mutahar, 2015; Damabi, Firoozbakht, & Ahmadyan, 2018; Geebren, Jabbar, & Luo, 2021; Vuong et al., 2020). Another empirical contribution is the study's proposition that customer satisfaction mediates the interaction between the use of m-banking and behavioural outcomes, which is not evident in the extant literature on m-banking.

By bringing together performance expectancy, compatibility, social norms and the DMISS quality dimensions, the study makes another empirical contribution by illustrating empirical synergy between attitudinal and experiential effects in the antecedence to customer satisfaction. Recent studies on m-banking that focused on adoption as the ultimate dependent variable have mostly used a fragmented approach, revealing a conceptual integration gap that this study shows can be bridged (Agyei et al., 2020; Chawla & Joshi, 2018; Ho et al., 2020; Shareef et al., 2018). This integration occurs within a background in which the few studies focused on the success of m-banking have predominantly applied the DMISS model. However, they have largely used the model uncritically by adopting it holistically and dropping one or two base constructs (e.g. Jaafreh, 2017; Maraqa, Al-Amawi, & Hashem, 2018; Sharma & Sharma, 2019; Tam & Oliveira, 2017b). While this strategy is relevant and important, this study endeavoured to build on what is known by integration, and tests the boundary conditions extracted from more than one theory (MacInnis, 2011). The

proposed symmetry between constructs identified from DMISS, UTAUT and IDT is not evident in extant studies on m-banking post-adoption behaviour.

1.9.2 Contribution to industry

Unlike some previous studies (e.g. Cruz et al., 2010; Luarn & Lin, 2005) this study was premised on shifting the m-banking implementation strategy beyond acceptance and adoption success factors. It explored behavioural factors that would be important to practitioners interested in knowing what to address to improve customer loyalty, continued patronage and positive word-of-mouth about m-banking from customers. This is done through by providing a model from which m-banking practitioners can extract strategy drivers aimed at customer retention, market penetration and growth in market share by addressing customer satisfaction with m-banking at the front-end and at the back-end. The front-end focuses on new m-banking clients by addressing performance expectancy, compatibility, social norms and credibility. The back-end revolves around customer satisfaction, which depends on taking care of system quality, information quality and service quality, meeting the needs of repeat customers, and extracting more value from infrequent platform users.

The study illuminates mechanisms that could address the low diffusion rates in the lower LSM categories. To this effect, banks may benefit by using a tiered tariff system to incentivise the lower income brackets. By establishing the antecedents to both customer satisfaction and behavioural outcomes, the study provides practitioners with a marketing strategy blueprint as it identifies and ranks the predictors according to importance and performance mapping. Consequently, practitioners can streamline their marketing campaigns, prioritising key antecedents for a specific target market. This would facilitate a departure from reliance on relatively expensive traditional legacy media channels that affords little differentiation (television, radio and the printed press (newspapers and magazines)) to contemporary, less cumbersome mobile digital platforms (smartphones, iPADS, smartwatches and PDAs). This may also make reaching customers segmented demographically easy when they post their ads on social media channels (YouTube, Facebook, X, Tiktok, Instagram, LinkedIn, etc.). What sets these practical contributions apart is that empirical work addressing

behavioural outcomes of m-banking use and customer satisfaction is not prevalent in the current m-banking body of knowledge.

1.10 RESEARCH CONCEPTUAL MODEL

Figure 1.2 presents a concise depiction of the research model in which the conceptualised exogenous constructs are performance expectancy (PE), compatibility (COMP), social influence (SI) and the quality dimensions (QUAL) (system quality, information quality and service quality). The model posits a sequential mediation block that consists of use of m-banking as well as customer satisfaction. It further posits that the ultimate endogenous construct in the study is a set of customer behavioural outcomes (BO). A detailed model tested through empirical measurement is presented in Chapter 3 in which the behavioural outcomes are specified to be continuity, loyalty and customer word of mouth.

Briefly, the study explores the influence of PE, COMP, SI and quality of the m-banking channel on the use, anticipated use and, subsequently, customer satisfaction in the banking context. Furthermore, the model presents a framework showing the association between the use of m-banking and customer satisfaction with the individual behavioural outcomes that are reflected by customer loyalty (or lack thereof), word of mouth, and continuity. The extrapolation from use/intention and customer satisfaction to behaviour patterns uniquely contributes to the theory and practice of m-banking. Theoretically, this aspect of consumer behaviour in the m-banking context has not been explored much in the extant literature, despite indications in the same literature of its increasing significance due to demographic shifts and increase in communication technology accessibility and dissemination. Practically, a framework that provides measurement of consumer behaviour provides tangible metrics for decision-makers in the retail banking industry. The envisaged research blueprint that combines the aforementioned constructs is presented in Figure 1.2.

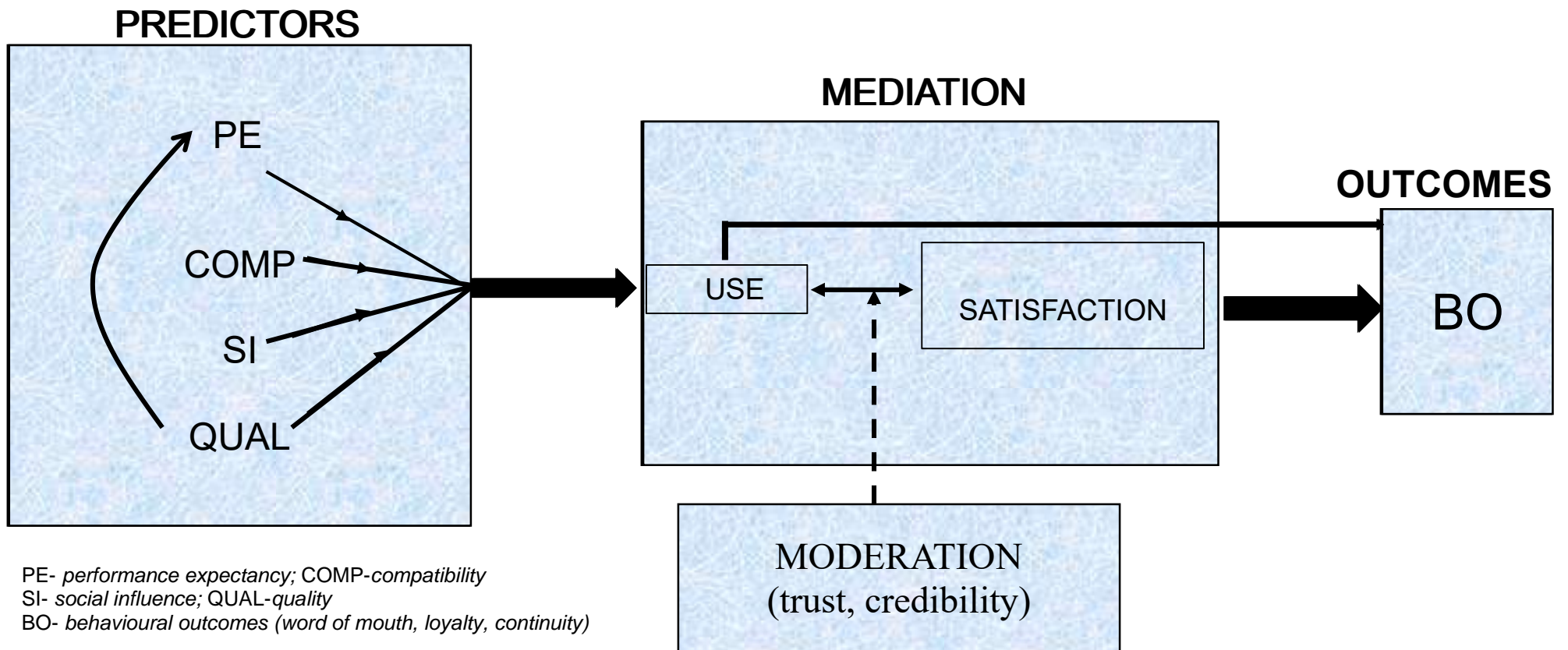


Figure 1.2: Conceptual model

Source: Developed for the current study

The conceptual model in Figure 1.2 shows associations between latent variables in attitudinally framed relationships between the constructs PE, COMP and SI and the mediators, use and customer satisfaction. Concurrently, it posits behaviourally pitched relationships between the quality dimensions (system, information and service quality) and the mediators. Additionally, the model proposes that trust and credibility have a moderating effect in the association between the use of m-banking and customer satisfaction premised on the nature of m-banking transactions that can be viewed as high risk by customers. Lastly, the model shows the final set of relationships which lead to the behavioural outcomes. The research conceptual model is explored in greater detail in Chapter 4 of the thesis wherein specific hypotheses are explicitly synthesised based on prior literature and relevant theory.

1.11 DELIMITATION OF THE STUDY

The research framework was operationalised on a sample of retail banking clients in South Africa. This means the focus was on individual bank clients and potential m-banking customers. Collective entities and businesses were excluded from the study. This is because the main study objective was to establish the drivers of customer satisfaction and the behavioural outcomes of m-banking use at the individual customer level. The study focused on consumers 18 years and older as they are not considered to be minors and could provide feedback that added value to the investigation. The study did not restrict the banking institution a customer belonged to as it was for all retail bank customers. People without bank accounts were excluded from the study as the research instrument was designed to solicit responses that were relevant to bank account holders. The study defines mobile banking as transactions done on mobile devices (cell phones, smart phones, PDAs, smartwatches, etc) (Shaikh & Karjaluoto, 2015; Tam & Oliveira, 2017a). It excludes access through laptops and desktop computers, classified as internet banking devices in this study context because they operate on the same access interface, quite different from the one on hand-held mobiles. This delineation of mobile banking access devices is evident in extant studies (e.g. Bhardwaj & Aggarwal, 2016; Shaikh & Karjaluoto, 2015; Tam & Oliveira, 2017a; Zhang et al., 2018).

In formulating the theoretical model, constructs were selected from three theories: DMISS, UTAUT and IDT, with the DMISS playing a central role. The DMISS model was ideally suited as it is premised on measuring the success of an information system. The quality dimensions stipulated in DMISS were ideal for measuring banking clients' attitudes pitched at the post-adoption phase of the m-banking value chain and customer experience curve. Only compatibility was incorporated into the research model from the IDT, while social influence and performance expectancy were the only variables adopted from the UTAUT. While UTAUT2 (Venkatesh, Thong, & Xu, 2012) is conceptually superior and more exhaustive (Venkatesh, Thong, & Xu, 2016), the study invoked the seminal UTAUT model (Venkatesh et al., 2003) because of its parsimony, and it contains the constructs that were identified as resonating with those identified for the study from the other theories. These theories are discussed in greater detail in chapters two and three of this thesis. The choice of variables was driven by the research objectives which required coverage of both experiential and attitudinal drivers of post-adoption behaviour. Hence there is a need for the variables to be complementary when put together. The post-adoption positioning of the study precluded commonly used m-banking adoption theories like the technology acceptance model (TAM, and TAM 2), the entirety of the UTAUT (including UTAUT 2), the entirety of the IDT, theory of planned behaviour (TPB), and the task technology fit framework (TTF). Most of these theories focus on the drivers of consumer attitude and behavioural intent. For example, the TAM is premised on the perceived ease of use of a technology and perceived usefulness, culminating in adoption intention. In contrast, the few studies on m-banking pitched at the post-adoption phase have predominantly made use of the DMISS model in tandem with another theory or its adaptation and incorporated other variables (e.g. Albashrawi & Motiwalla, 2017b; Baabdullah, Alalwan, Rana, Kizgin, & Patil, 2019; Sharma & Sharma, 2019; Tam & Oliveira, 2017b).

1.12 DEFINITION OF KEY TERMS

In order to delineate the study's underlying nomenclature, it is pertinent to provide contextual definitions for the key terms used repeatedly in the thesis. The definitions were identified based on alignment with the research objectives and best-fit with the

primary study constructs. The selected terms that underscore the research blueprint are: mobile banking (m-banking), perceived quality, behaviour, behavioural outcome, customer satisfaction and system use.

1.12.1 Mobile banking (m-banking)

Mobile banking incorporates using smart phones or other mobile devices to undertake banking transactions such as checking account balances, transferring funds between accounts, paying bills, finding ATMs, etc. (Mahad, Mohtar, & Othman, 2016).

1.12.2 System use

System use refers to the actual utilisation of an information system, at different levels of contact and intensity, by the intended consumers either in a process sense or causal sense, which could be voluntarily or under mandate (DeLone & McLean, 2003).

1.12.3 Perceived quality

According to Masrek et al. (2018), perceived quality is a construct that consists of two dimensions which are information quality and system quality, wherein information quality is operationally defined as the extent to which users believe that the information retrieved from the mobile banking channel is accurate and per their expectation. Broadly, system quality refers to the desirable attributes of an information system like its flexibility, its simplicity, reliability, response time, etc (DeLone & McLean, 2016). Contextually, system quality can be defined as the extent to which m-banking users believe that the platform is reliable, accessible, prompt, efficient and effective (Masrek et al., 2018). In this study, service quality was part of the sub-dimensions that made up the conceptualisation of perceived quality. It can be delineated as the extent to which the users of an information system receive support when and if they need it from the service provider and intermediaries (DeLone & McLean, 2003).

1.12.4 Customer satisfaction

Customer satisfaction is defined as the extent to which users of the information system are pleased with the mobile banking services because their m-banking needs and expectations are fulfilled by the service provider (Masrek et al., 2018).

1.12.5 Behaviour

Behaviour is an indication of how an individual, by way of action or reaction, acts towards people, society, objects, etc (Lazzeri, 2014).

1.12.6 Behavioural outcomes

Behavioural outcomes refers to cognitive and/or affective responses to stimuli that arises from experiential and/or attitudinal experiences (Gyaneshwar Singh & Shiv Ratan, 2016).

1.13 CHAPTER SUMMARY AND OUTLINE OF THE STUDY

This chapter has introduced the study by outlining the background that revealed both a managerial conundrum and a theoretical gap in the extant literature on m-banking that is evident locally and globally. Having outlined the scholarly discourse that prevails in the m-banking body of work, the discussion then positioned how this study joins into the debate. This was done by posing research objectives that had to be accomplished to answer the stated research questions that arose through engagement with the extant literature. An outline of the problem statement was followed by a pictorial depiction of the synthesised research model that needed to be operationalised in pursuit of the stated objectives. Also covered was a brief overview of the study's contribution to both theory and practice. The rest of the thesis is arranged according to the subsequent chapters as follows:

Chapter 2 starts with the theoretical grounding of the study which brings together the three theories that provided the primary framework for the study's conceptualisation. A reflective and critical literature review of empirical extant studies on m-banking follows this. A funnel approach was adopted as the literature review starts at a global level and filters down to the local level, culminating in the in-depth discussion of m-

banking adoption, use, customer satisfaction and continued use within a South African context.

Chapter 3 discusses the extant studies as per levels in the m-banking value chain: adoption drivers, use of m-banking, customer satisfaction, and behavioural outcomes. This discussion provides grounding for the hypothesis formulation, which is the major theme of the chapter. The hypotheses are inclusive of direct relationships between variables as well as mediation and moderation propositions.

Chapter 4 describes the research methodology, research design, philosophical underpinning and practical execution of the study in the field. The practical execution details about how the data was collected, captured, processed and analysed.

Chapter 5 outlines the rigorous quantitative data analysis that was undertaken, starting with the sample profile, followed by the measurement model and finally the structural model analysis that provided metrics for testing the hypotheses posed in Chapter 3 of the thesis. The analysis encapsulates the direct, mediated and moderated relationships.

Chapter 6 provides a recapitulation of the study that recasts the study objectives in light of the research findings emanating from the previous chapter on data analysis. The discussion of the research findings was done systematically per the research objective. It was done reflectively in light of previous studies on m-banking. Contextual extrapolations were made per research objective's findings. This provided insights that placed the study's findings within the broader m-banking field.

Chapter 7 closes the thesis by providing thematic conclusions summarising the thesis framed at the antecedence, mediation, moderation and behavioural outcomes level respectively. This was followed by a detailed outline of the study's contributions to the theoretical body of knowledge specific to m-banking. It also includes implications and recommendations for m-banking industry practitioners. The discussion also identifies and makes recommendations focussing on what studies on m-banking in the future could explore emanating from the study's findings and limitations.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides a reflective outline of the extant knowledge on m-banking at a global level and then systematically narrows down to a local level, focusing on the post-adoption realm. In so doing, it filters down to contextually and theoretically relevant antecedents (such as performance expectancy), moderators (such as trust) and behavioural outcomes of continued use of m-banking (such as loyalty). The convergence culminates in the synthesis of a unique moderated-mediated integrated conceptual framework borne out of three theories: DMISS, UTAUT and IDT.

2.2 THEORETICAL GROUNDING

The theoretical constructs postulated for this study are performance expectancy and social influence from the UTAUT theory (Venkatesh et al., 2003); compatibility from the IDT theory (Rogers, 2003); system quality, information quality, service quality, system use and customer satisfaction from the DMISS model (DeLone & McLean, 1992, 2003, 2016). These constructs provide the theoretical underpin for the study.

2.2.1 DeLone and McLean model

The DMISS model was postulated as a framework for specifying and evaluating the dimensions that measure the success of an information system (IS) (DeLone & McLean, 1992, 2003, 2016). The seminal model comprised of individual and organisational impact; system use; user satisfaction; system quality and information quality (DeLone & McLean, 2003). It was updated in 2003 and net benefits replaced the two impact attributes. Also, service quality was added as a predictor variable. The latest updated version replaced 'net benefits' with 'net impacts' (DeLone & McLean, 2016).

A recurring theme in all three model iterations is that the selection of success dimensions and measures should be contingent on the objectives and context of the

empirical investigation (DeLone & McLean, 2003). Also, the model is premised on both a variance and process perspective (Burton-Jones et al., 2015; DeLone & McLean, 2003), despite criticism that this juxtaposition is untenable and creates ambiguity, resulting in a lack of specificity and clarity (Burton-Jones et al., 2015; Seddon, 1997). While largely validating the relevance and robustness of the model in studying IS success, Jeyaraj (2020), Mardiana, Tjakraatmadja, and Aprianingsih (2015) and T. D. Nguyen, Nguyen, and Cao (2015), indicate that contestations around the model persist: inconsistency in application; attributes, roles and relationships of the success dimensions are highly debated. While Jeyaraj (2020) questions the robustness of service quality's dimensionality, studies on the service industry (e.g. Ojo, 2017; Sharma & Sharma, 2019; Tam & Oliveira, 2016) have confirmed and validated it.

Despite criticism due to inconsistent empirical invocation of the model constructs (Jeyaraj, 2020), the value of this ambiguity is model flexibility, sustenance of higher degrees of freedom and generalisability (Bhattacharjee, 2001; Mardiana et al., 2015). Concurrently, this ensures model parsimony and high predictive and explanatory power from the least number of constructs (Weber, 2012). Empirical studies provided sufficient evidence of the model's resilience and rigour in falsifiability, a requirement for 'good' theory (Bacharach, 1989; Weber, 2012). Contestation around the model's positioning culminates in this study concurring with the proposition by Burton-Jones et al. (2015) that researchers may benefit from constructing a framework driven by their research questions; hence focus is placed on conceptual resonance and alignment.

In terms of investigating the South African m-banking interface from a customer's perspective, Burton-Jones et al. (2015) provide a convincing thesis that strongly advocates a theoretical paradigm in which the study is not premised on the traditional variance/process dichotomisation. Rather, it can be an intersection between the two, premised on conceptual latitude and conceptual fitness. This is driven by the demonstrably contested nature of the information systems success terrain. Hence, in this study, select constructs established to be relevant are invoked: the quality dimensions (system, information and service), user (customer) satisfaction and system use.

2.2.2 The unified theory of acceptance and use of technology (UTAUT)

The UTAUT was developed by Venkatesh et al. (2003) as a unified theory that incorporated eight models that dealt with adoption of new technology and general human behaviour. Their objective was to provide a grand theory that could be used to study information systems and technology acceptance and dissemination (Rana et al., 2015). The background was that many researchers were collating and integrating constructs from different, but broadly similar theories in their research (Rana et al., 2015). The UTAUT has four predictor constructs (performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC), and four moderating constructs (gender, age, experience and voluntariness of use) (Venkatesh et al., 2003).

The most prominent finding about the UTAUT at its inception was that it was able to account for approximately 70% of the variance in participants' usage intention, while the combination of the eight theories from which it was derived could only account for approximately 40% of the possible outcome (Bhatiasevi, 2016; Venkatesh et al., 2003). The prediction of 70% of user adoption intentions has not been empirically proven consistent, especially in developing countries with unique socio-cultural paradigms (Olushola & Abiola, 2017). Additionally, reviews of the UTAUT show that the theory is predominantly invoked in citations, with very few direct applications or integrations in empirical work (Venkatesh et al., 2016; Williams, Rana, Dwivedi, & Lal, 2011). Furthermore, the UTAUT is quite good at predicting adoption intention, but it lacks depth in explaining the root-cause of the behaviour (Olushola & Abiola, 2017). Another deficit inherently relevant to the UTAUT theory application in an m-banking context is a lack of accommodation for customers' perceptions of risk associated with mobile financial transactions (Mohapatra et al., 2020). The implication is that as robust and comprehensive as the theory may be, applying it in its entirety as a theoretical underpinning may not be a prudent move. In this contested background, this study incorporates performance expectancy (PE) and social influence (SI), from UTAUT into the base model. These constructs are chosen due to conceptual fitness and compatibility with the study objectives. PE was found to be the construct with the most empirical support in previous studies (Venkatesh et al., 2016; Williams et al., 2011) and social influence has been validated as impacting the adoption of mobile technology (Cruz et al., 2010; Laukkanen, 2016).

2.2.3 Innovation diffusion theory (IDT)

The innovation diffusion theory (IDT) (also known as diffusion of innovation theory (DOI)) was postulated by Rogers (1995) as a theory that could be used to explain the stages of technology adoption and the attributes upon which this diffusion is predicated. Rogers (1995) used 'technology' and 'innovation' synonymously because they both broadly describe a mechanism that reduces uncertainty in the cause-effect schema in human endeavour (Rogers, 2003; Rogers, Singhal, & Quinlan, 2014; Sahin, 2006). Diffusion refers to the dissemination of attributes of the innovation through society, a risk-reduction process characterised by five characteristics: relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003).

Relative advantage is a measure of the improved efficiency that an innovation brings compared to the method previously used (Moore & Benbasat, 1991). Adoption is more likely if customers can experiment with a technology on a trial basis without significant cost or long-term commitment required (Al-Jabri & Sohail, 2012; Rogers, 2003). The higher the trial accessibility, the higher the rate of adoption (Rogers et al., 2014; Sahin, 2006). The uptake is further accentuated if use of the innovation is observable to the customer's social circle (Rogers et al., 2014). The more observable the innovation impact is, the higher the likely adoption rate (Sahin, 2006).

Compatibility refers to the symmetrical alignment between an innovation and the prevailing customer values, norms and routines (Chen, Gillenson, & Sherrell, 2004). Seamless assimilation without drastic departures from normal practice reduces uncertainty. In contrast, an innovation is considered complex if customers view it as difficult to understand and/or use, increasing the likelihood of rejection due to higher risk perception (Rogers, 2003). If an innovation is perceived as requiring high cognitive or physical commitment to utilise, its rate of diffusion can be low (Sahin, 2006). Accordingly, this study incorporates compatibility into the base model because it complements the other attributes from UTAUT and DMISS, hence conceptually fit.

Table 2.1 provides recent examples of application of the three theories in m-banking studies. The selection of exemplar application articles is not exhaustive. The focus

was on recent articles (ideally within the past five years) in order to capture current scholarly engagement on m-banking. Priority was placed on articles that applied the stated theory with least adaptations. The Table also depicts where and how this study is positioned, and how it introduces a different slant into the m-banking theoretical discourse.

Table 2.1: Selected extant research on m-banking, applying the UTAUT, IDT and DMISS theories

Theory	Seminal constructs	Postulated by	Exemplar application in mobile banking	Study focus
TAM and/or UTAUT	Perceived usefulness/Performance expectancy; Effort expectancy (ease of use); Facilitating Conditions; Social influence; adoption (intention)	Venkatesh et al. (2003)	Thusi and Maduku (2020) in South Africa.	Millennials' acceptance and use of m-banking
			Malaquias and Silva (2020) in Brazil	Adoption of m-banking
			Vuong et al. (2020) in Vietnam	Intention to adopt and use m-banking
IDT	Complexity; trialability; compatibility; relative advantage; adoption	Rogers (1995)	Shambare (2011) in South Africa	Perception of risk and security concerns slow down adoption rate
			Owusu et al. (2021) in Ghana	Integrated IDT and TAM for individuals to adopt m-banking.
			McGovern et al. (2019) in Ireland	Behavioural intentions of customers to adopt m-banking.
DMISS	System Quality; Information Quality; Service Quality; System Use; Satisfaction; Net Impacts	DeLone and McLean (1992)	Sharma and Sharma (2019) in Oman	Customers' actual usage of m-banking
			Maraqqa et al. (2018) in Jordan	Impact of system quality, information quality and service quality on customer satisfaction with m-banking
			Gharaibeh and Gharaibeh (2020) in Jordan.	Impact of system quality, information quality, service quality and trust on intention to use m-banking.
<i>This study</i>	<i>Performance expectancy; compatibility; social influence; system quality; information quality; service quality; system use; satisfaction; trust; credibility; continuity; loyalty; word of mouth</i>		<i>The study focuses on post-adoption consumer behaviour: clarifying antecedents and outcomes of a moderated-mediated relationship between constructs synthesised from DMISS, UTAUT, IDT and extant literature.</i>	

Source: Developed for the current study

2.2.4 Contextualisation of theories

UTAUT, IDT and DMISS have been empirically validated in previous studies for predicting and explaining the adoption and use of information systems, dissemination of innovations, and customer satisfaction, respectively. Constructs from these theories are chosen because of the theories' individually verified predictive and explanatory power in previous empirical work on the adoption and use of technology, and customer satisfaction. The three theories have strong theoretical foundations, having gone through several reviews, critiques and updates to improve their explanatory resilience and predictive rigour. This study positions m-banking acceptance and use within the realm of information systems, whose success may be influenced by its multifaceted quality, the nature of its use and expected performance by customers (Maraqqa et al., 2018). Extant studies have adapted elements of the UTAUT in studying m-banking (Baabdullah et al., 2019; Bhatiasevi, 2016; Thusi & Maduku, 2020; Yu, 2012), while others have incorporated the DMISS model in their theoretical frameworks, also focussing on m-banking (Jaafreh, 2017; Masrek et al., 2018; Sharma & Sharma, 2019).

Closely related to this study's conceptualisation, Singu and Chakraborty (2022) operationalised a conceptual framework that brought together the UTAUT and DMISS constructs in a m-banking context. However, their dependent variables were customer behavioural intention to adopt (also as a mediator) and intention to recommend m-banking services. Hence, the motivation in this study to use UTAUT, DMISS and IDT constructs as a basis for an in-depth and rigorous study to investigate the use of m-banking, customer satisfaction and behavioural outcomes of m-banking use. The point of departure in this context is a focus beyond the intention to adopt and the actual adoption of the channel.

Although the DMISS model has been applied successfully in studies on various information systems, it only focuses on the impact of quality aspects on the use of technology and customer satisfaction. However, only focusing on the system side of the adoption and use of an IS/IT system ignores the complexity of the drivers of adopting and using a new technology (Albashrawi & Motiwalla, 2020). It does not consider other predictors of innovation and customer satisfaction. Also, it does not

consider behavioural outcomes of customer satisfaction. This study addresses these deficiencies by invoking other, non-system-related constructs into the research framework.

Similarly, reviews of studies that have used the UTAUT have shown that it is theoretically robust (Venkatesh et al., 2016) but empirically weak (Olushola & Abiola, 2017; Williams et al., 2011) as most empirical studies often revert to the theories from which it was conceptualised. This study only adopts performance expectancy and social influence from UTAUT. This is because the UTAUT reviews and empirical work has shown that PE is the construct with the strongest empirical support (Beh, Ganesan, Iranmanesh, & Foroughi, 2021; Rabaa'i & AlMaati, 2021; Venkatesh et al., 2016). Social influence cuts across adoption theories such as TAM 2 and IDT. Also, performance expectancy was established to be a key predictor of satisfaction and intention to continue using a technology (Hong, Thong, & Tam, 2006). Furthermore, PE resonates closely with compatibility and the three quality dimensions envisaged for this study in predicting customer satisfaction with m-banking. Hence, conceptual fitness is behind the synthesis of the framework. This integration is anticipated to bring synergy and completeness to the research model.

The innovation diffusion theory (IDT) has been applied in various fields (education, anthropology, marketing, information technology and information systems). The validation of some of the IDT constructs in IS studies (e.g. Al-Jabri & Sohail, 2012; Koenig-Lewis et al., 2010; Wessels & Drennan, 2010) provides the impetus for this study to include compatibility in the conceptual framework. Since IDT focuses on why and how an innovation disseminates into a society, this study envisages the element of compatibility that would impact customer satisfaction with m-banking. M-banking is conceptualised as an innovation because it reconfigures the traditional banking landscape. In the process, it opens avenues for the banking industry to new customers and service providers.

In the synthesis of the UTAUT theory, Venkatesh et al. (2003) conceptualised the facilitating conditions construct as encapsulating the compatibility construct in IDT, perceived behavioural control (from the decomposed theory of planned behaviour), as well as facilitating conditions (from the model of PC utilisation). Subsequently,

measures defined for testing facilitating conditions in UTAUT accommodate the three constructs from which it was derived. However, the measures tend to be imprecise and generic in certain contexts, m-banking included. Hence this study reverts to the compatibility construct as originally defined in the IDT theory. It measures how an innovation compliments contemporary consumer values, competencies, norms and experiences (Moore & Benbasat, 1991). This positioning of the compatibility construct from IDT provides better conceptual fitness in this m-banking study in terms of the measures adapted for the empirical scale.

Performance expectancy, compatibility and quality (system, information, service) address different aspects of the customer satisfaction value chain. Performance expectancy and perceived compatibility mainly address adoption stimulus while quality dimensions impact continued use. Brought together, these aspects provide synergy due to their overall complementarity. Perceived compatibility results in a favourable or unfavourable attitude to m-banking use, but it does not address the evaluation of the perceived actual utility of the platform, which performance expectancy does. The quality dimensions provide theoretical underpinning driving actual action and reflection. This leads to behavioural outcomes that may be favourable (e.g., commitment, loyalty, positive word-of-mouth) or unfavourable (e.g., switching behaviour, negative word-of-mouth, complaining behaviour, etc). The conceptual integration envisaged in the study makes it possible to account for potential customers and repeat customers within one study framework (Lin, 2011), a consolidated approach not evident in previous studies on m-banking.

This theoretical background provides the nexus for this study to postulate incorporating the quality dimensions (information, system and service) in the DMISS model, the performance expectancy and social influence constructs in UTAUT, as well as compatibility construct in the diffusion of innovation theory (IDT) as part of the broad theoretical framework focusing on m-banking use and customer satisfaction in South Africa. Figure 2.1 depicts the resultant integrated theoretical spectrum, with the commonalities captured in the intersections. This conceptual base, including constructs from extant literature, will be used to synthesise the resultant conceptual framework for the study.

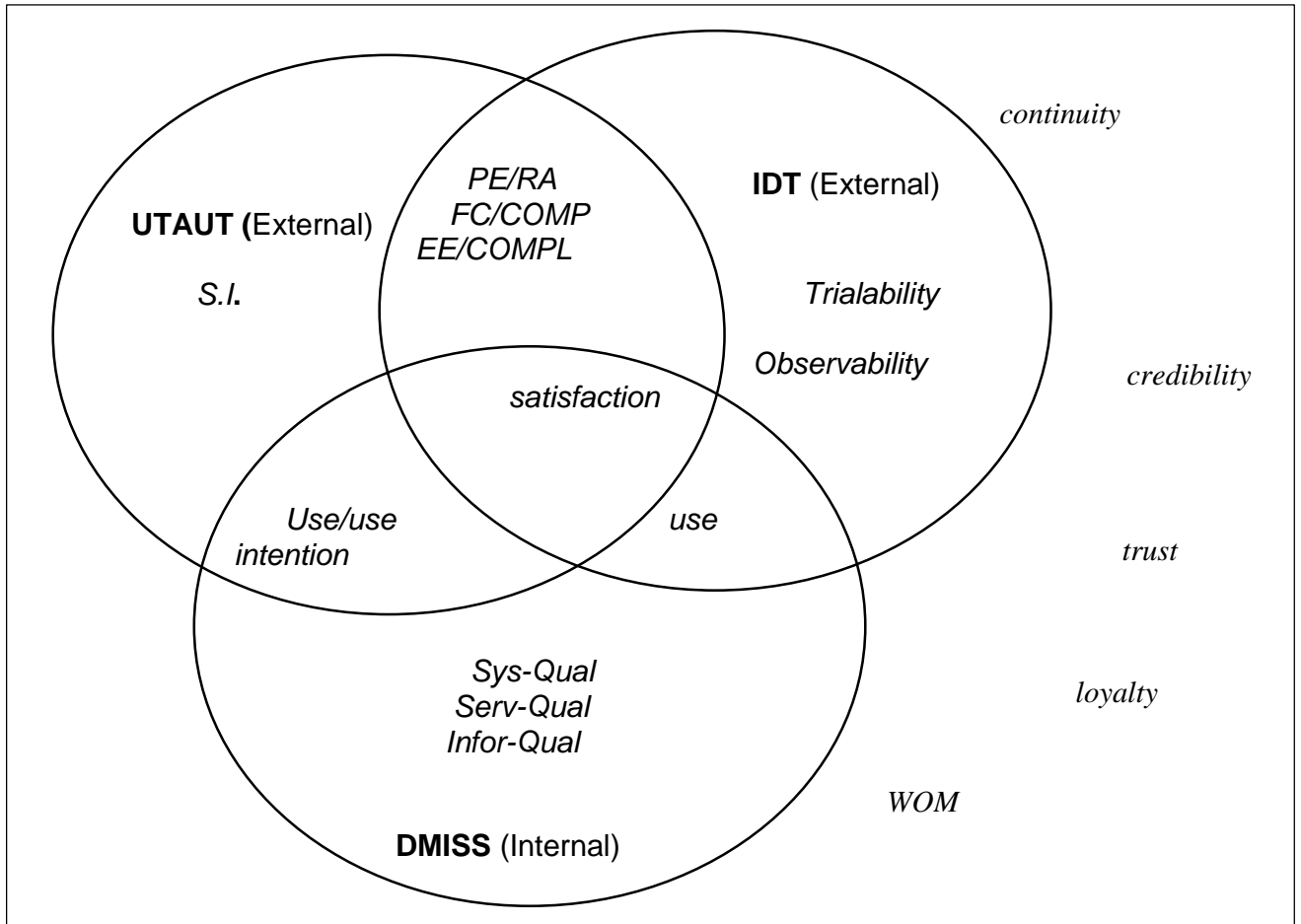


Figure 2.1: Conceptual base

Source: Developed for the current study

S.I.- social influence; *PE*- performance expectancy; *RA*- relative advantage; *FC*- facilitating conditions; *COMP*- compatibility; *EE*- effort expectancy; *COMPL*-complexity; *Sys-Qual*- system quality; *Serv-Qual* service quality; *Infor-Qual*- information quality

2.3 EMPIRICAL REVIEW

2.3.1 Mobile banking: a global overview

Mobile banking comprises consumer access to bank services using portable devices (Abayomi et al., 2020; Bhardwaj & Aggarwal, 2016; Ntseme & Chukwuere, 2017; Tam & Oliveira, 2017a). Services include access to transactions, funds transfer, bill payments, remittances and stock purchases, etc (Barnes & Corbitt, 2003; Bhardwaj & Aggarwal, 2016; Shaikh, Karjaluto, & Chinje, 2015c; Singh & Srivastava, 2018; Tam & Oliveira, 2017a; Zhou et al., 2021). According to Becker et al. (2022), m-banking is the digital banking channel that has experienced rapid growth and uptake in recent years. Access occurs via smartphones, mobile phones, tablets, smart watches, iPads, PDAs (Assensoh-Kodua et al., 2016; Govender & Sihlali, 2014; Makanyeza, 2017; Shaikh & Karjaluto, 2015; Shaikh et al., 2015c; Zhang et al., 2018). Notably, some researchers refer to online financial transactions, including desktop access (Mahad et al., 2016; Tan & Lau, 2016). Others invoke a more inclusive delineation that includes using feature phones that use unstructured supplementary service data (USSD) to access banking services (Perlman, 2017; Uwamariya & Loebbecke, 2020). More recent literature broadens the definition to include non-financial transactions offered by banks and other financial service providers (Shaikh & Karjaluto, 2015; Tam & Oliveira, 2017a; Veríssimo, 2016). The broader definitions capture the trend towards greater access, inclusion, and proximity through various portable devices, facilitated by a broader pool of service providers.

Customers benefit from m-banking through 24-hour access to their accounts anytime, anywhere, at low cost (Singh & Srivastava, 2018; Tam & Oliveira, 2017b). Banks incur fewer operational costs interacting with clients beyond traditional brick-and-mortar platforms (Foroughi et al., 2019; Hoehle et al., 2012; Ntseme & Chukwuere, 2017). They get access to tech-savvy younger customers who prefer digital transactions (Au-Yong-Oliveira et al., 2018; Moreno et al., 2017; Ndofirepi & Gavai, 2019; Purani et al., 2019; van Deventer et al., 2018). To leverage this, banks must be aware of common antecedents to m-banking adoption: perceived risk, compatibility, ease of use and usefulness (Elhajjar & Ouaida, 2019; Veríssimo, 2016).

The global proliferation of m-banking access has been driven by rapid growth in wireless communication technology as well as easier internet access and boom in smartphone technology (Becker et al., 2022; Elhajjar & Ouaida, 2019; Juniper Research, 2014; Mashithoh & Rahmat, 2021). The cheap access to mobile phones, especially in developing countries where traditional banking platforms have not been easily accessible, has played a key role in accelerating the access to m-banking (Vuong et al., 2020). However, Mashithoh and Rahmat (2021) assert that as per innovation diffusion, the proliferation of m-banking is still at a nascent phase and not widespread enough. Unlike in developed countries where m-banking is now regarded as a standard service that provides banking access anytime and anywhere at the blink of an eye (Orehovački et al., 2023), developed countries are still plagued by poor mobile technology infrastructure (Aker & Mbiti, 2010; Shaikh & Karjaluto, 2015). A unique, once-off driver of the adoption and use of m-banking was the outbreak and global spread of the COVID-19 pandemic in 2020 as public fear that hard cash (notes and coins) was a potential medium of spreading the virus led to many people working from home (Nair, Prabhu, Aditya, Durgalashmi, & Prabhu, 2021; Orehovački et al., 2023; Wiharso, Prasetyo, Prakoso, & Fabrianto, 2022). According to Fall et al. (2020), there is no consensus on the conceptualisation and delineation of m-banking, with studies domiciled in developed economies limiting it to the extension of traditional bank transactions to mobile devices while in developing economies it encapsulates a wide variety of transactions (payments, transfers, purchases), some of which did not exist before the advent of mobile phones. However, this is contradicted by Ahmad et al. (2020) who explicitly distinguish mobile money (m-money) domiciled by mobile network operators and fin-techs, whereas registered banks run m-banking.

Further review of extant studies on m-banking reveals the relevance of various quality dimensions and attributes in determining consumers' disposition to adopt and continue using m-banking once they have adopted it. Tarawneh et al. (2021) established that the m-banking interface design quality was the biggest predictor of m-banking use, and it similarly had an outsized influence on the intention to use it in a Malaysian study context. The attributes of design quality were identified to be the aesthetic appearance and design of the platform with respect to drawing clients away from traditional access channels. While pursuing a similar theme of the effect of perceived quality of m-banking on customer attitudes, Orehovački et al. (2023) isolated feedback quality,

responsiveness, efficiency and usefulness as the key constituent attributes of perceived m-banking quality, with the latter two most consequential within a Croatian m-banking study context. In resonance with the quality parameters outlined by Tarawneh et al. (2021), the quality of the m-banking application in terms of aesthetic design, response time and access speed to the customer's profile information was established to be pertinent to subsequent attitude and disposition to the platform (Mashithoh & Rahmat, 2021). While investigating the SERVQUAL dimensions (Parasuraman, Zeithaml, & Berry, 1985) within a m-banking context, Khan, Lima, and Mahmud (2021) established that all five service quality dimensions (tangibility, reliability, responsiveness, assurance and empathy) had significant influence on customer satisfaction. However, the results revealed the dominant influence of the responsiveness construct. This finding aligns with the findings of Orehovački et al. (2023) regarding the role of responsiveness. The analysis shows that there is an intersection between the studies on the overall theme of perceived quality of m-banking as a driver of attitudes and behaviour, but clear divergence in the proclaimed sub-dimensions of the quality construct.

2.3.2 Mobile banking: a sub-Saharan Africa (SSA) perspective

This reflective discussion reviews extant studies on m-banking conducted in the broader African region, excluding the north African belt, hence sub-Saharan Africa (SSA). South Africa is excluded in this subsection because a more detailed review focusing on the South African landscape is done subsequently. The choice of sub-Saharan Africa is because of the social, cultural, geographical and economic proximity of the other African countries in the SSA block to South Africa, where the study was domiciled.

According to Muzurura and Chigora (2019), the *zeitgeist* of the financial ecosystem of the current decade in sub-Saharan Africa revolves around a quantum transition from exclusive legacy transaction mediums based on hard cash, debit/credit cards and cheques to more inclusive m-banking commerce platforms. These inclusive transaction platforms are powered by mobile phones, designed for communication but now providing a platform for financial transactions accessible to people experiencing poverty (Lotto, 2018; Mashenene & Mkende, 2019). Despite emanating from a low

base, the outcome has been a huge leap in financial inclusion in many parts of the SSA region, with Kenya and Tanzania at the forefront (Ondiege, 2010, 2015; Rouse, 2017). Globally, SSA has been noted as having the lowest formal mainstream deposit-taking institution penetration (Ondiege, 2015). This has historically meant low financial inclusion rates, characterised by high poverty levels and low economic development, especially in rural SSA where many people live below the poverty line (Nan et al., 2021). The advent of mobile transactions has been targeted at this inclusion gap. Extant studies predominantly define financial inclusion within the SSA context as referring to measures implemented to ensure the low-income and financially disadvantaged population segments are able to access formal financial services at an affordable cost and in a sustainable manner (Akter, Anwar, Mustafa, Ali, & Cumilla, 2021; Burns, 2018). These population segments are termed the 'unbanked' or 'underbanked' because of limited or actual lack of access to traditional banking ecosystems in SSA (Akter et al., 2021; Asongu & Nwachukwu, 2018; Mlachila et al., 2013; Rouse, 2017).

At the centre of the financial inclusion wave in SSA has been the ubiquity of mobile phones, used to conduct mobile transactions. The ubiquity of the mobile phone has spurred network externalities as customers' families, friends and colleagues get into the loop of mobile transactions, creating a snowball effect (Fall et al., 2020; Katz & Shapiro, 1985). Mobile telephony exploded in SSA, growing more than 3000% in 15 years from 2000 to 2015, providing a catalyst for mobile transactions (Ahmad et al., 2020; Mutsonziwa & Maposa, 2016). However, some extant studies delineate between 'mobile money' transactions and 'mobile banking' as defined in this thesis (e.g. Gichuki & Mulu-Mutuku, 2018), while others make no clear distinction between the two, suggesting a degree of equivalence and/or overlap (e.g. Asongu, 2013; Bending et al., 2015; Mothobi & Grzybowski, 2017; Rouse, 2017).

Mobile money broadly encompasses transactions undertaken via a mobile phone solely within the domain of a mobile network operator (MNO) (Gichuki & Mulu-Mutuku, 2018; Kabala, Mapoma, Nalutongwe, Muyani, & Lungu, 2021). On the other hand, mobile banking depicts transactions conducted via the mobile device, thus using the MNO's communication infrastructure, but domiciled in a prudentially regulated bank by a customer of the bank (Kabala et al., 2021; Masamila, 2014). This is sometimes

called the bank-led model (Burns, 2018), which allows bank customers to check account balances, pay bills, transfer funds across accounts, make payments and send money to recipients who may or may not have a bank account (Katema & Lungu, 2019; Mutsonziwa & Maposa, 2016). Examples of m-banking as defined here include services offered by First National Bank (FNB) and Barclays Bank in Zambia (Sakala & Phiri, 2019), Botswana and South Africa (Chiguvi, 2016) as well as Commercial Bank of Africa (CBA) in Kenya (Ahmad et al., 2020; Ondiege, 2015). In contrast, mobile money does not require customers to have a bank account (Kabala et al., 2021; Kiggundu & Ogola, 2017). Instead, they have to be registered with a MNO's mobile money platform to transact (Burns, 2018). Once registered, the customer can use the mobile money account to buy and send airtime, deposit cash into the account, pay bills, and send and receive cash from other MNO customers (Kabala et al., 2021; Tchouassi, 2012).

MPESA, pioneered in Kenya, has been documented to be the classic example of mobile money that has been at the forefront of financial inclusion because at its core is the use of text message (SMS) technology embedded in mobile phones which the poor population segments have access to, even in rural areas (Kiggundu & Ogola, 2017). Registration for the service under the MPESA model was simplified, involved minimal red-tape, and was free, unlike traditional banking products (Kiggundu & Ogola, 2017; Masamila, 2014). It has been replicated successfully in other SSA countries like Tanzania, Uganda, Rwanda and Zimbabwe but could not gain traction in South Africa and Nigeria (Rouse, 2017). Scholarly contestations abound regarding the reasons for the varied uptake of the MPESA model in these SSA markets. Literature suggests that a good mobile phone penetration rate across the country that reaches people with low income, who mostly reside in rural areas, is necessary but not adequate on its own (Rouse, 2017). This dichotomy is illustrated by countries like Kenya and Nigeria, with almost similar mobile phone penetration rates but vastly different outlook on the dissemination of mobile transactions wherein Kenya is the world leader (Kiggundu & Ogola, 2017; Nan et al., 2021), but Nigeria a relative laggard (Burns, 2018).

South Africa and Somalia also present another illustration of the inadequacy of mobile phone uptake as a barometer for the likely success of the MPESA model. South Africa

leads the continent with saturation levels of mobile phone penetration (Chigada & Hirschfelder, 2017; Poushter & Oates, 2019), while Somalia is near the bottom of the ladder (Burns, 2018). In contrast, the rate of mobile money transactions in Somalia ranks among the highest in the sub-region (Asongu & Nwachukwu, 2018), while the MPESA equivalent failed to take off in South Africa despite repeated attempts to get it going (Rouse, 2017). Extant studies motivate the need for a conducive and enabling financial regulatory environment that incentivises MNOs to invest and innovate in the mobile transactions space without the stringent fiduciary instruments stipulated for the banking industry by regulators (Mlachila et al., 2013; Muthiora, 2015; Rouse, 2017).

Table 2.2 summarises extant studies on m-banking from selected countries in the SSA region. The selection is not exhaustive but provides a typical snapshot of the status quo regarding what scholars on m-banking are engaged in. As highlighted earlier, some scholars within the SSA region clearly distinguish mobile money from mobile banking while others use a loose definition that makes no distinction. As defined in the introductory chapter, this thesis delineates m-banking to be the bank-led model. Hence, the extant studies were selected to meet the bank-led model of the definition. The discussion is solely on extant studies of an empirical nature that focus on m-banking as defined in this thesis.

Table 2.2: Summary of extant studies on m-banking in sub-Saharan Africa

Author(s)	Theory/model(s)	Method(s) and Country of study	Main findings
Mandari, Koloseni, and Macha (2021)	ECS-IS and other related constructs	SEM- AMOS on 287 respondents in Tanzania.	Satisfaction and attitude have a direct positive influence on continuance usage of m-banking.
Muzurura and Chigora (2019)	Integrated model (TAM, DOI, TRA, PMB, UTAUT)	Multinomial regressions on 100 respondents in Zimbabwe.	Perceived usefulness, compatibility, perceived ease of use and demographics directly influence the adoption of m-banking.
Sakala and Phiri (2019)	TAM	Regression- SPSS on 289 respondents in Zambia.	Perceived ease of use, perceived usefulness, external factors and attitude directly and positively influence the use of m-banking, with perceived usefulness being the most impactful.
Ntseme, Nametsagang, and Chukwuere (2016)	TAM	Descriptive statistics- SPSS on 120 respondents in Botswana.	Perceived ease of use of m-banking positively influences its usefulness and its adoption. Also, the perceived usefulness of m-banking positively influences adoption.
Ramdhony and Munien (2013)	TAM and IDT with other relevant constructs	Chi-square test analysis on 169 respondents in Mauritius.	M-banking adoption mostly driven by the platform's convenience, compatibility, and ubiquity, while it was inhibited by perceived security risk and reliability.
Owusu et al. (2021)	TAM and IDT	SEM- AMOS on 517 respondents in Ghana.	Perceived ease of use, perceived usefulness, relative advantage and complexity are the key predictors of adoption intention about m-banking.

Bankole, Bankole, and Brown (2011)	Adapted UTAUT and Hofstede dimensions	Regression- SPSS on 231 respondents in Nigeria	Culture is the most important factor in predicting the adoption of m-banking.
Fall et al. (2020)	Adoption constructs from various theories	Chi-square test analysis on 400 respondents in Senegal.	Individual characteristics like education and ownership of a bank account influence adoption demographics like age and gender, which subsequently influence the actual use of m-banking.

Source: Developed for the current study

The preceding Table shows that empirical studies on m-banking in the SSA region mirror the broader landscape, largely skewed towards the adoption theme. In contrast, the Table also shows that a few extant studies focus on drivers of post-adoption behaviour like actual use intention and continued use of m-banking (e.g. Fall et al., 2020; Mandari et al., 2021). Specifically, Table 2.2 further shows that the major focus of extant studies is on the attitudinal and behavioural drivers of adoption, hence predominantly invoking the technology acceptance model (TAM) and related constructs in their theoretical conceptualisations (e.g. Ntseme et al., 2016; Ramdhony & Munien, 2013; Sakala & Phiri, 2019).

In developed economies with well-entrenched and efficient traditional banking platforms like Internet banking and point-of-sale disbursements, m-banking is viewed as an additional transacting mechanism (Muzurura & Chigora, 2019). In many SSA countries, m-banking is considered additive and transformational because it is often the only viable and affordable option due to its usefulness, convenience and accessibility (Muzurura & Chigora, 2019). It is transformational because in many rural areas in SSA, the mobile phone represents the first modern communication device accessible to many people (Tchouassi, 2012), making mobile transactions the only available option (Mutsonziwa & Maposa, 2016). In urban areas it is transformative because m-banking has decongested banking halls as many transactions previously done inside brick-and-mortar spaces are now available in the palm of customers' hands, anytime, anywhere (Mavhiki, Nyamwanza, & Shumba, 2015). In an empirical study on m-banking uptake in rural Zimbabwe, Muzurura and Chigora (2019) found that perceived usefulness and ease of use were positively associated with consumer likelihood of adoption. Also applying the technology acceptance model (TAM) in urban Botswana, Ntseme et al. (2016) assert that perceived ease of use and usefulness positively influence adoption intentions. The two studies differ in that social norms in the form of views of early adopters of m-banking were regarded as consequential in the study by Muzurura and Chigora (2019) while demographics like gender and age were more prominent in the study by Ntseme et al. (2016). This may be due to differences in context, as one study was done in a rural area (Muzurura & Chigora, 2019) while the other was in an urban setting (Ntseme et al., 2016). However, in an earlier empirical study in Mauritius based on constructs from the TAM and IDT theories, Ramdhony and Munien (2013) found that demographics like age, gender and

salary levels had little influence on the adoption of m-banking. Instead, convenience, effort expectancy, compatibility and access ubiquity were the key drivers of adopting m-banking, while perceived risk and reliability were regarded as the important inhibitors (Ramdhony & Munien, 2013). Convenience, ease of use and accessibility were also at the forefront of rural consumers' willingness to adopt m-banking in Zimbabwe, according to a study by Mago and Chitokwindo (2014). Similarly, Owusu et al. (2021) did a study on m-banking focusing on the Ghanaian youth market and conceptualised a research model based on the TAM and IDT. They found that perceived ease of use, perceived usefulness, relative advantage and complexity are the key predictors of m-banking adoption intention. Despite adopting the same theoretical frameworks, the two studies posit distinct findings, with the more recent study by Owusu et al. (2021) closely confirming the individual theories themselves.

Quite distinct from the study in Ghana by Owusu et al. (2021) that sets a narrative confirming the positive impact of the TAM antecedents to the adoption of m-banking (PU and PEOU), Cudjoe et al. (2015) earlier conducted a study on m-banking, also in Ghana, and similarly using the TAM and asserted findings showing that perceived credibility and cost were the significant predictors of m-banking adoption instead of the TAM antecedents. In contrast, a study into m-banking adoption in Namibia by Gomachab and Maseke (2018) found that the cost of accessing m-banking was less important than the service's reliability. The varied findings in the extant studies, sometimes on studies using the same theories and in the same country-context, may reflect an evolving m-banking field of study in the cited SSA countries that have unique challenges and opportunities. What is common is that most of the studies, as shown in Table 2.2, focus on the drivers of adoption from a technology acceptance ethos.

Empirical studies conducted in Zambia have also shown that traditional banks offer m-banking in competition with the mobile money services offered by MNOs to retain their current customers and attract the previously unbanked (Katema & Lungu, 2019; Kaziya & Mbetwa, 2017). A similar theme of m-banking initiatives launched by banks in response to thriving mobile money alternatives run by MNOs obtained in Zimbabwe, where the market leader, eco-cash, defied regulatory and competitive pressure to capture the biggest market share (Mutsonziwa & Maposa, 2016). According to Chitungo and Munongo (2013), the mobile transaction model in Zimbabwe resembles

the pioneering MPESA model in Kenya because it consists of platforms that are run solely by MNOs (e.g. eco-cash by Econet), while some are partnerships between banks and MNOs, others are available on mobile platforms but only to bank account holders (e.g. Commercial Bank of Zimbabwe's m-banking).

Unlike the situation in Zambia, Masocha and Dzomonda (2018) attribute the success of the mobile money/banking platform in Zimbabwe largely to the unique currency and liquidity challenges the country faced. Empirical findings from a study by Chitungo and Munongo (2013) in rural Zimbabwe indicate that perceived usefulness had the strongest influence on adoption intention, followed by social norms and perceived ease of use. This mirrors the findings by Sakala and Phiri (2019) in Zambia and Salim (2020) in Tanzania. Both studies applied various adaptations of the TAM in their studies. Similarly themed, Bankole et al. (2011) conducted a study into the adoption of m-banking in Nigeria and adapted the UTAUT theory by incorporating Hofstede's cultural moderators, while Baptista and Oliveira (2015) similarly adapted UTAUT with Hofstede's moderators in Mozambique and the two studies established that the cultural factors were statistically significant predictors of adoption of m-banking. The difference is that in the Nigerian context, Bankole et al. (2011) found that culture was the most impactful factor, while the Mozambican study found habit to be the strongest antecedent, with performance expectancy and hedonic motivation also playing a role. The two studies' findings coalesce around the significance of social factors in the intention to adopt m-banking. This resonates with the impact that both studies allude to cultural factors in adoption intentions.

As depicted in Table 2.2, a permeating theme in these empirical studies is that most use the technology acceptance model as their base model because they primarily focus on adoption. However, a study by Fall et al. (2020) among low-income groups in Senegal probed beyond simple adoption by proposing three phases to the process, starting with basic knowledge about the platform, followed by adoption and lastly, actual use of the service. Their results showed that for the low-income sampled population, adoption and actual use of m-banking were not independent of each other. Furthermore, they found that demographic factors like age and gender influenced the use of the platform, thus agreeing with earlier findings by Ntseme et al. (2016) in a study done in Botswana. While the study by Fall et al. (2020) discusses deeper

nuances behind the adoption construct, Mandari et al. (2021) conceptualised a study in Tanzania that looked at m-banking beyond adoption using the expectation confirmation model for information systems (ECM-ISC). Their study showed that confirmation and trust are the key predictors of customer satisfaction with m-banking actual use. These findings mirror studies conducted in other jurisdictions beyond the SSA region (e.g. Foroughi et al., 2019; Susanto, Chang, & Ha, 2016).

2.3.3 Mobile banking in South Africa

Like the global scenario and SSA, affordable mobile phones and e-commerce access have led to m-banking in South Africa (Ismail & Masinge, 2012; Koenait et al., 2019). According to Berndt, Saunders, and Petzer (2010), the South African banking industry is considered highly sophisticated and robust, but it hardly caters for the ‘unbanked’ people who form a large portion of the economically active population of the country. Unlike developed economies, m-banking provides South African banks access to a large market segment of underbanked people who could potentially increase their customer base (Ismail & Masinge, 2012; Masocha, Chiliya, & Zindiye, 2011; Shrivastava, 2010). Distinct from the broader population, the younger generation Y cohort has grown up in a digital era and shows a high propensity to accept m-banking (Govender & Sihlali, 2014; Van Deventer, 2019). This generational cohort has very low-risk aversion towards everything tech, including m-banking (Thusi & Maduku, 2020; van Deventer et al., 2018). The strong positive disposition towards m-banking by young consumers has been established by studies done on South African University student populations (i.e. Govender & Sihlali, 2014; Ntseme & Chukwuere, 2017; van Deventer et al., 2018). However, as the age cohort goes up, risk aversion associated with mobile transactions escalates because of the perceived uncertainty and risk embedded in virtual platforms (Dlodlo, 2014).

Table 2.3 gives a snapshot of the relevant studies on m-banking in South Africa. The selection depicts a chronological evolution of the studies on m-banking over a period close to two decades, from 2003 to 2020. It reveals what aspects of the m-banking value chain researchers have considered to be of scholarly and industry relevance in their discourse. The theme of the seminal study by Brown et al. (2003) was the factors influencing the adoption of m-banking using the IDT as a theoretical base. Similarly,

more than a decade later, Assensoh-Kodua and Msosa (2020) studied how perceived quality and trust influence the adoption and use of m-banking. Juxtaposing the two studies in isolation may suggest a transition from a focus on primary adoption drivers like compatibility and trialability to issues of trust and service quality, reflective of the maturity of the innovation. However, a study by Thusi and Maduku (2020) also investigated the drivers of adoption, suggesting the continued relevance of the adoption theme in the contemporary m-banking research terrain.

Similarly, Koenaitte et al. (2019) investigated how perceived ease of use and perceived usefulness played a pivotal role in the adoption of m-banking in the Gauteng province of South Africa. Just like the seminal study by Brown et al. (2003), the later studies (i.e. Assensoh-Kodua & Msosa, 2020; Koenaitte et al., 2019; Thusi & Maduku, 2020) similarly focused on primary adoption drivers, thus not indicating a thematic transition. This stasis suggests that, despite the passage of time, the theme of adoption remains the fundamental driver of scholarly engagement in the South African context as it dominates the other studies done in the intervening period, as shown in Table 2.3. This shows a deficit regarding studies focusing on actual use intention and post-adoption behaviour, a centrepiece of this thesis.

Table 2.3: Summary of extant studies on m-banking in South Africa

Author(s)	Theory/Model	Method(s)	Main findings
Brown et al. (2003)	IDT and other constructs	Multiple linear regression- SPSS on 162 respondents.	Relative advantage, trialability and consumer banking needs positively influence adoption of m-banking while perceived risk has a negative influence.
Shambare (2011)	IDT and other related constructs	Multiple linear regression – SPSS on 124 respondents.	Relative advantage and perceived complexity were the most impactful predictors of mobile banking adoption.
Ismail and Masinge (2012)	TAM2 and other constructs	ANOVA – SPSS on 316 respondents.	Perceived cost was the most important factor in determining adoption of m-banking and trust, which impacted perceived risk associated with the platform.
Maduku and Mpinganjira (2012)	TAM and other related constructs	Multiple linear regression- SPSS on 394 respondents.	Perceived usefulness, perceived ease of use, trust, and subjective norms significantly influence attitudes towards m-banking, with trust being the most impactful.
Govender and Sihlali (2014)	Adapted TAM with other constructs	Multiple linear regression on 71 respondents.	Perceived value and trust were the most important predictors of respondents' behavioural intention to use m-banking.
van Deventer et al. (2018)	Adapted TAM	SEM- AMOS on 334 respondents.	Perceived ease of use and perceived relative advantage significantly and positively influence m-banking.
Koenaite et al. (2019)	Adapted TAM	SEM- AMOS on 325 respondents.	Intention to use mobile banking plays a key role in customers' mobile banking usage.

Thusi and Maduku (2020)	UTAUT2	PLS-SEM on 352 respondents.	Performance expectancy, facilitating conditions, habit, perceived risk and trust influence customers' intention to adopt m-banking.
Assensoh-Kodua and Msosa (2020)	Combination of relevant constructs derived from literature	SEM-WARP-PLS on 150 respondents.	The perceived quality of m-banking strongly impacts its adoption and use, followed by perceived trust, and social norms.

Source: Developed for the current study

Koenaite et al. (2019) established that knowledge and use of m-banking in South Africa is low, thus agreeing with the broader perspective of low adoption rate advanced earlier by Rammile and Nel (2012), who sampled a broader population group, unlike studies that focused on specific generational cohorts. However, this contradicted the findings of Maduku and Mpinganjira (2012), which reflected strong positive attitudes towards acceptance and continued use of m-banking, accentuated by the major South African banks simplifying their digital platforms, making them customer-friendly and easy to navigate at very low cost compared to visiting the banking halls (Mujinga, Eloff, & Kroeze, 2018). Similarly, Bankole et al. (2012) and Shambare (2011), concluded that m-banking use had been widely adopted in South Africa, despite an indication of investigating relatively small sample sizes (220; 124) derived from non-probabilistic judgement and snowball sampling respectively. Despite reservations due to a lack of trust, Ismail and Masinge (2012) found that low-income customers in the Gauteng province of South Africa showed positive attitudes toward adopting m-banking. Synthesis of the findings on m-banking studies in South Africa indicates much higher adoption and use when compared to the results in the seminal work of Brown et al. (2003), in which 6% of respondents had used m-banking. On reflection, the literature on m-banking adoption and use in South Africa shows contestation between studies reporting very high levels of acceptance and those that put forward acceptance and adoption stasis, except in certain niche market segments.

Despite a background of studies documenting that all big commercial banks in South Africa offer m-banking in their package (Chigada & Hirschfelder, 2017; Lightico, 2020; Ntseme & Chukwuere, 2017; Shambare, 2013), its use is dominated by specific market cohorts that tend to be younger, relatively educated and living in urban areas. A theme of fragmented m-banking use in South Africa is echoed by Chigada and Hirschfelder (2017) and Lotto (2018), who indicated that uptake and use of m-banking is lower than in neighbouring countries with smaller economies like Zimbabwe and Kenya. This is attributable to a lack of awareness of its usefulness (Mlitwa & Tshetsha, 2012; Rammile & Nel, 2012) as well as a stringent banking industry regulatory framework (Finmark Trust, 2017; Kersop & Du Toit, 2015) designed around the themes of “know your customer” and “anti-money laundering” (KYC-AML) protocols (Burns, 2018) . However, this position starkly contrasts the earlier assertions by Ondiege (2010) that South Africa was the country with the highest use of m-banking

on the continent. These apparent contradictions may be attributable to how each study defined m-banking. This fragmentation demonstrates varied m-banking study conceptualisation, which often depends on study context and sometimes respondent demographic profile.

Assensoh-Kodua and Msosa (2020) provide deeper insight by opining that adopting of m-banking, and its actual use, are distinct processes in the m-banking value chain, similar to the proposition made concurrently by Fall et al. (2020). Investigating a broad South African respondent profile, Assensoh-Kodua and Msosa (2020) found that perceived quality, trust and social norms are key predictors of m-banking adoption and actual use. The strong relevance of system quality in customers' consideration of using m-banking was echoed by a study by Van Deventer, De Klerk, and Bevan-Dye (2017) that focused on a younger generational cohort. This reinforces the view that younger consumers give less credence to the platform's perceived usefulness and ease of use because they are tech-savvy and focus on issues of quality they encounter on m-banking. The importance of trust is echoed by Dlodlo (2014), who studied mobile payment systems in South Africa. While the findings converge on the strong and statistically significant association between service quality and trust, they diverge on the other findings as Dlodlo (2014) focused on continuance intentions while Fall et al. (2020) delved deep into the adoption theme to establish underlying nuances.

Deeper insight into m-banking post-adoption consumer behaviour within a South African context was also behind the conceptualisation of the studies by Njenga and Ndlovu (2013) and Shaikh, Karjaluoto, and Chinje (2015b). According to Njenga and Ndlovu (2013), perceived m-banking utility was the central nexus between the initial adoption and its continued use, while perceived risk had little to no effect. The positive effect of the perceived utility of m-banking was further confirmed in a later study by Nkoyi, Tait, and Van der Walt (2019), who established that perceived usefulness and perceived ease of use had a direct influence on South African rural consumers' attitude to continue transacting virtually. Shaikh et al. (2015b) proposed trust, satisfaction and word of mouth as post-adoption consequences and established that trust was a centrepiece driving the continued use of m-banking. In contrast, Njenga and Ndlovu (2013) established that perceived utility was most prominent. Other studies also reinforce the prominence of trust in the m-banking value chain (Assensoh-Kodua &

Msosa, 2020; Dlodlo, 2014). In tandem with trust, customer satisfaction also plays a prominent role in post-adoption behaviour, and customers evaluate it based on the convenience, accessibility and processing speed of the m-banking interface (Shaikh et al., 2015b).

2.3.4 Mobile banking adoption

From the exposition in the global overview on m-banking, to the detailed discussion on m-banking in the SSA context, and finally zooming into the South African perspective, the permeating theme is m-banking adoption. Scholarly empirical work on adopting m-banking invokes various adoption theories like the IDT, the TAM, the UTAUT, etc. This makes it imperative to drill down into the latent construct of m-banking adoption as depicted in the extant literature. In the m-banking study value-chain, adoption represents customers' entry point into the terrain of the technology. Deep insight is provided by Fall, Ky, and Birba (2015), who categorise the broad theme of m-banking adoption into three sequential stages: first is the customer's knowledge about m-banking (awareness), second is the customer having access to test the service (possession) and third is actual adoption in a meaningful way that makes a difference in their actual transaction routine.

Despite the cheaper access to bank services available to low-income clients through m-banking (Owusu et al., 2021), as well as lower costs for the banking industry (Deloitte, 2019; Mastercard, 2017; Raza, Umer, & Shah, 2017; van Deventer et al., 2018) the uptake of m-banking is still low compared to the high rates of mobile phone penetration and access (Abayomi et al., 2020; Ruano-Arcos et al., 2020; Shaikh & Karjaluo, 2015; Vuong et al., 2020). This is despite research showing that m-banking was on the verge of mass-market adoption over a decade ago (Deloitte, 2010). Hence, even if m-banking is popular and relatable for many consumers due to the increasing ubiquity of mobile phones, actual adoption is still lagging (Chaouali & Souiden, 2019). Furthermore, adoption of m-banking has not directly translated to continued use, hence a lack of sustainable traction (Ashique & Subramanian, 2022). Reasons cited in literature include resistance to what some consumers regard to be a high-risk innovation (Ashique & Subramanian, 2022; Giovanis, Athanasopoulou, Assimakopoulos, & Sarmaniotis, 2019) as well as resilient affinity to hard cash in the

form of notes and coins (Bech et al., 2018; Deloitte, 2019). This apprehension deepens some customers' anxiety and distrust of the channel (Gupta & Arora, 2017; Zhao, Koenig-Lewis, Hanmer-Lloyd, & Ward, 2010). On the same apprehension theme, Kumar, Dhingra, Batra, and Purohit (2020) cite m-banking's vulnerability to risks of phishing, hacking and leaks of personal financial information as inhibiting factors.

Distinguishing between mainstream m-banking and mobile money services offered by fin-techs, Kumar et al. (2020) also indicate that a high percentage of customers prefer mobile wallets offered by fin-techs than the m-banking delivered by traditional banking houses due to ease of use and accessibility. Other factors include low financial and digital literacy levels, which are prevalent in older transacting customers who are also the high-net-worth bank clients (Kumar et al., 2020). Financial literacy often mediates the association between attitude towards m-banking and effective uptake and use of the platform (Mohapatra et al., 2020). This apparent dichotomy between adoption rates justifies why m-banking maintains recency in marketing research.

Many recent adoption-driven studies on m-banking place much emphasis on variables that attempt to capture respondents' views on how its acceptability and user-friendliness (e.g. usefulness, ease of use, credibility, trust, etc) shape their perspectives regarding likely adoption and use (e.g. Haider, Changchun, Akram, & Hussain, 2018; Hassan & Wood, 2020; Vuong et al., 2020). According to Shaikh and Karjaluoto (2015), variables that capture acceptability of the m-banking interface have been widely tested and validated in m-banking adoption studies over a long period and in a variety of socio-economic contexts (e.g. Elhajjar & Ouaida, 2019; Hanafizadeh, Behboudi, Koshksaray, & Tabar, 2014; Luarn & Lin, 2005; Mortimer, Neale, Hasan, & Dunphy, 2015; Muñoz-Leiva et al., 2017; Ndofirepi & Gavai, 2019; Owusu et al., 2021; Rehman et al., 2019). However, other studies have found insignificant support for some of the propositions that placed acceptance of the m-banking technology in terms of its ease of use and perceived usefulness in the forefront (Al-Jabri, 2015; Froughi et al., 2019; Malaquias & Hwang, 2019), thus suggesting the role of other underlying drivers in determining the choices customers make to either adopt m-banking or refrain from it. The key take away from this summation is a lack of consensus, thus divergence.

2.3.5 Mobile banking actual use

Unlike the adoption of m-banking, studies focusing solely on the actual use of m-banking beyond initial adoption are less prevalent (Albashrawi & Motiwalla, 2020; Oertzen & Odekerken-Schröder, 2019). The background to the discussion is that the initial adoption/acceptance of m-banking is not synonymous with actual system use, hence the need for this categorisation (Avornyo, Fang, Odai, Vondee, & Nartey, 2019). A customer's initiation of a m-banking account does not imply it will be used immediately or even subsequently (Fall et al., 2015). Drivers of adoption are quite distinct (e.g. social influence, perceived usefulness) from those of actual use (e.g. network externalities, technical know-how) (Fall et al., 2020). According to Petter et al. (2013), the use of an information system is characterised by factors like frequency of use, depth of use, duration of use, and appropriateness of use. System use thus captures the extent to which customers utilise the range of options inherent in an IS/IT system (Motiwalla, Albashrawi, & Kartal, 2019). Sustained use of m-banking, post-adoption, that may involve value co-creation between customers and banks is indispensable because it may culminate in customer loyalty (Oertzen & Odekerken-Schröder, 2019) Table 2.4 captures extant studies focusing on the use of m-banking, a phase that is preceded by its initial adoption/acceptance, according to Fall et al. (2020).

Table 2.4: Summary of previous studies on m-banking use

Author(s)	Theory/Model	Method(s)	Main findings
Zhou (2012)	No specific theory/model-integrated trust and flow with other relevant constructs	SEM-LISREL on 200 respondents.	Actual usage is preceded by usage intention which depends on trust and flow experience on m-banking.
Yu (2012)	UTAUT	SEM-Smart PLS on 441 respondents.	Social influence had the most impactful regression weight on the adoption and use of m-banking.
Baptista and Oliveira (2015)	UTAUT2 and Hofstede's cultural moderators	SEM-Smart-PLS on 252 respondents.	Behavioural intention (moderated by the cultural factors) and habit provided the most impactful significant influence on actual use of m-banking.
Albashrawi and Motiwalla (2020)	UTAUT and DMISS	SEM-Smart-PLS on 472 respondents.	Positioned as a mediator, satisfaction accounted for most of the variance in using m-banking when objectively captured data was analysed.
Sharma and Sharma (2019)	Adapted DMISS model	SEM-AMOS and NN modelling on 227 respondents.	Satisfaction and intention to use m-banking are the key antecedents to its use.

Mustafa (2021)	UTAUT	SEM-PLS on 216 respondents.	Behavioural intention and facilitating conditions are the most impactful precedents to the actual use of m-banking.
Solarz and Adamek (2021)	TAM and other relevant constructs	SEM-AMOS on 1030 respondents.	Positive behavioural intention and negative perceived risk have the most impactful influence on the actual use of m-banking.

Source: Developed for the current study

Table 2.4 shows that the UTAUT and its adaptations have been used in studying the actual use of m-banking that signifies customers' transition beyond the adoption stage (Albashrawi & Motiwalla, 2017b; Baptista & Oliveira, 2015). In terms of impact, satisfaction and the intention to use m-banking have been documented to be strong precedents for customers' use of the channel (Motiwalla et al., 2019; Sharma & Sharma, 2019). Also, the positive word of mouth disseminated by loyal m-banking customers can be leveraged in marketing campaigns aimed at boosting more use of the platform by new clients and occasional users (Albashrawi & Motiwalla, 2020; Assensoh-Kodua & Msosa, 2020). However, Assensoh-Kodua and Msosa (2020) assert that empirical results show that customer satisfaction is not a panacea for adopting and using m-banking. They suggest that other factors like service quality and perceived trust are pertinent to use behaviour.

Extant studies propose that the actual use of m-banking is preceded by behavioural intention and/or attitude (Avornyo et al., 2019; Baptista & Oliveira, 2015; Solarz & Adamek, 2021; Zhou, 2012). This direct association has been empirically supported (Zhou, 2012) but also found no empirical support in other studies (e.g. Baptista & Oliveira, 2015). The difference may be attributed to the unrelated antecedents driving the customers' behavioural intentions. Ubiquity, structural assurance and perceived ease of use, mediated by trust and flow, were invoked in the study by Zhou (2012), while Baptista and Oliveira (2015) suggested that intention was driven by performance expectancy, hedonic motivation and habit. Structural assurance, ubiquity and trust played the key role in actual use of m-banking according to Zhou (2012) while performance expectancy and habit weighed heavily on behavioural intention, according to Baptista and Oliveira (2015). Despite differences in primary antecedents investigated, the comparison confirms the role of behavioural intentions in using the platform. The social influence on behavioural intentions on the use of m-banking was found to be insignificant (Baptista & Oliveira, 2015), contradicting the assertion by Yu (2012), who stated that social influence had the strongest predictive effect on the actual use of m-banking.

Empirical results of a study on m-banking adoption and its actual use, by Farah et al. (2018), established that performance expectancy, effort expectancy, social influence, habit and hedonic motivation directly influenced consumers' behavioural intention.

Furthermore, the study confirmed the positive influence of behavioural intention on customers' actual use of m-banking. However, facilitating conditions, trust and risk perceptions found no empirical support in the study. Similarly, facilitating conditions were found to be insignificant in impacting behavioural intentions, customer satisfaction, and m-banking use in studies by Albashrawi and Motiwalla (2020) and Baptista and Oliveira (2015). The difference is that Albashrawi and Motiwalla (2020) assert that this may be attributed to customers being familiar with the navigation steps, thus finding it easy to troubleshoot without requiring any assistance.

In contrast, Baptista and Oliveira (2015) offer a more direct and context-driven explanation in which customers perceived little institutional support provided when using the m-banking. In contrast, facilitating conditions were found to have a significant direct effect on m-banking usage by Yu (2012). This assertion is bolstered by a recent study that shows behavioural intentions and facilitating conditions explaining most of the variance extracted in using m-banking platforms in the Middle East (Mustafa, 2021). This bolsters earlier findings by Richard and Mandari (2017), showing that customer awareness and perceived ease of use of m-banking provided the strongest positive influence in using m-banking while perceived risk and cost were strong inhibitors. The findings may reflect respondents' perceptions at the early stages of their use of m-banking, in which an enabling interface and service design are appreciated.

2.3.6 Customer satisfaction with mobile banking

According to DeLone and McLean (2003), customer satisfaction refers to positive opinions and perceptions consequent to using an information system (m-banking in this context) and extracting personal value-addition superior to alternatives. Studies that have investigated customer satisfaction with m-banking have predominantly invoked the DMISS model as their theoretical base (e.g. Al-Ghazali et al., 2015; Baabdullah et al., 2019; Damabi et al., 2018; Geebren et al., 2021; Purwati, Mustafa, & Deli, 2021; Tam & Oliveira, 2017b).

Applying the DMISS model, Baabdullah et al. (2019) established that system and service quality directly impacted customer use of m-banking. From a process

perspective, the use of m-banking precedes customer satisfaction, while high satisfaction levels are likely to spur its greater use from a causal perspective (DeLone & McLean, 2003; Laforet & Li, 2005). Thus, concurring with findings by Gao and Waechter (2017), Baabdullah et al. (2019) established that system quality, information quality and service quality are strong antecedents of trust in mobile payment systems while trust positively impacts customer satisfaction (Damabi et al., 2018). The findings by Gao and Waechter (2017) are further reinforced by Geebren et al. (2021), who established that the three DMISS quality dimensions indirectly influence customer satisfaction from m-banking through trust. However, a direct influence of the quality dimensions on customer satisfaction with m-banking using the DMISS model was established in a study by Purwati et al. (2021). Trust was confirmed to be a very strong antecedent of m-banking customer satisfaction by Geebren et al. (2021).

However, contrary to Gao and Waechter (2017) as well as Geebren et al. (2021), Damabi et al. (2018) found no significant positive impact of system quality and information quality on customer satisfaction with m-banking. Despite a high number of extant studies confirming the positive influence of the quality dimensions on customer satisfaction (e.g. Gao & Waechter, 2017; Geebren et al., 2021; Ojo, 2017; Purwati et al., 2021; Sharma & Sharma, 2019), findings by Damabi et al. (2018) signal divergence that cannot be ignored as just an outlier because, similar to Geebren et al. (2021), their study established that trust has a significant impact on customer satisfaction. An overview that can be extrapolated from these studies is that they demonstrate, to varying degrees, the validity and relevance of the DMISS model in studying customer satisfaction with m-banking in various domains. Despite broadly adapting the DMISS model as their conceptual base, the varied results signal a level of contestation and lack of consensus that spurs further research impetus.

Importantly, banks need to pay attention to accessibility, reliability, customisation, and responsiveness of the m-banking interface (Baabdullah et al., 2019), which are drivers of customer satisfaction. Information quality was closely related to reliability and strongly impacted consumer behaviour (Gao & Waechter, 2017; Zhou, 2011). This contradicted the results of Baabdullah et al. (2019) who found information quality to have little impact on m-banking customer satisfaction. Since customers rely on the accuracy of information the m-banking channel provides, it must be accurate and

error-free (Zhou, 2011). Due to the relative novelty of m-banking, some studies (Shareef et al., 2018; Sharma & Sharma, 2019; Tam & Oliveira, 2016) established that service quality is a strong measure of satisfaction since customers often need a good level of support from the banks' IT departments and their mobile carriers.

In a study focusing on Omani banks, Manchanda and Mukherjee (2014) validated the quality dimensions, system use and customer satisfaction as relevant variables influencing customer decision-making regarding m-banking, thus its overall success or failure. However, they found that system use did not significantly impact customer satisfaction. An insignificant impact of system use on customer satisfaction and net benefits was also observed by Ojo (2017). Similarly, service quality was found to have no significant positive influence on customer satisfaction in a study on mobile payment systems in South Africa by Dlodlo (2014). The totality of these findings contradicts the assertion by DeLone and McLean (2003) and Laforet and Li (2005) that use precedes satisfaction in a process perspective of evaluating the success of an information system. However, ample empirical findings confirm that system use impacts customer satisfaction and net benefits of the system, as per the DMISS model conceptualisation of the association between system use and customer satisfaction (e.g. Borena & Negash, 2016; Petter et al., 2013; Urbach, Smolnik, & Riempp, 2010).

Similarly, the positive association between the DMISS quality dimensions and customer satisfaction, as well as the antecedence of system use on satisfaction as envisaged by DeLone and McLean (2003), was validated in a study on the banking system in Saudi Arabia by Jaafreh (2017). These empirical findings indicate that the DMISS model antecedents to customer satisfaction and net benefits have solid contextual validation. However, contestations persist on the relevance and impact of each dimension, depending on the study context, industry segment and sample profile.

2.3.7 Mobile banking continued use

The motivation for addressing customers' continued use of m-banking lies in recognising that users of an information system (IS) tend to re-evaluate their experience after adoption before engaging in concerted, continuous use

(Bhattacharjee, 2001). Continuance usage of the information system can be defined as the propensity to continue using m-banking beyond the initial adoption phase (Albashrawi & Motiwalla, 2017a). The catalyst for long-term sustainability and success of an information system, from a business perspective, is customer devotion and continued use (Bhattacharjee, 2001). This suggests that banks would be interested in factors that sustain customer allegiance and continued use of m-banking beyond initial adoption in order for them to extract return on investment made on the platform (Foroughi et al., 2019; Yuan, Liu, Yao, & Liu, 2016).

Literature on the continuance intention of m-banking is not as exhaustive as that on initial adoption (Asnakew, 2020), and, even then, a wide range of theoretical frameworks and drivers of continued use have been invoked (Foroughi et al., 2019). The theories include the expectation-confirmation model (ECM) (Bhattacharjee, 2001) and its extension, the expanded expectation-confirmation model (E-ECM) (Thong, Hong, & Tam, 2006) (e.g. Chong, 2013b; Susanto et al., 2016), the technology readiness index (TRI) (Parasuraman, 2000) (e.g. Humbani & Wiese, 2019), the task technology fit model (TTF) (Goodhue & Thompson, 1995) (e.g. Yuan et al., 2016), the technology continuance theory (TCT) (Liao, Palvia, & Chen, 2009) (e.g. Foroughi et al., 2019) and the technology acceptance model (TAM) (Davis, 1989) (e.g. Asnakew, 2020; Avornyo et al., 2019; Kumar, Rejikumar, & Ravindran, 2012).

Notably, a number of the studies used the theories in tandem with each other or incorporated other constructs into their selected base theory and operationalised a composite model (e.g. Asnakew, 2020; Chen, 2012; Humbani & Wiese, 2019; Yuan et al., 2016). Table 2.5 provides a summary of extant studies on m-banking continuance use studies. The Table shows that more studies use adaptations of the expectation confirmation model (ECM) and analyse the data using variance-based structural equation modelling compared to those using covariance techniques. Customer satisfaction is the most common exogenous variable driving continuance intention captured in the Table.

Table 2.5: Summary of previous studies on m-banking continuance

Author(s)	Theory/Model	Method(s)	Main findings
Chen (2012)	No specific theory/model- borrowed constructs from SERVQUAL and Technology readiness	SEM-AMOS on 390 respondents	Relationship quality is the most important predictor of continued use of m-banking.
Kumar et al. (2012)	TAM and other constructs	SEM-Warp-PLS on 184 respondents	Satisfaction was established as the strongest predictor of continuance intention to use m-banking.
Susanto et al. (2016)	ECM and other constructs	SEM-Smart-PLS on 301 respondents on respondents	Satisfaction, self-efficacy and perceived usefulness are the significant direct antecedents of continuance use intention of m-banking.
Yuan et al. (2016)	ECM and Task technology fit	SEM-AMOS on 434 respondents	Satisfaction is the major predictor of users' continuance intention in using m-banking.

Foroughi et al. (2019)	Technology continuance theory (TCT) and other constructs	SEM-Smart-PLS on 369 respondents	Perceived usefulness provided the strongest regression weight on continuance intention in the cohort of exogenous factor postulated on m-banking: satisfaction, attitude, PU, self-efficacy, and channel preferences.
Asnakew (2020)	TAM and Trust Theory	SEM-PLS on 202 respondents	Attitude and trust jointly explained half the variance in continuance intention of using m-banking.
Avornyo et al. (2019)	TAM and ECM and other constructs	SEM-AMOS on 295 respondents	Continuous usage intention of m-banking is depends on satisfaction, perceived enjoyment and perceived usefulness.

Source: Developed for the current study

According to Dai, Hu, and Zhang (2014), customers are inclined to keep using an information system accessed through a mobile device if they perceive it to add value and satisfy their needs. This direct association between customer satisfaction and the inclination to keep using an information system concurred with findings from mobile commerce studies by Boakye, Prybutok, and Ryan (2012) and Chong (2013b). This theme is further reinforced by a study on mobile payment systems in South Africa in which satisfaction was empirically validated as the strongest driver of continuance intention to keep using the payment channel (Humbani & Wiese, 2019). The centrality of customer satisfaction in customers' inclination to continue using an IT/IS system is also captured more specifically in m-banking studies.

In an m-banking study looking at post-adoption behaviour, Chen (2012) established that relationship quality is the strongest pre-requisite for its continued use. Relationship quality was conceptualised as a higher-order construct that had satisfaction and trust as sub-dimensions (Chen, 2012). Perceived quality and perceived trust were also established as the most important antecedents of customers' continued intention to use m-banking by Assensoh-Kodua and Msosa (2020). However, perceived quality was conceptualised differently as a higher-order construct distinct from trust, and consisted of information quality, interaction quality and system quality (Assensoh-Kodua & Msosa, 2020). The m-banking study undertaken by Assensoh-Kodua and Msosa (2020) established that customer satisfaction is not a significant predictor of continued m-banking use; instead, it elevates the importance of service quality and trust.

In contrast, findings in other contexts indicated that satisfaction is the strongest predictor of continued use of m-banking (Kumar et al., 2012; Mandari et al., 2021; Susanto et al., 2016; Yuan et al., 2016). All four studies postulated satisfaction as a mediator between the primary latent variables and continued use. However, Mandari et al. (2021), Susanto et al. (2016), and Yuan et al. (2016) operationalised ECM predictors (perceived usefulness and confirmation), while Kumar et al. (2012) utilised TAM primary predictors (perceived ease of use and usefulness) in their respective studies. Additional variables were added in all four studies. A notable divergence is that having used ECM as the base model, Susanto et al. (2016) incorporated perceived security into the model and found it to be statistically insignificant in

predicting satisfaction, while Yuan et al. (2016) added perceived risk and found it to be a significant predictor of satisfaction. Although the perceived risk had a notable effect, it was found to have a negative impact on both user satisfaction and continued usage of mobile banking services. While Foroughi et al. (2019) and Avornyo et al. (2019) empirically confirmed a positive relationship between customer satisfaction and ongoing m-banking usage, they did not attribute greater significance to its effect than other proposed predictors.

While the perceived risk was found to be a significant predictor of satisfaction by Yuan et al. (2016), it was not a significant variable of satisfaction (perceived quality) by previous m-banking studies by Chen (2012) and Kumar et al. (2012). However, perceived risk was found to significantly impact the continued use of m-banking, with high levels of perceived risk leading to less continued use of the platform (Kumar et al., 2012; Shao, Zhang, Li, & Guo, 2019; Yuan et al., 2016). This starkly contrasts the findings by Njenga and Ndlovu (2013) who stated that perceived risk had no significant impact on customers' propensity to continue using m-banking. Another notable association concerns the effect of perceived usefulness on the continued use of the information system. Results show that there is a significant positive association between the two (Asnakew, 2020; Avornyo et al., 2019; Njenga & Ndlovu, 2013; Yuan et al., 2016) but other results contradicted this finding (e.g. Humbani & Wiese, 2019), actually finding an insignificant effect of PU on continued use.

Several studies indicate that perceived usefulness directly and positively influences customer satisfaction with the platform (e.g. Avornyo et al., 2019; Humbani & Wiese, 2019; Yuan et al., 2016). There is less clarity regarding the impact of perceived ease of use on perceived usefulness, with Yuan et al. (2016) and Avornyo et al. (2019) confirming the strong positive association between the two. However, Zhou (2014) states a lack of empirical support for the proposition. Notably, Zhou (2014) advances a strong rationale for why PEOU's effect on PU was insignificant, stating that studies on continued use of an IS/IT platform tend to focus on respondents already familiar with the platform who find it easy to use and have no challenges navigating the system.

A recurring theme in many studies focusing on the continued use of IS/IT systems is the effect of trust on either customer satisfaction or actual continued use itself (e.g.

Asnakew, 2020; Chong, 2013b; Shao et al., 2019; Susanto et al., 2016; Zhou, 2014). However, the operationalisation of trust in the research models and the results provide diverse findings. For example, Chong (2013b) established that trust directly influences both satisfaction and continued use of mobile platforms, while Asnakew (2020) indicated that trust mediates the effect of structural assurance and reputation on continued use, with satisfaction playing no role. On the other hand, Susanto et al. (2016) found that the effect of trust on continued use of a mobile payment system went through satisfaction. In contrast, other studies confirm a direct association between perceived trust and continued use of m-banking (Assensoh-Kodua & Msosa, 2020; Rabaa'i & AlMaati, 2021).

The nexus between trust and continued use of m-banking lies in a financially consequential interface that occurs in the absence of bank personnel (Assensoh-Kodua & Msosa, 2020; Bataineh, Al-Abdallah, & Alkharabsheh, 2015; Zhou & Liu, 2014). Like Asnakew (2020), Shao et al. (2019) investigated trust as a mediator and found it positively influenced the intention to continue using a mobile payment system. Despite a lack of full consensus in the cited literature, it is apparent that in m-banking and related IS studies, trust affects customer satisfaction and their preparedness to continue using the platform beyond the initial adoption phase. The difference is that in some studies, trust is regarded as one of the primary predictors (e.g. Kumar et al., 2020; Sharma & Sharma, 2019; Zhou, 2014), while in some it is viewed as a mediator (e.g. Asnakew, 2020; Mandari et al., 2021; Susanto et al., 2016). Hence, to maximise return on investments made in m-banking channels, banks may benefit from implementing measures that ensure satisfaction and lead to repeat customers trusting the platform in terms of reliability, safety and security (Asnakew, 2020).

2.4 CHAPTER SUMMARY

The chapter's objective was to critically reflect on the scholarly discourse on the themes of mobile banking from a global and regional perspective, and filtered down to a local level within the South African landscape. The dual chronological and thematic evaluation revealed key research gaps that showed, at both a high and a granular level, the skewed focus on the adoption theme and a deep paucity of work pitched at

the post-adoption level that would interrogate and spotlight consumer behavioural outcomes. The review showed that the skewed focus permeates the stated geographic categorisations (global, regional and local), thus illustrating a much broader thematic bias in the literature. Furthermore, studies conducted in developed and developing economies similarly reflect the same thematic bias.

Substantively, the review showed that studies invoke various m-banking adoption drivers borrowed from various theories and related literature as the basis of their research frameworks. It showed that the weight of impact and associated polarity between the identified exogenous variables and the adoption of m-banking varies across studies and contexts. Beyond contestations, some common themes (e.g., the prevalence of TAM as a base theory) and findings (e.g., relatively high levels of adoption in developing economies) also emerged.

The next chapter engages relevant literature but marks a distinct departure from the preceding narrative as it zooms into studies that provide grounding for specific research hypotheses that are premised on the identified research gaps. Mapping out the research hypotheses is done by a systematic and condensed consolidation of relevant literature that provides background empirical support for relationships between specific exogenous and endogenous variables. The variables are borrowed from the three theories previously discussed and relevant literature. Hence, unlike the previous chapter, the focus is on commonalities and intersections that provide a springboard for postulated propositions instead of contestations. This culminates in the conceptualisation of the proposed research model at the end.

CHAPTER 3

HYPOTHESES DEVELOPMENT AND THE CONCEPTUAL MODEL

3.1 INTRODUCTION

The theoretical review outlined in the previous chapter illustrated how the UTAUT theory, the DMISS model and the innovation diffusion theory could be brought together to provide theoretical underpin for this study. This chapter extrapolates this argument by using related empirical findings to buttress the proposed theoretical linkages. This is done in the form of hypothesised direct and indirect (mediated) relationships between specific exogenous variables and the four endogenous variables: performance expectancy, actual use of m-banking; customer satisfaction with m-banking and behavioural outcomes. Specific interactions arising from perceived credibility and trust of m-banking are also opined on the basis of extant studies and included. At the end, the propositions are mapped out in a compact diagram that provides the research blueprint that was actioned in the methodology chapter subsequently.

3.2 PERFORMANCE EXPECTANCY'S INFLUENCE ON THE USE OF M-BANKING AND CUSTOMER SATISFACTION

Performance expectancy (PE), postulated in the unified theory of acceptance and use of technology (UTAUT), refers to an individual's belief that using a system will result in gains in task execution (Venkatesh et al., 2003). Within the context of m-banking, it refers to expectation that transactions will be made easier, more convenient and efficient for the customer in contrast to traditional channels (Venkatesh et al., 2012).

Empirically, Thusi and Maduku (2020) identify key PE benchmarks that positively influence millennials to adopt m-banking: transaction speed, convenience, ubiquity and immediacy. Besides the stated sub-dimensions identified by Thusi and Maduku

(2020), a non-trivial positive association between performance expectancy and the use of m-banking was postulated by Zhou et al. (2010), and the empirical findings supported this. Similarly, Bhatiasevi (2016) proposed that the performance expectancy of mobile banking has a direct and positive relationship with the customer's intention to adopt m-banking, and the hypothesis was validated. The same positive association between performance expectancy and the adoption of m-banking was validated by other researchers (e.g. Baabdullah et al., 2019; Bankole et al., 2012; Shaikh et al., 2015c). This illustrates an empirical narrative emanating from previous studies that supports the theoretical proposition that performance expectancy directly influences the use of an information system. It is thus hypothesised, for this study, as follows:

H₁: There is a significant positive relationship between performance expectancy and the use of m-banking.

Borrowing from the UTAUT theory, extant studies have demonstrated that performance expectancy is directly associated with customer satisfaction with m-banking (Albashrawi & Motiwalla, 2017a). Also, Rana and Dwivedi (2018), in a study on the use of an e-learning platform, hypothesised that perceived usefulness (PU), a TAM surrogate for PE in UTAUT, was positively associated with customer satisfaction from using the platform, and the hypothesis was supported. This positive association was further confirmed in an empirical study on m-banking by Rabaa'i and AlMaati (2021). It is therefore hypothesised, for this study:

H₂: There is a significant positive relationship between m-banking performance expectancy and customer satisfaction.

3.3 THE EFFECT OF M-BANKING QUALITY ON SYSTEM USE AND PERFORMANCE EXPECTANCY

This study adopts the user-based view of defining quality (interface/system quality, information quality, service quality) because it focuses on customer satisfaction, resonating with the marketing perspective from which the study is rooted (Garvin, 1984; Kitchenham & Pfleeger, 1996; Mavetera & Lubbe, 2017). It also aligns well with the paradigm of conceptual fitness and conceptual latitude (Burton-Jones et al., 2015).

A number of studies applied and tested the DMISS success taxonomy in mobile banking (e.g. Albashrawi & Motiwalla, 2017a; Baabdullah et al., 2019; Ou, Davison, & Huang, 2016; Sharma & Sharma, 2019; Tam & Oliveira, 2016) with a key finding being the strong association between service quality and system use as well as net benefits derived by customers (Cates, Chong, & Rauniar, 2009; Hsu, Yen, & Chung, 2015; Sharma & Sharma, 2019). In a study on m-banking that brought together the UTAUT and DMISS constructs, Singu and Chakraborty (2022) established that the system quality of m-banking was the strongest predictor of the customer behavioural intention to adopt m-banking. Similarly, Gao and Waechter (2017) established that system quality, information quality and service quality led to higher levels of effective use of a mobile payment system because of higher levels of trust.

A direct influence of system quality on channel use was verified by Eskandar, Omar, Baheshwan, Albzeirat, and Albzeirat (2018) within a learning management system. This concurred with the findings of Yakubu and Dasuki (2018) who also established that the system quality of a learning management system positively influences the use of the system. Similarly, Tam and Oliveira (2017b) investigated the influence of system quality on the use of m-banking and established a positive association. Consequently, this leads to the following hypothesis:

H_{3a}: There is a significant positive relationship between the system quality of m-banking and its use.

According to Lwoga and Sife (2018), the information quality has a positive effect on the continued usage of an e-resources system. Similarly, Bahaddad (2017) established a positive relationship between information quality and the use of an m-commerce application. In an investigation on internet usage, Alameria, Isaac, Ameenc, and Bhaumik (2019) confirmed the positive impact of information quality on its use. Further evidence of the positive association between information quality and system use was confirmed by Ojo (2017) in an investigation into a healthcare information system. Additionally, information quality was found to have a strong impact on customer behaviour since customers rely on the accuracy of information the m-banking platform provides, making it imperative that it be accurate and error-free

(Zhou, 2011). Consequently, banks need to pay attention to the accessibility, reliability, customisation, and responsiveness of their m-banking interface (Baabdullah et al., 2019). This culminates in the following hypothesis:

H_{3b}: There is a significant positive relationship between the quality of the information available on m-banking and its use.

DeLone and McLean (2003) postulated that service quality (SERVQUAL), conceptualised in the marketing literature (Kettinger & Lee, 1994; Leyland, Watson, & Kavan, 1995) is a relevant success dimension in the IS model and they incorporated it subsequently. Empirical support was provided by Jaafreh (2017) who postulated a positive association between service quality and the use of the banking system and results provided support for the conjecture. Further corroboration is provided by Bahaddad (2017), who verified that service quality has a positive impact on the use of an m-commerce application. More recently, studies have confirmed a positive association between service quality and system use in an e-learning platform as well as student information management systems (Gharaibeh & Gharaibeh, 2020; Mkinga & Mandari, 2020). Furthermore, the service quality of an online document processing system was found to be positively associated with its use (Ramos, Yuliaty, & Simanjuntak, 2022). Some studies have established that, due to the relative novelty of m-banking, service quality is a strong predictor of system usage since customers often need a good level of support from the banks' IS departments and their mobile carriers (Baabdullah et al., 2019; Sharma & Sharma, 2019; Tam & Oliveira, 2016). This leads to the following hypothesis:

H_{3c}: There is a significant positive relationship between the service quality of m-banking and the use of m-banking.

Zhou (2013) asserts that if a customer of a mobile payment system experiences the payment platform as having a poor interface design (poor system quality), and being difficult to navigate, their performance expectancy of the platform may be low. Empirical results confirmed the direct association between system quality and performance expectancy (Zhou, 2014). Similarly, Chen, Meservy, and Gillenson (2012) postulated that system quality indirectly impacts the perceived usefulness (a proxy for performance expectancy) of an information system, and the mediated relationship was supported. Information quality is characterised by accuracy, recency

and relevance (Zhou, 2013), and, if adequate, may positively impact customer perceptions of the mobile platform's performance expectancy. The significant positive interaction between information quality and performance expectancy was empirically established by Chen et al. (2012) as well as Zhou (2013). In an m-banking study context, it was empirically verified that system and information quality positively influence customers' performance expectancy by Windasari and Mousa (2021). Emanating from this background, this study posits the following set of hypotheses between the quality dimensions and performance expectancy of m-banking:

H_{4a}: There is a significant positive relationship between m-banking system quality and performance expectancy.

H_{4b}: There is a significant positive relationship between m-banking information quality and performance expectancy.

H_{4c}: There is a significant positive relationship between m-banking service quality and performance expectancy.

3.4 THE INFLUENCE OF COMPATIBILITY OF M-BANKING ON ITS USE

Compatibility refers to a new technology or innovation's conformity to existing customer practices, routines and lifestyle in the realm of IT/IS use (Rogers, 2003). Compatibility was found to be the antecedent of m-banking adoption and use that had the strongest predictive power in a study by Al-Jabri and Sohail (2012). Furthermore, Dash, Bhusan, and Samal (2014) concluded that when customers deduce that m-banking is well-suited to their work and daily routines, their disposition to adopt and use it is enhanced. Similarly, Koenig-Lewis et al. (2010) also found that compatibility had a strong and positive predictive effect on the acceptance and use of m-banking. Other studies on m-banking that adapted the innovation diffusion theory established similar empirical findings (Lin, 2011; McGovern et al., 2019; Mohammadi, 2015; Ndubisi & Sinti, 2006; Wessels & Drennan, 2010). This historical empirical grounding motivates the following hypothesis for this study:

H₅: There is a significant positive relationship between the compatibility of m-banking and its use.

3.5 SOCIAL INFLUENCE IN ACCEPTANCE AND USE OF M-BANKING

Social influence (SI), also called subjective norms, refers to the extent to which significant others (family members, relatives, friends, workmates) influence a customer's decision regarding the adoption and/or use of a technology or innovation (Crespo & del Bosque, 2008; Fishbein & Ajzen, 1973; Venkatesh et al., 2003). Contemporary views of a customer's social circle and the broader society often influence a person's perception of the use of certain technological options, either positively or negatively (Purani et al., 2019). These subjective norms are important in customers' decision-making because they moderate uncertainties and mitigate dispositions of risk (Purani et al., 2019). This is accentuated by a social media ecosystem that accelerates the continuous dissemination of trends, views and opinions among contact groups at the speed of the click on a touch screen (Au-Yong-Oliveira et al., 2018). This creates a self-sustaining feedback loop, potentially inflating the impact of SI on customer decision-making.

Baabdullah et al. (2019) empirically validated that social influence positively impacts the use of m-banking. This strong influence of the views of significant others on m-banking customers' use of m-banking was also recently asserted in a study by Shahid, Islam, Malik, and Hasan (2022). Specifically, SI refers to the extent to which customers believe that their social contemporaries expect them to use m-banking (Baptista & Oliveira, 2015). The significant positive influence of social norms on South African consumers' willingness to accept m-banking was confirmed by Assensoh-Kodua and Msosa (2020). This background motivates the following hypothesis for this study:

H₆: There is a significant positive relationship between social influence about m-banking and its use.

3.6 QUALITY OF M-BANKING, USE AND CUSTOMER SATISFACTION

Satisfaction is a dynamic, affective and pleasurable post-consumption state that depends on the equilibrium between prior expectations of the service and the post-

consumption disposition (Cenfetelli, Benbasat, & Al-Natour, 2008; Geyskens & Steenkamp, 2000; Oliver, 2010; Raab, Ajami, & Goddard, 2008). It is similarly defined as an emotion-driven pleasurable response a user displays after using the IS/IT system (Malik, Suresh, & Sharma, 2017; Yuan et al., 2016). The expectancy-disconfirmation logic is the underlying model for satisfaction (Churchill & Surprenant, 1982; Patterson & Spreng, 1997). It states that satisfaction arises from an equilibrium between initial expectation and a state of perceived discrepancy (Churchill & Surprenant, 1982; Patterson & Spreng, 1997). Equilibrium depends on responses to technical problems by the customer support desk, whether readily available on demand and relevant (i.e., confirmation) or even anticipatory of their unmet needs (i.e., positive disconfirmation). Poor quality may lead to dissatisfaction due to unmet expectations (negative disconfirmation) (Churchill & Surprenant, 1982; Oliver, 1980).

M-banking interface quality manifests through its consistency, robustness, accessibility, ease of access, reliability, accuracy of the data, and access speed (DeLone & McLean, 2003; Petter et al., 2013; Talukder, Quazi, & Sathye, 2014). In a study on mobile payment systems, Zhou (2013) established a significant and strong association between the quality of the platform and customer satisfaction. Empirical support for the positive association between customer satisfaction and platform quality was also proposed and validated by Ojo (2017) in a study on a healthcare network. Similarly, Tam and Oliveira (2017b) hypothesised that the system quality of m-banking has a positive influence on user satisfaction and the empirical results provided support for the hypothesis. Further evidence was established in an investigation of an e-government system by Stefanovic, Marjanovic, Delić, Culibrk, and Lalic (2016) who proposed that system quality has a positive effect on user satisfaction and the hypothesis was supported. Empirical support of the positive association between system quality and customer satisfaction in a m-banking context was similarly established by Veeramootoo, Nunkoo, and Dwivedi (2018), Al-Otaibi, Aljohani, Hoque, and Alotaibi (2018) as well as Zarepour Nasirabadi and Ghamaripoor (2024). This leads to the following study hypothesis:

H_{7a}: There is a significant positive relationship between system quality of m-banking and customer satisfaction.

The positive relationship between system quality of an information management system and its use was empirically confirmed by Eskandar et al. (2018), and similarly by Yakubu and Dasuki (2018). On a broader level, studies have confirmed the positive influence of system quality on customer satisfaction (e.g. Ojo, 2017; Stefanovic et al., 2016; Zhou, 2013). Further corroboration in m-banking contexts is evident in the study by Tam and Oliveira (2017b) as well as Veeramootoo et al. (2018). While investigating the role of performance expectancy, Zhou (2014) confirmed that system quality has a direct positive influence on performance expectancy while other researchers provided empirical validation of the positive influence of performance expectancy on the use of m-banking (Baabdullah et al., 2019; Bankole et al., 2012; Shaikh et al., 2015c). These studies provide evidence of the interceding role of both the use of m-banking as well as performance expectancy on the relationship between system quality and customer satisfaction, providing motivation for the following mediation hypotheses:

H_{7b}: The use of m-banking mediates the relationship between the system quality of m-banking and customer satisfaction.

H_{7c}: The relationship between the system quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

Albashrawi and Motiwalla (2017b) showed that the three DMISS quality dimensions (system quality, information quality and service quality) have a significant and positive influence on customer satisfaction. The quality of information on an online platform (e-learning and information management) was validated to be an antecedent of customer satisfaction with the platform (Aldholay et al., 2018; Rana & Dwivedi, 2018). In the context of this study, Permanasari and Munandar (2022) empirically validated that the information quality of m-banking has a positive and direct association with customer satisfaction. This leads to the following hypothesis:

H_{7d}: There is a significant positive relationship between m-banking information quality and customer satisfaction.

Windasari and Mousa (2021) confirmed the positive influence of m-banking information quality on performance expectancy while Baabdullah et al. (2019) demonstrated that performance expectancy has a positive influence on the use of m-

banking. In the same value chain, using the DMISS model, the influence of the use of an information system on customer satisfaction has been empirically validated (Tam & Oliveira, 2017b; Urbach et al., 2010). In tandem, these studies' findings motivate the following mediation hypotheses:

H_{7e}: The relationship between the information quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

The five elements that encompass good service quality that may lead to customer satisfaction with m-banking are assurance, empathy, reliability, responsiveness and tangibles (Parasuraman et al., 1985). These were hypothesised by Jaafreh (2017) in a study focusing on the banking system in Saudi Arabia. The empirical results provided significant and strong support for the hypotheses. This was also supported by the results of a study into a higher education system in which service quality was found to strongly influence customer satisfaction (Harlie, Hairul, Rajiani, & Abbas, 2019; Mtebe & Raphael, 2018). Other studies confirmed the same positive association between service quality and customer satisfaction in m-banking study contexts (e.g. Chiguvi, 2016; Khan et al., 2021; Maraqa et al., 2018; Permanasari & Munandar, 2022) as well as in a study on mobile payments in South Africa by Dlodlo (2014). A recent study into a student information system in a tertiary institution premised on the DMISS model also provides empirical support for the positive association between service quality and customer satisfaction (Mkinga & Mandari, 2020). In the context of m-banking, the quality of m-banking services, encompassing the quality sub-dimensions (system quality, information quality, service quality) was empirically confirmed to have a direct positive effect on customer satisfaction in some recent studies (Damabi et al., 2018; Motiwalla et al., 2019; Purwati et al., 2021; Salam, Saha, Rahman, & Mutsuddi, 2021). Previously, Kumar et al. (2012) had empirically confirmed that perceived service quality of m-banking strongly influenced customer satisfaction from m-banking. This background provides grounding for synthesising the following hypothesis:

H_{7f}: There is a significant positive association between the service quality of m-banking and customer satisfaction.

Ramos et al. (2022) empirically confirmed that the service quality of an information system has a positive influence on its use by the clients while a number of studies asserted the influence of the use of an information system on customer satisfaction (e.g. Aldholay et al., 2018; Kamboj, Sharma, & Sarmah, 2022; Martins et al., 2019; Rana & Dwivedi, 2018). On the other hand, Zhou (2013) stated that perceptions of poor service quality diminish the customers' performance expectancy from an information system. In contrast, Baabdullah et al. (2019) established that high levels of performance expectancy of m-banking have a spill-over effect on high levels of its usage. The interplay between the use of an information system and customer satisfaction was empirically validated by Tam and Oliveira (2017b) as well as Urbach et al. (2010). In m-banking contexts, the influence of service quality, directly impacting its use, and customer satisfaction, has also been empirically tested and established in recent studies. (Mostafa, 2020; Nguyen, Pham, Tran, & Pham, 2020; Tumewah & Kurniawan, 2020). These studies provide empirical evidence that buttresses the pivotal role of use and performance expectancy in the relationship between service quality and customer satisfaction. The spin-off of this interplay culminates in the following mediation hypotheses:

H_{7g}: The relationship between the service quality of m-banking and customer satisfaction is mediated by the use of m-banking.

H_{7h}: The relationship between the service quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

DeLone and McLean (2003) argued that the nature, degree and quality of use of an information system interacts with customer satisfaction either sequentially, or causally: *"Use must precede user satisfaction in a process sense, but positive experience with use will lead to greater user satisfaction in a causal sense"* (DeLone & McLean, 2003:23). The process perspective defines the inter-relationship as meaning that satisfaction with use of m-banking has to be preceded by using it. Variance definition implies a more nuanced interpretation: depth of use, breadth of use and complexity of use of m-banking by the customer determine levels of the customer's satisfaction with the platform (Burton-Jones et al., 2015). Consequently, higher levels of satisfaction with m-banking are more likely to generate more use of the platform from a variance

perspective of the 'use' attribute (DeLone & McLean, 2003). The variance perspective of the association may be responsible for why limited use of m-banking by customers translates to low levels of perceived satisfaction (Geebren et al., 2021).

The relationship between use and customer satisfaction was tested empirically by Eskandar et al. (2018), who proposed that the use of an information management system significantly affects clients' satisfaction and found empirical support for the proposition. Applying the DMISS model (DeLone & McLean, 2003) in an empirical study on an e-learning system, Mkinga and Mandari (2020) confirmed that the use of the platform has a positive and direct association with customer satisfaction. Investigating the explanatory power of the DMISS model, Van Cauter, Verlet, Snoeck, and Crompvoets (2017) confirmed that the use of a public sector information system is directly associated with customer satisfaction. Having adapted system use as defined in the DMISS model within a m-banking context, Kamboj et al. (2022) established that m-banking system use has a positive direct association with customer satisfaction. Other studies also provide similar empirical support for the positive relationship between use of an information system and customer satisfaction (e.g. Aldholay et al., 2018; Martins et al., 2019; Ramos et al., 2022; Rana & Dwivedi, 2018; Tam & Oliveira, 2017b; Urbach et al., 2010). Accordingly, the following hypothesis is proposed:

H_{8a}: There is a significant positive relationship between the use of m-banking and customer satisfaction.

The positive influence of information quality on the use of an information system has been established by previous studies (Alameria et al., 2019; Bahaddad, 2017; Zhou, 2011). Furthermore, Baabdullah et al. (2019) confirmed this relationship in a m-banking context. On a related theme, Mkinga and Mandari (2020) provided empirical findings showing that system use influenced the customer satisfaction from an information system. These findings illustrate that system use has both exogenous and endogenous properties. This background motivates the following mediation hypothesis, with use as the pivot variable:

H_{8b}: Use of m-banking mediates the relationship between the information quality of m-banking and customer satisfaction.

3.7 PERCEIVED CREDIBILITY OF M-BANKING AND CUSTOMER SATISFACTION

Credibility implies the perception by the customers that m-banking is safe and secure from hackers and online intruders who may compromise their personal information leading to financial loss (Luarn & Lin, 2005). It also encapsulates customer concerns regarding m-banking privacy, security and risk exposure on the virtual platform (Wang et al., 2003; Yu, 2012). The relevance of this construct was empirically verified by several studies on m-banking (e.g. Bhatiasevi, 2016; Koenig-Lewis et al., 2010; Malaquias & Hwang, 2019; Verkijika, 2018).

Perceived credibility of the m-banking interface is pertinent since customers need to be assured that m-banking has robust security features similar to traditional, over-the-counter, brick-and-mortar access (Islam et al., 2017). A perception of stringent hardware and software security systems affirms platform credibility. It also allays possible fears of performance and privacy risks (Akturan & Tezcan, 2012). Previous studies have provided empirical evidence for the positive association between the perceived credibility of the platform and customer acceptance of m-banking (Haider et al., 2018; Talukder et al., 2014; Yu, 2012). Researchers have established that for many customers to move from just a positive attitude to actual adoption, and, subsequently, sustained use, they must find the platform credible first (Bhatiasevi, 2016; Jeong & Yoon, 2013; Luarn & Lin, 2005; Wang et al., 2003). Furthermore, Masrek et al. (2018) hypothesised that the perceived credibility of m-banking, in terms of security and privacy, positively influenced customer satisfaction and the hypothesis was supported. This culminates in the following prediction for this study:

H_{9a}: Perceived credibility of m-banking is positively related to customer satisfaction with m-banking.

In a market cohort with high levels of behavioural intention to accept and use m-banking, customer assurance with its credibility, in terms of maintenance of safeguards for their financial transactions, is more likely to increase customer satisfaction (Luarn & Lin, 2005; Wang et al., 2003). On the same theme, Islam et al. (2017) conceptually motivated the relevance of the perceived credibility of m-banking in m-banking empirical studies because the integrity of the platform in securing the customers' assets and transactions plays a key role in decision-making. The influence of the perceived credibility of m-banking in impacting customers' decision-making, before and after adoption, has been confirmed in related studies (e.g. Bhatiasevi, 2016; Haider et al., 2018; Saji & Paul, 2018; Vuong et al., 2020). Kumar et al. (2012) established that the perceived credibility of m-banking was a direct antecedent to customer satisfaction with m-banking. This was empirically supported by Masrek et al. (2018), who established the perceived credibility of m-banking as a direct antecedent to customer satisfaction. However, Talukder et al. (2014) had found no empirical support for the association between the perceived credibility of m-banking and using/adopting it. Broadly, these studies suggest that if customers are convinced of its credibility, they are more likely to derive greater satisfaction from using m-banking. However, the findings suggest a degree of inconsistency in the asserted relationships. Consequently, this leads to the following possible interaction effect:

H_{9b}: M-banking perceived credibility moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the relationship.

3.8 TRUST AND CUSTOMER SATISFACTION FROM M-BANKING

In the context of m-banking, trust can be described as the customer's belief and expectation of integrity, accountability and capacity of the banking institution to protect, in good faith, the customer's interests as he/she conducts transactions on their mobile device (Zhang et al., 2018). It is rooted in the preparedness to be vulnerable to the benevolent disposition of the other party towards the customer (Boateng, Adam, Okoe, & Anning-Dorson, 2016; Mayer et al., 1995; Rousseau et al., 1998). What elevates the relevance of trust in a m-banking study is the fact that customers have to grapple with the security and privacy of their personal and financial data that is captured through

the various mobile devices used for m-banking (Chong, 2013a; Sharma & Sharma, 2019).

Empirically, Zhang et al. (2018) proposed and validated a positive association between trust and customer willingness to accept m-banking. Furthermore, Alalwan et al. (2017) established that trust was the strongest predictor of intention to adopt and use m-banking, complementing other m-banking studies (e.g. Alalwan et al., 2017; Bhardwaj & Aggarwal, 2016; Govender & Sihlali, 2014; Zhang et al., 2018). Specifically, Masrek et al. (2018) as well as Mandari et al. (2021) hypothesised a significant positive relationship between trust in m-banking and customer satisfaction and the hypothesis was confirmed. Similarly, higher levels of trust leading to a higher degree of customer satisfaction with service rendered were empirically validated by Weerakkody, Irani, Lee, Hindi, and Osman (2016).

Furthermore, Sharma and Sharma (2019), as well as Altay and Yaprakli (2024), hypothesised a positive relationship between trust and customer satisfaction in m-banking, while Dlodlo (2014) similarly postulated in a mobile payment context and, in both cases, the hypothesis was supported. Trust was also established to be a positive predictor of the perceived usefulness of m-banking by Zhou (2011). This background culminates in the following hypothesis for this study:

H₁₀: Trust in m-banking is positively related to customer satisfaction.

In a financial ecosystem with market segments exhibiting high m-banking acceptance and use, customers who perceive it to be trustworthy are more likely to derive greater satisfaction from its use (Masrek et al., 2018). The relative novelty of the platform, as well as the elevated risk level inherent in financial transactions conducted outside traditional brick-and-mortar interface, may lead to perceived trustworthiness of the platform moderating the strength of the association between m-banking use and customer satisfaction. In a study on m-banking, Salam et al. (2021) established that trust in m-banking is a key antecedent to its adoption and eventual use in the long-term. In a previous m-banking empirical study, Chung and Kwon (2009) established that perceived trust moderated the interaction between system quality, information quality and service quality with customer satisfaction. Chung and Kwon (2009) also

established that the impact of m-banking use on customer satisfaction was moderated by perceived trust. In contrast, Lin (2011) empirically established that perceived trust was a direct antecedent to the adoption and use of m-banking by customers. Subsequently, Muñoz-Leiva et al. (2017) also established perceived trust in m-banking as an antecedent to customer satisfaction, while Singu and Chakraborty (2022) established trust to be a direct antecedent to the behavioural intention to adopt m-banking.

However, Geebren et al. (2021) established perceived trust to be a mediator between the DMISS quality dimensions (system, information, service) and customer satisfaction from m-banking. Similarly, Damabi et al. (2018) confirmed that trust in m-banking interceded in the relationship between system quality and information quality with customer satisfaction from m-banking. This mediation role of trust in an m-banking context was also established by Zalloum, Alghadeer, and Nusairat (2019). Mostafa (2020) empirically established that levels of trust play a role on the levels of use of m-banking, but established no moderating effect on subsequent levels of customer satisfaction. Furthermore, even if Altay and Yaprakli (2024) confirmed that trust has a positive effect on customer satisfaction, they did not establish any moderation effect. This background provides evidence of inconsistency in the role of perceived trust in this value chain. Evidently, the role of perceived trust in the interplay between the stated variables is quite embedded as established in the extant studies on m-banking, albeit with contestations about its positioning. Consequently, the following possible interaction effects are proffered:

H_{11a}: Trust in m-banking moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the association.

H_{11b}: Trust in m-banking moderates the significant positive relationship between the service quality of m-banking and customer satisfaction, such that the association is strengthened.

H_{11c} : Trust in m-banking moderates the significant positive relationship between the information quality of m-banking and customer satisfaction, such that the association is enhanced.

3.9 BEHAVIOURAL OUTCOMES OF M-BANKING USE

Behavioural outcome (BO) refers to the vast universe of post-adoption and post-use behavioural dispositions by customers. According to Oertzen and Odekerken-Schröder (2019), within a m-banking context, the post-adoption customer behaviour determines the value of current customers in terms of their sustained use of the platform as well as dissemination of positive WOM. Behavioural outcomes encapsulate customer dispositions that signal the likelihood of customer retention or potential defection from the product or service (Wilson, Zeithaml, Bitner, & Gremler, 2012; Zeithaml, Berry, & Parasuraman, 1996). Favourable outcomes include repurchase intentions, attachment to the product, higher volumes of voluntary purchase of a product, preparedness to pay a premium for the product, and dissemination of positive word of mouth (WOM) (Hennig-Thurau, Gwinner, & Gremler, 2002; Olorunniwo, Hsu, & Udo, 2006; Zeithaml et al., 1996). Unfavourable outcomes include complaining behaviour, spreading negative word of mouth, seeking legal recourse, switching behaviour and decreased product use (Zeithaml et al., 1996).

Retention is characterised by recency of purchase, frequency of purchase and monetary value of purchase (RFM) (Barnes, 2007). However, loyalty is a higher-order attribute in the value chain, attained when customers display emotional attachment to the product/service, characterised by willingness to pay a premium, tolerance for occasional mishaps and affinity for the brand/product beyond its functional role (Barnes, 2007; Peelen, van Montfort, Beltman, & Klerkx, 2009; Purwanto, Deviny, & Mutahar, 2020). In agreement, Rai and Medha (2013) depict customer loyalty as a mindset that arises from sustained satisfaction that results in emotional attachment to a product or service, manifested by affinity, preference and repeated patronage.

Contextually, behavioural outcomes could manifest through the recommendation of m-banking to someone else, expanded use, diminished use, and discouraging potential clients from the service (Olorunniwo et al., 2006). A strategy producing high levels of satisfaction is ideal because this often leads to continuance intentions, and

high levels of commitment sometimes culminate in loyalty (Bhattacharjee, 2001; Chen et al., 2012; Shaikh et al., 2015c).

In a study on customer reactions to service failure and recovery, Matos, Fernandes, Leis, and Trez (2011) hypothesised that one of the favourable outcomes of customer satisfaction was repurchase intention. Further elaboration is in the empirical validation of the positive association between customer satisfaction and continued customer engagement with m-banking established by Kamboj et al. (2022). Also, customer satisfaction was validated to be an antecedent of the willingness of customers to continue using a mobile app (Wang, Wang, Lin, & Tsai, 2019; Zhao & Bacao, 2020). Additionally, satisfaction was established to be a significant positive driver of the continued use of m-banking and mobile payment in previous empirical studies (e.g. Dlodlo, 2014; Mandari et al., 2021; Yuan et al., 2016). This background motivates the following hypothesis for this study:

H_{12a}: Satisfaction with m-banking is positively and directly related to customer continuity when transacting through m-banking.

As previously stated, the role of perceived trust on the levels of customer satisfaction has been investigated in previous studies on information systems and validated as a mediator (Damabi et al., 2018; Masrek et al., 2018; Zalloum et al., 2019), as a primary antecedent (Liébana-Cabanillas, Muñoz-Leiva, Sánchez-Fernández, & Viedma-del Jesús, 2016; Slazus & Bick, 2022; Zhao & Bacao, 2020) and as a moderator (Chung & Kwon, 2009). This inconsistency culminates in the following first-stage moderated mediation (Hayes, 2015) postulation arising:

H_{12b}: The significant indirect effect of service quality on continuity with m-banking through satisfaction is moderated by trust such that higher levels of trust have a significant and positive strengthening effect on the relationship.

Empirical studies have confirmed a significant and positive relationship between customer satisfaction and customer loyalty in m-banking contexts (Permanasari & Munandar, 2022; Thakur, 2014). This positive association is not an isolated case as other studies confirmed it in related studies (e.g. Baabdullah et al., 2019; de Matos,

Henrique, & de Rosa, 2013; Hennig-Thurau et al., 2002; Zhou et al., 2021). Similarly, the direct and positive association between customer satisfaction and customer loyalty in digital banking platforms was validated by Arhas et al. (2022) and Sampaio, Ladeira, and Santini (2017). This confirmed earlier findings establishing the positive association between customer satisfaction and customer loyalty, documented by Rust, Zahorik, and Keiningham (1995) as well as Lin and Wang (2006). Similarly, the outcomes of customer satisfaction were identified to be trust, loyalty and positive word of mouth (p-WOM) in other studies (e.g. de Matos et al., 2013; Hennig-Thurau et al., 2002; Mbango & Phiri, 2015; Sampaio et al., 2017). The positive association between customer satisfaction and WOM was found to be the strongest one. Similarly, Fu, Ju, and Hsu (2015) empirically confirmed that customer satisfaction positively affects e-WOM.

According to Oertzen and Odekerken-Schröder (2019), m-banking customers receive WOM as a post-adoption driver and likewise send WOM as a post-adoption behaviour. In fact, De Matos and Rossi (2008) asserted that even at lower satisfaction levels, customers may still disseminate positive WOM. Related to WOM as a behavioural outcome of m-banking use, Rai and Medha (2013) identified key antecedents of customer loyalty to be satisfaction, service quality, commitment and trust. On the same m-banking theme, Zhou et al. (2021) confirmed that service quality is a mediating antecedent to customer loyalty. Accordingly, the following propositions are made in the context of this study:

H_{12c}: Satisfaction with m-banking is positively and directly related to customer loyalty to m-banking.

H_{12d}: Satisfaction with m-banking is positively and directly related to customer dissemination of positive word of mouth about m-banking.

Having established that service quality has a direct influence on customer satisfaction (Khan et al., 2021; Motiwalla et al., 2019), which in turn positively influences both customer WOM and customer loyalty (Özkan, Süer, Keser, & Kocakoç, 2020; Sampaio et al., 2017), the role of trust in this value-chain has been established to be either a strong antecedent (Chong, 2013b; Zhao & Bacao, 2020) similar to service

quality and satisfaction or as a moderator (Chung & Kwon, 2009). This background provides impetus for the following trust-induced interaction effects:

H_{12e} : The indirect effect of service quality on customer loyalty through satisfaction is moderated by trust such that higher levels of trust have significant and positive strengthening effect on the association.

H_{12f} : The significant indirect effect of service quality on customer WoM through satisfaction is moderated by trust such that higher levels of trust have a significant and positive strengthening effect on the association.

According to Tam and Oliveira (2017b), prolonged use, just like intermittent use of m-banking, is driven by attitude or previous experience. Familiarity with the platform leads to greater affinity and, sometimes, more regular use. In a study applying the DMISS model, Ramos et al. (2022) proposed and empirically validated that the use of an online system had a direct and positive effect on the net benefits accrued to the customer. Specifically, a direct and positive effect of the use of a banking system on the net benefits derived by customers was established in a study conducted by Jaafreh (2017). Similarly, a study on the use of an online employee portal system showed that the use of the system had a significant, and positive, direct effect on individuals' post-use attitudes as per the DMISS 1992 model (Urbach et al., 2010).

In the domain of this study, usage of mobile banking has been empirically established as enhancing customer loyalty to the platform (Baabdullah et al., 2019). According to Baabdullah et al. (2019), a bank can influence customer continuity of using m-banking and loyalty by incentivising its adoption and use over visiting a branch. The empirical results validated the proposition that usage positively impacted customer loyalty in m-banking. In the context of an m-banking study, Kamboj et al. (2022) confirmed direct positive relationships between the use of m-banking and customer satisfaction as well as customer satisfaction and the continued use of m-banking. They further confirmed a partial, complementary mediation role of customer satisfaction between use and continued engagement with the platform. Other empirical findings also confirmed the positive effect of usage on the levels of m-banking patronage (Ganguli & Roy, 2011; Oppong, Adjei, & Poku, 2014). Accordingly, the following hypotheses are proposed:

H_{13a}: The use of m-banking is positively related to relationship continuity.

H_{13b}: The use of m-banking is positively related to customer loyalty.

Additionally, empirical studies have established that the use of an information system tends to influence higher levels of customer satisfaction (Tam & Oliveira, 2017b; Urbach et al., 2010). In terms of satisfaction, Hennig-Thurau et al. (2002) asserted that its outcomes include customers' positive WoM and customer loyalty. Similarly, Hew, Lee, Ooi, and Lin (2016) identified that customer satisfaction leads to loyalty and continued engagement with the product or service.

Other studies confirm the antecedence of customer satisfaction on loyalty, continuity and WOM (Humbani & Wiese, 2019; Permanasari & Munandar, 2022; Rabaa'i & AlMaati, 2021; Sampaio et al., 2017). The studies' findings show that satisfaction is often an outcome of the use of an information system while it is concurrently a prerequisite to behavioural outcomes like continuity, loyalty and WoM. However, other findings have established that the use of an information system has a direct influence on these behavioural outcomes, notwithstanding customer satisfaction (e.g. Baabdullah et al., 2019; Oppong et al., 2014). This suggests that satisfaction plays an interceding role between the use of an information system and the behavioural outcomes arising thereof. This background provides grounding for the following mediation hypotheses:

H_{13c}: The relationship between the use of m-banking and customer disposition to continue using it is mediated by customer satisfaction.

H_{13d}: The relationship between the use of m-banking and customer loyalty is mediated by customer satisfaction.

In a study on m-banking, Mehrad and Mohammadi (2017) empirically established that word of mouth was the main driver of customers' attitudes towards the use of m-banking. Using a moderated mediated framework, Shankar et al. (2020) established that electronic word of mouth plays a key role in the successful dissemination of m-banking use, provided customers have attained a certain level of trust in the platform.

Similarly, Rajaobelina et al. (2021) established that, in a m-banking context, the usability of m-banking apps is directly associated with the spread of positive word of mouth by customers regarding the service. This positive association was confirmed in other studies (e.g. Purwanto et al., 2020; Zalloum et al., 2019; Zoghlami, Yahia, & Berraies, 2018). This background provides grounding for the following study hypothesis:

H_{13e}: The use of m-banking is positively associated with customer WoM.

The centrality of customer satisfaction in the nexus between the use of an information system and customer dissemination of WoM is entrenched in studies that confirm that use precedes satisfaction (Tam & Oliveira, 2017b; Urbach et al., 2010) in tandem with those that established the antecedence of satisfaction to the dissemination of customer WoM (e.g. Olorunniwo et al., 2006; Sampaio et al., 2017). This role played by customer satisfaction as confirmed in these cited studies provides a basis for proposing the following mediation hypothesis:

H_{13f}: The relationship between the use of m-banking and customer dissemination of positive WoM is mediated by customer satisfaction.

The interactions proposed by the preceding hypotheses and research constructs are captured in the research framework presented in Figure 3.1. Subsequently, Table 3.1 provides a consolidated summary of the hypotheses that were developed in this chapter.

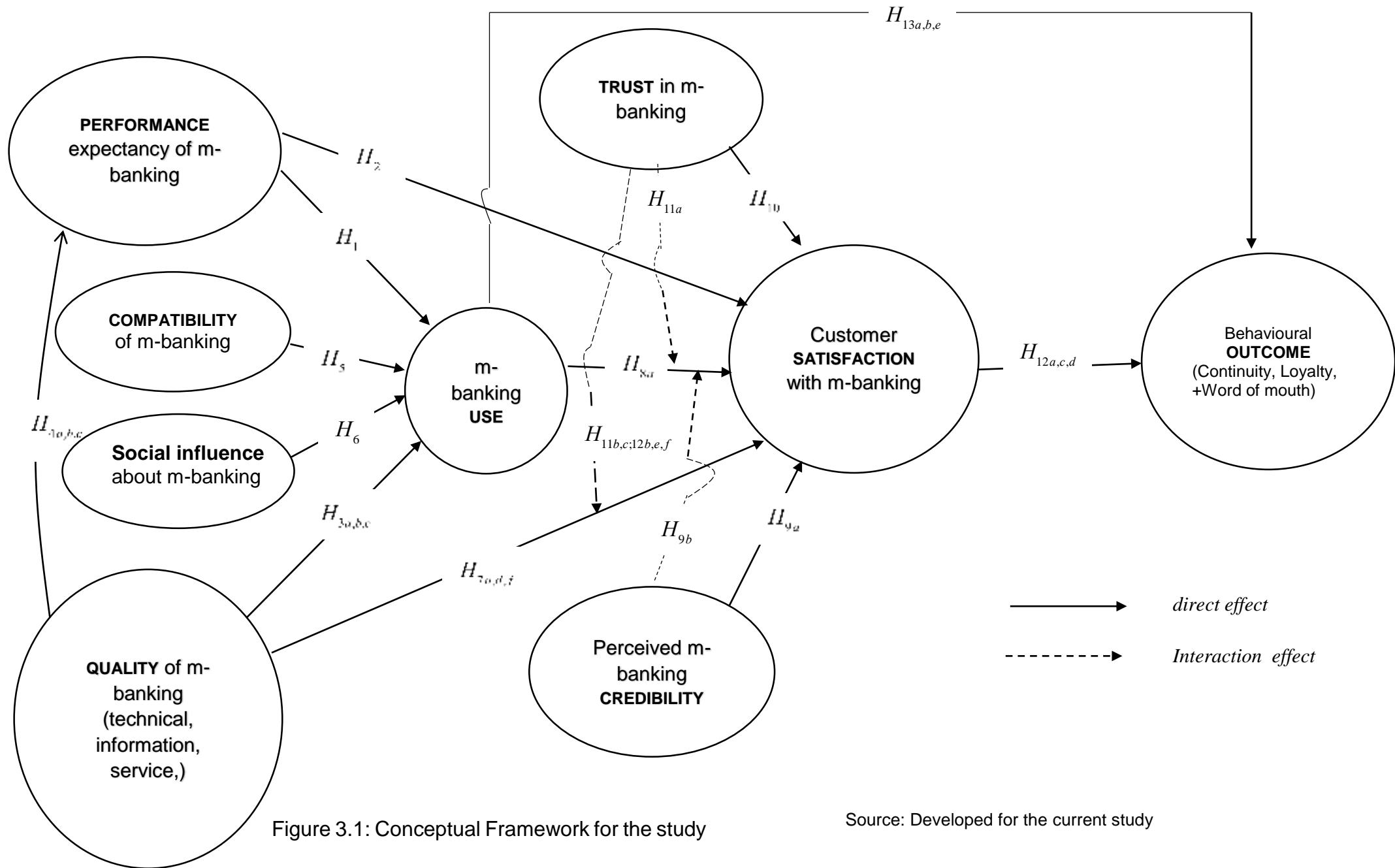


Figure 3.1: Conceptual Framework for the study

Source: Developed for the current study

Table 3.1: Summary of hypotheses

H₁	There is a significant positive relationship between performance expectancy and the use of m-banking.
H₂	There is a significant positive relationship between m-banking performance expectancy and customer satisfaction.
H_{3a}	There is a significant positive relationship between the system quality of m-banking and its use.
H_{3b}	There is a significant positive relationship between the quality of the information available on m-banking and its use.
H_{3c}	There is a significant positive relationship between the service quality of m-banking and the use of m-banking.
H_{4a}	There is a significant positive relationship between m-banking system quality and performance expectancy.
H_{4b}	There is a significant positive relationship between m-banking information quality and performance expectancy.
H_{4c}	There is a significant positive relationship between m-banking service quality and performance expectancy.
H₅	There is a significant positive relationship between the compatibility of m-banking and its use.
H₆	There is a significant positive relationship between social influence about m-banking and its use.
H_{7a}	There is a significant positive relationship between system quality of m-banking and customer satisfaction.
H_{7b}	The use of m-banking mediates the relationship between the system quality of m-banking and customer satisfaction.
H_{7c}	The relationship between the system quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.
H_{7d}	There is a significant positive relationship between m-banking information quality and customer satisfaction.
H_{7e}	The relationship between the information quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.
H_{7f}	There is a significant positive association between the service quality of m-banking and customer satisfaction.
H_{7g}	The relationship between the service quality of m-banking and customer satisfaction is mediated by its use.

H_{7h}	The relationship between the service quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.
H_{8a}	There is a significant positive relationship between the use of m-banking and customer satisfaction.
H_{8b}	Use of m-banking mediates the relationship between the information quality of m-banking and customer satisfaction.
H_{9a}	Perceived credibility of m-banking is positively related to customer satisfaction with m-banking.
H_{9b}	M-banking perceived credibility moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the relationship.
H₁₀	Trust in m-banking is positively related to customer satisfaction.
H_{11a}	Trust in m-banking moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the association.
H_{11b}	Trust in m-banking moderates the significant positive relationship between the service quality of m-banking and customer satisfaction, such that the association is strengthened.
H_{11c}	Trust in m-banking moderates the significant positive relationship between the information quality of m-banking and customer satisfaction, such that the association is enhanced.
H_{12a}	Satisfaction with m-banking is positively and directly related to customer continuity when transacting through m-banking.
H_{12b}	The significant indirect effect of service quality on continuity with m-banking through satisfaction is moderated by trust such that higher levels of trust have a significant and positive strengthening effect on the relationship.
H_{12c}	Satisfaction with m-banking is positively and directly related to customer loyalty to m-banking.
H_{12d}	Satisfaction with m-banking is positively and directly related to customer dissemination of positive word of mouth about m-banking.
H_{12e}	The indirect effect of service quality on customer loyalty through satisfaction is moderated by trust such that higher levels of trust have significant and positive strengthening effect on the association.
H_{12f}	The significant indirect effect of service quality on customer WoM through satisfaction is moderated by trust such that higher levels of trust have a significant and negative suppressing effect on the association.

H_{13a}	The use of m-banking is positively related to relationship continuity
H_{13b}	The use of m-banking is positively related to customer loyalty.
H_{13c}	The relationship between the use of m-banking and customer disposition to continue using it is mediated by customer satisfaction.
H_{13d}	The relationship between the use of m-banking and customer loyalty is mediated by customer satisfaction.
H_{13e}	The use of m-banking is positively associated with customer WoM.
H_{13f}	The relationship between the use of m-banking and customer dissemination of positive WoM is mediated by customer satisfaction.

3.10 CHAPTER SUMMARY

This chapter built upon the broader literature discussion that was presented in Chapter 2 of the thesis and zoomed into a more focused extant literature-driven discussion focussing solely on the constructs identified as relevant for this study from the DMISS, UTAUT and IDT theories, as well as from relevant literature. The discussion provided empirical and theoretical grounding for the hypotheses that were proposed subsequently. The hypotheses included direct and indirect associations between the constructs. Also included in the discussion are interaction effects that were synthesised on the basis of previous studies on m-banking and related information systems literature. This culminated in the synthesis of the study's theoretical framework, a research blueprint whose empirical operationalisation is presented in the next chapter of this thesis, Chapter 4.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

Having outlined the theoretical framework depicting the research hypotheses to be tested, this chapter outlines the research philosophy, research strategy, research design and the research methods and procedures operationalised in executing the outlined framework. The chapter covers the target population, sampling method, the measures and scales on m-banking adapted for the study, and the ethical standards maintained during the data collection phase. A detailed outline of the data collection procedures that were implemented as well as the subsequent analysis is also described. This starts with analytical techniques that were implemented to establish validity and reliability of the measurement model (outer model), followed by the path analysis of the structural model (inner model) in terms of the direct relationships as well as the mediation and moderation analysis that were mapped out in the preceding section.

4.2 RESEARCH PARADIGM

Research paradigm refers to the underlying assumptions, beliefs, value system and methodological conduct that define how the researcher views the terrain under investigation (McGregor & Murnane, 2010; Saunders, Lewis, Thornhill, & Bristow, 2019). Burrell and Morgan (2019) delineate a research paradigm as a researcher's frame of reference expressed through their untested assumptions and choice of theorisation. This is the lens through which the researcher views the research ecosystem, asks research questions, and operationalises the research discourse (Davies & Fisher, 2018). Paradigmatic delineation is important because it clarifies what the researcher considers acceptable knowledge and how it is acquired and communicated. According to Jackson (2013:50) "...even the most scientific, positivist, objective, quantitative researcher will make a subjective choice, for example, of which statistical measure to apply- and interpretative as the researcher's perceptions are utilised in all stages of decision-making throughout a research project". The subjective philosophical choices deal with values, beliefs, ontology and epistemology (Jackson,

2013). Explicitness regarding philosophical assumptions and positions enables the researcher to choose and justify empirical methods and analytical techniques that ensure consistent results and findings. This background justifies the need to discuss the overarching research philosophy and the related concepts of ontology, epistemology and axiology and how these frameworks drove the choices of research design, research strategy and choices specifically operationalised in this study.

Exhaustive engagement with extant studies on m-banking within the South African context and beyond revealed a scarcity of focus on factors driving the continued use of m-banking and customers' post-adoption behaviour. Similarly, the theoretical discourse in extant studies revolves around IS/IT adoption theories, thus reinforcing the deficit on both fronts. This study was informed by a proposition that a holistic and integrated framework that spans m-banking adoption drivers and post-adoption outcomes may provide a unique contribution to knowledge in the context of mobile banking. Hence, the research was based on a philosophical assumption that studying customer perceptions, attitudes and experiences of m-banking is better done broadly at a macro level by looking at both drivers of adoption and outcomes that arise on an on-going basis from an aggregate pool of respondents.

4.3 ONTOLOGICAL POSITIONING

Ontology is the philosophical study of the nature of reality (Jackson, 2013), or the nature of the topical matter subjected to intellectual inquiry (Tsoukas & Chia, 2011). Ontology can alternatively be positioned as a theoretical perspective about the nature of social phenomena (Bryman, 1984; Saunders, Lewis, Thornhill, & Bristow, 2015) and assumptions about the nature of reality and how it manifests itself as a subject of a researcher's inquiry (Bahari, 2010; Easterby-Smith, Thorpe, & Jackson, 2012; Saunders et al., 2019). In terms of m-banking as defined and delineated in this study, it studies the consumer attitudes, experiences and opinions of m-banking before and after adoption, focusing on the post-adoption landscape. This ontological positioning of the study was informed by the discussion outlined in Chapter one of the introductory background of this thesis.

From an ontological perspective, the question that informed subsequent methodological choices was whether the discourse on m-banking is optimally interrogated at a macro level that looks at it as an external manifest reality or at a micro level that looks at it as a dynamic lived reality deeply informed by individual conception. The choice determined whether stated objectives were pursued by operationalising a quantitative research design that sought 'objective' and quantifiable data from a pool of respondents or a qualitative research design in which in-depth interpretive statements formed the basis of the collected data and subsequent sense-making (Jackson, 2013). This is pertinent because a qualitative ontological philosophy opines that the required knowledge is experiential, personal and 'subjective' (Jackson, 2013), while a quantitative one is objectively measurable and not personal. The former entails implementing an inductive research approach, while the later implies a deductive approach. This study operationalised the macro-level perspective that looks at aggregate reality from a big pool of respondents using a so-called 'objective' ontology. This informed the subsequent methodological choices in the value chain: data collection techniques and tools, data analysis packages and methods, and interpretation strategies.

A primary objective of this study was to determine predictors of the use of m-banking, customer satisfaction with m-banking, and behavioural outcomes of use and satisfaction with the platform. Specific predictors, derived mostly from theory and some from literature, were opined. Relationships between specific predictors and stated endogenous variables were posited using predictive taxonomies. For example, it was stated that the performance expectancy of mobile banking has a direct and positive relationship with the use of m-banking. Furthermore, it was proposed that high levels of actual m-banking use directly influence customer satisfaction. Similar to previous studies on m-banking, these propositions, derived predominantly from theory, were interrogated by operationalising a deductive research approach. Hence, a quantitative research design was implemented.

4.4 EPISTEMOLOGICAL POSITIONING

Epistemology is rooted in the Greek words '*episteme*' and '*logos*', with '*episteme*' denoting scientific knowledge and '*logos*' depicting information or theoretical account

(Johnson & Duberley, 2000; Krauss, 2005). Epistemology is thus a philosophy of what knowledge is, how it is recognised, how it is conceptualised and the value system used as a yardstick for it, and its dissemination (Bhawuk, 2010; Hall, 1990; Hardy, 2016). In short, it is the mechanism behind how researchers know what they claim to know (Tsoukas & Chia, 2011).

The relevance of the epistemological perspective behind the research lies in the fact that it informs methodological choices a researcher makes since the objective of the research is the generation, dissemination and advancement of new knowledge within a chosen realm (Snape & Spencer, 2003; Zikmund & Babin, 2015). Methodological choices to operationalise a research framework cannot be separated from a researcher's subsequent knowledge contribution claims. This is why the ontological and epistemological perspectives are intertwined: the choice is between an ontological stance that views knowledge as reality that exists distinctly from a respondent's cognitive schema, meaning that epistemologically, knowledge can be deduced from objective observation compared to an ontological perspective that assumes knowledge is induced interpretively, hence epistemologically by subjective extrapolation and sense-making (Jackson, 2013).

A research study on m-banking can be pitched at the level of a zoomed-in, nuanced and in-depth engagement with a relatively small sample of the banking public to extricate meaning that may be posed as assumptions or hypotheses for further study on m-banking. Depth and rigour about what informs attitudes, emotions and customer choices about m-banking are at the apex of this approach. Alternatively, a broader engagement that focuses on the average drivers of the adoption and use of m-banking by a big pool of respondents could be the focus that uses inferential statistics to make extrapolations. Driven by the research objectives, this study adopted the latter strategy. The ontological perspective about studying m-banking adoption and use was posited at a broad, macro-level as responses were solicited from a large pool of bank clients. Subsequently, inferential deductions about the research hypotheses were made. These deductions formed the basis upon which contributions to knowledge about m-banking adoption, its use and subsequent behavioural customer dispositions were premised.

The epistemological choices lie on a subjectivist-objectivist continuum (Eriksson & Kovalainen, 2015) in which subjectivism posits that knowledge is dynamic and contingent on reflection and interpretation that varies according to socio-cultural norms, ethical dictums as well as moral principles (Levers, 2013). Subjectivism posits that knowledge can be extracted from issues like language, gender and social class (Lincoln, Lynham, & Guba, 2011). The other end of the spectrum states that objectivism is an epistemological position in which knowledge exists intrinsically within an object and cannot vary according to human interaction characterised by issues like gender, language, social class, etc (Levers, 2013). This study adopted the objectivist epistemological position as it aligns with the other elements of the research design implemented in the study. This epistemological positioning informed the choice of research methods, data collection techniques and subsequent analysis.

Consequently, a post-positivist paradigmatic philosophy was the underlying driver behind the research operationalisation. It is rooted in an acceptance that studying human behaviour and attitudes is a dynamic process in which the relationship between cause and effect is probabilistic (Creswell & Creswell, 2017), not absolutist. Hence an ontological perspective acknowledges reality as dynamic and context-driven. The epistemology behind the post-positivist philosophy involves objectively reducing observations and attitudes to a small set of discrete variables numerically measured to test theory-driven hypotheses. In this case, it concerns the use of m-banking, customer satisfaction and behavioural outcomes (Killam, 2013). These measurements provided data that was analysed leading to support or lack of support for hypotheses about customer satisfaction with m-banking and the behavioural outcomes arising thereof posed in the previous chapter of this thesis. Inferences about the impact of postulated antecedents, mediators and moderators of consumer behaviour from m-banking use were made based on collated empirical data (Bhattacharjee, 2001). So, deductions emanated from interpreting non-binary numerical probabilities. This is in keeping with recent studies on m-banking which operationalised cross-sectional quantitative methodologies (e.g. Alkhowaiter, 2020; Farah et al., 2018; Koenaitte et al., 2019; Owusu et al., 2021; Raza et al., 2017). A post-positivist paradigm that allowed for deductive extrapolations was operationalised. The method provided statistically robust results that were appropriate for situational analysis of consumer m-banking behaviour. This is quite distinct from an explicitly positivist paradigm which would entail

minimal subjective inferences (Creswell, 2013). While they lie on the same cause-effect predictive continuum, post-positivism incorporates randomness and unpredictability, hence not as deterministic as strict positivism (Waismann, 2011).

4.5 AXIOLOGICAL POSITIONING

Axiology is a philosophical belief system that focuses on the role of ethics and values in research execution and the researcher's disposition (Saunders et al., 2019; Wahyuni, 2012). Values and ethics played a key role in the operationalisation of this study from the preliminary project conceptualisation phase to the actual field work that was conducted subsequently. The underlying ethos was to demonstrate respect for the rights and dignity of potential respondents in the study regardless of their likely banking profile.

According to Mertens (2010), research ethics have three pillars: respect, beneficence and justice. The researcher demonstrates respect by ensuring that respondents from diverse backgrounds and those in vulnerable categories are given extra protection and consideration. Beneficence requires the researcher to ensure that respondents suffer no harm or personal detriment from the research. If research projects lead to societal benefits, justice requires that vulnerable groups also enjoy the benefits. During the data collection, participants who requested to take the questionnaires with them for later completion were given leeway, and arrangements were made for later pick-up. This was in recognition of the fact that some participants needed more time to go through all the items in the questionnaire than others due to various reasons, e.g., busy day-time routines. To illustrate that there was no potential personal detriment, respondents were informed at the outset that the survey did not solicit any personal banking-related information like their national identity numbers, bank account details, names of their banks, etc. Emphasis was placed on conveying that the survey was for academic purposes and responses were about respondents' attitudes, experiences, and beliefs about m-banking. Additionally, respondents could access the research report later date if interested.

Consequently, values of respect and human dignity as well as ethical protocols of doing no harm and ensuring participants' informed consent are the axiological

principles that guided the researcher in executing the research methodology. Practically, this meant that potential respondents were informed upfront that they were under no obligation to participate and could quit before completing the survey if they felt like it. This resulted in some participants submitting partially completed questionnaires that had to be excluded during the data capture stage. Some participants felt uneasy about responding to certain questions about their m-banking attitudes, profiles and experiences. This was accepted by the researcher and viewed objectively as part and parcel of field work that involves human participants and within the axiological principles that guided the researcher as outlined. These principles guided the researcher in all the phases of the project, particularly the data collection, data analysis and subsequent discussion of the findings.

4.6 RESEARCH DESIGN

Research design is the blueprint or overall strategy that a researcher outlines and operationalises to answer the research questions emanating from the problem statement (Bloomfield & Fisher, 2019). According to Saunders et al. (2015), the research approach may involve empirical testing of a theoretical proposition (deductive) by analysing quantitative data or the development of a theory (inductive) through the analysis of qualitative data. This study implemented the deductive approach, in line with the post-positivist philosophy outlined prior. So, the strategy involved collecting quantitative data from sampled respondents using a structured survey questionnaire. The objective was to numerically measure the postulated associations between performance expectancy, compatibility, quality dimensions and social influence with customers' use of m-banking, satisfaction and behavioural outcomes. A measurement of the direct and indirect effects of perceived trust and perceived credibility of the platform in the m-banking value chain was included. This was done ex-post-facto, as the effects of the independent variables on the dependent variables were predominantly solicited reflectively in the survey tool, with no interference by the researcher (Abayomi et al., 2019).

All these measurements were done through a once-off collection of primary data from current and potential m-banking customers to test the proposed hypotheses

(Blumberg, Cooper, & Schindler, 2014). The research design aimed to establish if empirical data would attest to statistically significant associations between the postulated predictors, mediators and moderators leading to the rejection of the null hypotheses. This was done by capturing an in-situ reflection on customers' m-banking experiences and dispositions (Mohajan, 2020). Hypothesised relationships, if empirically validated, could provide evidence that could be extrapolated to other related m-banking contexts, and the broader IS field. Arguably, at any point in time, both cross-sectional and longitudinal studies provide historical empirical evidence that cannot be projected into future consumer behaviour beyond probabilistic tendencies.

4.7 RESEARCH PROCEDURE AND METHODS

4.7.1 Sample Design

Sample design entails the framework and action plan that involves the identification of the relevant population and the selection of the survey sample (Babin & Zikmund, 2016; Malhotra, Nunan, & Birks, 2017). Sample design consists of defining the population, accessing the sample frame if available, selection of sampling techniques, implementing the sampling strategy and determination of the sample size (Babin & Zikmund, 2016). The strategies implemented in this study are discussed next.

4.7.2 The Target Population

A population is the complete universe of elements that share desirable characteristics that are the subject of the research study from which inferences are envisaged (Babin & Zikmund, 2016; Blumberg et al., 2014). An investigation into the whole population is undertaken through a census and is often not viable, too expensive and/or unnecessary to make valuable findings (Cooper & Schindler, 2014).

The population for the study consisted of all adults 18 years and older, with a bank account and residing either in Gauteng or Mpumalanga province of South Africa. This translated to a population of approximately twelve million, extrapolated from the approximately forty million banked South African adults (FSCA, 2022). The Gauteng province provides a research context with a higher likelihood of respondents with years of m-banking experience, and those with limited exposure. The province is the country's economic hub (South African Market insights, 2019), driven by a

cosmopolitan population which is representative of the country (Maduku & Mpinganjira, 2012) regarding social, cultural and economic diversity. In contrast, Mpumalanga province is largely rural with a higher proportion of underbanked people than Gauteng province. This provided greater diversity in the respondent profile, which could have been skewed towards higher socio-economic cohorts in the Gauteng province's respondent pool, while Mpumalanga on its own may have trended predominantly towards the lower LSMs. Hence amalgamating the two provided a degree of demographic diversity and equilibrium.

4.7.3 Sample Frame

A sampling frame lists all the elements of a study's population (Cooper & Schindler, 2014; Malhotra et al., 2017). In the context of this study, the sampling frame consists of an itemised list of all twelve million bank clients (approximately), with an active account at one of the commercial banks in South Africa that provide m-banking access, residing in the Gauteng and Mpumalanga provinces, at the time of the data collection process. This type of consolidated list could not be accessed due to a number of reasons. Firstly, the customer-base lists are the confidential properties of the individual banks, who are unwilling to provide them to third parties due to competitive, privacy and legal reasons. Secondly, banks are legally bound to strictly adhere to the protection of the privacy of the personal information of their clients by the regulatory authority as per POPIA (Protection of Personal Information Act). Consequently, the outlined sampling frame could not be accessed.

4.7.4 Sampling Techniques

The absence of a sampling frame led to the execution of non-probability, purposive sampling of respondents in which respondents were selected according to the needs of the study. Purposive sampling is ideally implemented when collecting specific data from a designated cohort of the population (Sekaran & Bougie, 2016). These requirements were that respondents be residents either in Gauteng or Mpumalanga, at least 18 years old and own a bank account providing access to cell phone banking. Past studies on m-banking have also used purposive sampling. A few examples: Aslam, de Luna, Asim, and Farhat (2023); Hariyanti, Hidayatullah, and Prasetya

(2020); Ramli et al. (2021); Rombe, Zahara, Santi, and Rahadhini (2021); Shaikh et al. (2021); Yunus (2014).

4.7.4.1 Non-probability Sampling

Non-probability sampling refers to the selection of respondents based on the researcher's personal judgement (Blumberg et al., 2014; Sekaran & Bougie, 2016; Zikmund & Babin, 2015). Unlike probability sampling, not every member of the population is afforded an equal chance of being sampled (Zikmund & Babin, 2015). Rules of probabilistic chance do not apply in non-probability sampling because research elements are selected subjectively. In this study, a non-probability purposive sampling technique was used because of the unavailability of a sampling frame. Non-probability sampling is considered appropriate if a study intends to explore and test a theoretical framework developed to test a reflected phenomenon, in this case the behavioural outcomes of m-banking (Hulland, Baumgartner, & Smith, 2018; Mumtaz, Ting, Ramayah, Chuah, & Cheah, 2017).

4.7.4.2 Purposive sampling

Purposive sampling is the non-probabilistic selection of respondents who can provide the desired information, either because they are the only ones who have it, or conform to some stipulated criteria (Sekaran & Bougie, 2016). In this study context, the criteria were that respondents were 18 years and older, resided in the stipulated provinces, and also owned a bank account providing access to m-banking. There are two forms of purposive sampling: judgment sampling and quota sampling.

Judgment sampling involves the selection of respondents who are conveniently placed or in the best position to provide the information required. In contrast, quota sampling ensures certain population segments are proportionately represented by allocating a quota to each designated segment (Blumberg et al., 2014). This study employed both forms of purposive sampling by allocating a percent quota of questionnaires that needed to be distributed in Mpumalanga and a proportional percent quota that had to be distributed in Gauteng. After that, in each province, judgment sampling was used to select respondents who met the set criteria of 18 years and above and owned a bank account that provided access to mobile banking.

4.8 SAMPLE SIZE DETERMINATION

The sample size is the total number of the population elements selected for the research study (McGivern, 2013) and should ideally be large enough and diverse enough to resemble the population from which it is drawn (Blumberg et al., 2014). Hence, the sample selection is pertinent in a quantitative research design that makes inferential deductions at the end.

Raosoft's online calculator, and the G*Power sample size online tool (Faul, Erdfelder, Buchner, & Lang, 2009) gave a sample size of 385. Yamane's formula (Chaokromthong & Sintao, 2021) produced 400 individual bank customers who would be the unit of analysis. Similarly, in the same ball-park, Krejcie and Morgan (1970) sample size determination table gave 384 respondents for the designated population size. Previous studies on m-banking have investigated sample sizes within the same range: Makanyeza (2017) (232 respondents), Nel and Boshoff (2014) (487 respondents), Rammile and Nel (2012) (288 respondents), Thusi and Maduku (2020) (352 respondents). Hence a targeted sample size of 400 respondents was deemed appropriate in this case, benchmarked on these previous m-banking studies, and the sample size calculation above. Furthermore, partial least squares (PLS) estimation requires at least ten times the largest number of structural paths directed at a particular latent variable in the model (Barclay, Higgins, & Thompson, 1995), and this sample size met that benchmark as the maximum number of paths to an endogenous variable in this study was seven.

Nayak and Narayan (2019) established that historical average response rate was 33% across both online and paper-based surveys. For this study, this translated to a minimum of 1200 questionnaires that needed to be disseminated to attain the envisaged sample size. These questionnaires were distributed evenly in the two selected provinces.

4.9 SAMPLE ELEMENTS (UNIT OF ANALYSIS)

The unit of analysis refers to individual members of the population who participate in the survey and provide the information sought by the researcher (Sekaran & Bougie,

2016; Zikmund & Babin, 2015). In this study, the unit of analysis comprised adults 18 years and above who resided either in Gauteng or Mpumalanga province and owned a bank account that provided access to m-banking at the time of the survey. The questionnaire design accommodated participants who may not have been active users of cell phone banking.

4.10 ERRORS IN SURVEY RESEARCH

Survey error refers to a discrepancy between the sample statistic and the true population parameter that occurs because a participant chose or could not answer a survey question accurately (Blumberg et al., 2014; Zikmund & Babin, 2015). According to Biemer (2010), total survey error (TSE) is the aggregate effect of all errors in survey data that emanates from the design process, the data collection, the processing and analysis procedures. Survey errors manifest in data that deviates from the underlying true values. Survey errors are detrimental to the research process because they undermine the accuracy of inferences derived from the survey data (Biemer, 2010; Malhotra et al., 2017). In order to ensure good quality data and results that are accurate, reliable and valid, the research design execution needs to be purposefully geared to minimise survey errors. However, a researcher cannot eliminate all errors during the research process (Biemer, 2010; Sekaran & Bougie, 2016). Survey errors emanate from sampling weaknesses or non-sampling deviations.

4.10.1 Sampling errors

Sampling errors arise due to parameter estimates derived from data collected from elements of the population instead of the entire target population (Makvandi, Bouchard, Bergeron, & Sedigh, 2013). Small sample sizes tend to inflate sampling errors and thus bigger sample sizes often lead to smaller deviations from the true population parameters (Blumberg et al., 2014). Hence, better sample statistics are obtained if a survey obtains data from as big a sample as possible, especially for small target populations. To minimise the sampling errors, this study used a sample size of 453, despite the calculated sample size being 385 as per the Raosoft sample size calculator and Yamane's formula.

4.10.2 Non-sampling errors

Non-sampling errors arise due to the use of non-random sampling techniques, or other conduct by the researcher or by participants. It is unlikely to be minimised by increasing the sample size. Sources of non-sampling errors include poor research design, poorly designed questionnaires that do not solicit relevant responses from participants, and inappropriate data analysis techniques administered by the researcher (Fuller, Simmering, Atinc, Atinc, & Babin, 2016). Similarly, non-sampling errors can emanate from participants who provide incomplete or ill-considered responses due to a lack of interest (Cooper & Schindler, 2014). Non-sampling errors are categorised as response or non-response errors (Fuller et al., 2016). Non-response refers to errors that emanate from selected respondents who do not avail themselves to participate, thus impacting the sample size. Response errors arise from inaccurate answers due to participants' ignorance or inattention (Sekaran & Bougie, 2016). In the context of this study, such errors were mitigated by using hand-delivered questionnaires through which respondents were given plenty of time to complete the tool under no time pressure. Statistical techniques were used to identify outlier cases during the data analysis process and they were removed from the data pool.

4.11 DATA COLLECTION PLAN

The data collection plan involved designing and implementing a quantitative data collection tool. The data collection tool was a paper and pencil survey questionnaire. The details of the design are outlined in the next section.

4.11.1 Quantitative method: survey

Survey data aimed at producing information that would address the research questions was collected from the delineated target sample using a structured questionnaire. According to Malhotra et al. (2017), the survey questionnaire for quantitative research design is an ideal tool for descriptive studies because it prompts participants to choose from pre-set responses, thus making it possible to compare and establish trends and make inferences deduced from measures of central tendency, dispersion, skewness, etc. Surveys can be interactive or non-interactive (Zikmund & Babin, 2010). The interactive survey approach involves a bi-directional interface between a researcher and the participant, face-to-face or electronically while non-

interactive excludes any active engagement from the researcher. This study made use of the latter.

Non-interactive surveys can be delivered electronically (e.g. via email, social media apps, web-hosted platforms, etc) or by hard copies delivered physically or through traditional mail. This platform involves no dialogue between the researcher and the respondent regarding the completion of the questionnaire because the tool is self-administered, as the respondent reads and answers the questions independently without the researcher's assistance (Creswell & Creswell, 2017; Zikmund & Babin, 2010). The advantages of the non-interactive questionnaire are that it is comparatively cheaper and can be administered quickly by the researcher. The major disadvantage is that the quality of the responses depends on the clarity of the written questions as respondents have no interaction with the researcher as they complete the tool. Another weakness of the self-administered questionnaire is low response rates as there are limited ways of prompting respondents to complete the tool (Sekaran & Bougie, 2016).

4.11.2 Research Instrument Design

According to Malhotra et al. (2017), a questionnaire is simply a formalised set of questions posed to a respondent in order to solicit information from them. Importantly, the information should be statistically meaningful and relevant to the topic of the research study (Roopa & Rani, 2012). The questionnaire is a reliable tool for collecting quantitative primary data (Malhotra et al., 2017). Hence Krosnick (1999) depict it as the centrepiece of a survey. If designed well, it measures what it is meant to measure (validity) and does so with precision (reliability) (Taherdoost, 2016), thus providing data that leads to relevant and accurate information about investigated phenomena. If not, the results from the collected data may be subject to question and doubt. This questionnaire must be designed using sound and tested scientific best-practice protocols.

The first prescript in the research instrument design is that the questionnaire must gather data that addresses the research problem posed at the beginning of the project (validity). The questionnaire should minimise response errors by having clear wording

to solicit information from respondents that is relevant to research questions and objectives (McDaniel Jr & Gates, 2018). The second prescript is that the questionnaire should gather data that is reliable and accurate (reliability). The third prescript is that the questionnaire should be cognitively easy to use for the respondents and fit for the researcher. It should facilitate efficient data processing subsequently. The questionnaire design used in this study was done with these prescripts as a blueprint. A concerted effort was made to balance between brevity aimed at minimising respondent fatigue and achieving depth and rigour in the solicited information. To ensure validity and reliability, the measures used in the questionnaire were adapted from previously validated scales as outlined in the next section.

4.11.3 Survey instrument layout

The detailed questionnaire is presented in Appendix A. The questionnaire for this study had the following sections: Screening questions; province of residence; content questions on m-banking, and demographic questions.

4.11.3.1 Section 0: Screening questions

Screening questions are designed to establish and exclude potential target population respondents who do not meet a pre-set criteria (Cooper & Schindler, 2014). In this study, the questionnaire had three screening questions. The first one required each respondent to be a minimum of 18 years in order to participate in the survey. The second question required them to reside in Gauteng or Mpumalanga Province. Lastly, respondents had to own a bank account with any South African bank. Answering no to any of the three questions meant that respondents could not continue the survey. This was implemented by the field assistants, based on their engagement with potential respondents. Respondents who did not meet the criteria were expressly told they could not complete the rest of the document.

4.11.3.2 Section 1: Province of residence

Section 1 of the questionnaire required respondents to indicate whether they were residents of Gauteng or Mpumalanga. This ensured respondents resided in the prescribed survey area per the research design. Capturing views from respondents living in a predominantly urban metropolis (Gauteng) with those in a more rural context

(Mpumalanga) also assisted in establishing a wide and diverse catchment area for the survey to ensure plurality of attitudes and views on m-banking that could depict a semblance of the national trend using a statistically non-probabilistic sample.

4.11.3.3 Section 2 to 14: Measurement of constructs

Sections 2 to 14 consisted of attitudinal, experiential and behavioural rating questions on each latent variable. The constructs were measured using existing scales confirmed for validity and reliability in previous studies. Elaboration on the adapted scales is given in the next subsection of this thesis.

4.11.3.4 Section 15: Demographic questions

The last section consisted of questions establishing the respondents' demographic profile. This involved questions about age, employment status, monthly income, level of education and gender identification. These demographic factors have previously been established to influence attitudes towards adopting and using emergent technologies, hence their relevance.

4.12 CONSTRUCTS AND MEASUREMENT SCALES

The measurement items for each latent variable were adapted from previously validated scales obtained from related literature, specifically on m-banking or related IS/IT field in which the DMISS, UTAUT or IDT theories were applied. This ensured that scales had been previously established to be both reliable and valid in relevant empirical studies. The adapted scales are available in Appendix B of this thesis. All latent variables were measured using multi-item ordinal five-point Likert-type scales with '1'=strongly disagree, '2'=disagree, '3'= neither disagree nor agree, '4'=agree, and '5'=strongly agree. Multi-item scales were used in the survey tool to capture a wide spectrum of respondent attitudes and perceptions on each construct. Furthermore, this strategy minimises possible systematic and random errors that may lead to redundancy of some postulated constructs in the theoretical framework, especially if a large sample size is obtained (Churchill, 1979).

The previously validated scales were adapted for the South African m-banking context, driven by the study objectives. The questionnaire was pre-tested for

language, sequencing and contextual relevance before the main study commenced as, Chitungo and Munongo (2013) recommended.

4.12.1 Performance Expectancy

Performance expectancy refers to an individual's anticipation that system use enhances task execution (Venkatesh et al., 2003). The performance expectancy construct was measured using five behaviourally posed opinion questions on m-banking adapted from Baabdullah et al. (2019). These measurement items are presented in Table 4.1. Responses were anchored between strongly disagree (1) and strongly agree (5). Respondents chose a rating that reflected their opinion based on experience or expectation of mobile banking.

Table 4.1: Measurement scale for performance expectancy

Item statement	Adapted from	Composite reliability and average variance extracted in Baabdullah et al. (2019)	
		CR	AVE
Using mobile banking improves my performance in conducting daily banking transactions.	Baabdullah et al. (2019)	0.897	0.641
Using mobile banking makes it easier for me to conduct banking transactions.			
I find mobile banking useful in conducting my banking transactions.			
I can manage my money through mobile banking without visiting the bank, anytime, anywhere.			
Mobile banking helps me accomplish tasks more quickly.			

4.12.2 Compatibility

Compatibility was conceptualised in the innovation diffusion theory as a new technology's consistency and resonance with the consumer's prevailing contextual value systems, beliefs, habits and experiences (Agarwal & Karahanna, 1998; Koenig-Lewis et al., 2010; Rogers, 2003). A further breakdown identifies normative or cognitive compatibility which refers to the alignment of consumers' thoughts and feelings with an innovation (Tornatzky & Klein, 1982) and operational compatibility which focusses on what consumers do (Agarwal & Karahanna, 1998). As conceptualised in this thesis, the context of mobile banking invokes both normative and operational compatibility because the survey questions probed both attitudes, opinions, and experiences of the service, as depicted in the five measurement items shown in Table 4.2. Responses were similarly pitched on a five-point disagree (1)-agree (5) Likert-type scale. As depicted in Table 4.2, scale items were adapted from Koenig-Lewis et al. (2010).

Table 4.2: Measurement scale for compatibility

Item statement	Adapted from	Composite reliability and average variance extracted in Koenig-Lewis et al. (2010)	
		CR	AVE
I believe that using mobile banking fits/will fit my lifestyle.	Koenig-Lewis et al. (2010)	0.89	0.656
I believe that using mobile banking is/will be suitable for me.			
I believe that my mobile phone is compatible with mobile banking technology.			
Using my mobile device to conduct mobile banking is quite similar to my regular activities.			
The technology skills I already know are relevant for mobile banking.			

4.12.3 Social influence

Social influence was conceptualised as a measure of the degree to which a prospective adopter perceives that acquaintances in their social circle expect them to utilise the innovation (Venkatesh et al., 2003). Acquaintances that significantly impact the consumer’s positive or negative disposition to the innovation include family, friends, neighbours, relatives, etc (Baabdullah et al., 2019; Rana et al., 2015). This is accentuated by the proliferation of social media through which influence can be exerted, transmitted and felt regarding what innovation is socially acceptable at any point in time (Dwivedi et al., 2018). In the context of m-banking, Baabdullah et al. (2019) asserted that social influence enhanced the use of mobile banking and measured it using the scale adapted for this thesis as depicted in Table 4.3. The

composite reliability and average variance extracted values in the original scales met the thresholds of 0.7 for CR (Hair, Black, Babin, Anderson, & Tatham, 2014) and 0.5 for AVE (Fornell & Larcker, 1981).

Table 4.3: Measurement scale for social influence

Item statement	Adapted from	Composite reliability and average variance extracted in Baabdullah et al. (2019)	
		CR	AVE
People who are important to me think that I should use mobile banking.	Baabdullah et al. (2019)	0.869	0.691
People who influence my behaviour think that I should use mobile banking.			
People whose opinions I value prefer that I use mobile banking.			
Most people I interact with prefer to transact with me via mobile banking.			
My friends, family and colleagues do most of their transactions using mobile banking.			

4.12.4 System quality

System quality was conceptualised as a measure of the desirable attributes of an information system (DeLone & McLean, 2016; Urbach & Müller, 2012). Examples of attributes that are directly relatable within the context of m-banking as conceptualised in this thesis include ease of use of the application interface, flexibility of the interface in terms of accessibility through different devices, reliability of the interface in terms of robustness and minimal downtime, response time in terms of access speed and

navigation when logged in and sophistication in terms of diversity of features and options. The system quality latent variable was measured using reflective indicators adapted from Urbach et al. (2010). As depicted in Table 4.4, the adapted scale had good reliability and validity as both measures surpassed the stipulated benchmarks of 0.5 for AVE and 0.7 for CR. Questionnaire items asked experiential-based questions on m-banking with responses depicted on a five-point disagree-agree Likert-type scale.

Table 4.4: Measurement scale for system quality

Item statement	Adapted from	Composite reliability and average variance extracted in Urbach et al. (2010)	
		CR	AVE
Mobile banking is easy to navigate.	Urbach et al. (2010)	0.938	0.716
Mobile banking allows me to easily find the information I am looking for.			
Mobile banking loads up information I need on my device very quickly.			
Mobile banking is error-free most of the time I use my device.			
Mobile banking offers full functionality on my device.			

4.12.5 Information quality

DeLone and McLean (2016) conceptualised information quality as the desirable attributes of a system's outputs. In the context of m-banking, this would include the relevance and accuracy of the information retrieved by the customer through the

interface regarding their account holding and/or transactions. Similarly, the relevant detail provided through the interface and the account information being up to date even outside traditional banking hours contribute to customer perception of the information quality attribute. According to Tam and Oliveira (2017b), the information on m-banking platforms should be relevant, useful and up to date to improve customer satisfaction positively. Failure to meet these attributes may lead to customer frustration and, dissatisfaction (Tam & Oliveira, 2017b). The scale adapted for this study from Urbach et al. (2010) had good reliability and validity as depicted in Table 4.5, as it also met the stipulated benchmarks for both parameters.

Table 4.5: Measurement scale for information quality

Item statement	Adapted from	Composite reliability and average variance extracted in Urbach et al. (2010)	
		CR	AVE
The information provided by mobile banking is relevant.	Urbach et al. (2010)	0.929	0.686
The information provided by mobile banking is accurate.			
The information provided by mobile banking is reliable.			
The information provided by mobile banking is complete.			
The information provided by mobile banking is up-to-date.			

4.12.6 Service Quality

Service quality was not initially included in the seminal DMISS model but was incorporated in the model updates borrowing from the SERVQUAL model in marketing due to the recognition that customer service in the form of responsiveness, empathy and technical competence of the IT personnel plays a key role in customer satisfaction

(DeLone & McLean, 2003, 2016). Service quality is measured by the perceived quality of support the users of m-banking receive from the support and technical teams available from the service provider that enable quick trouble-shooting (Petter, DeLone, & McLean, 2008). The scale depicted in Table 4.6 was adapted from Tam and Oliveira (2017b) and also showed good levels of validity and reliability in terms of composite reliability (CR>0.7) and convergent validity (AVE>0.5) (Bagozzi & Yi, 1988). The sustainable long-term use of a novel platform like m-banking relies greatly on ensuring reliable customer service that contributes to customer satisfaction (Tam & Oliveira, 2017b).

Table 4.6: Measurement scale for service quality

Item statement	Adapted from	Composite reliability and average variance extracted in Tam and Oliveira (2017b)	
		CR	AVE
The service personnel are always eager to help whenever I need support with the mobile banking.	Tam and Oliveira (2017b)	0.970	0.903
The responsible service personnel provide personal attention when I experience problems with the mobile banking.			
The responsible service personnel provide services related to the mobile banking at the promised time.			
The responsible service personnel have sufficient knowledge to answer my questions regarding the mobile banking.			

I can access a service agent quickly when I need assistance on mobile banking.			
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4.12.7 System use

System use was conceptualised as a system success sub-dimension that refers to how clients of the information system utilise its capabilities in terms of their frequency of using it, the breadth and depth to which they use it, the relevance of their use and the nature of use (DeLone & McLean, 2003). Within the context of m-banking, Zhou (2011) operationalised a scale that asked respondents behavioural questions about their use and intended use of m-banking. The scale was adapted for this thesis' survey tool because the content validity was good and contextually relevant for an m-banking study. Objectively, the scale's reliability and convergent validity, depicted in Table 4.7, show very high metrics compared to the standard benchmarks for AVE and CR.

Table 4.7: Measurement scale for system use

Item statement	Adapted from	Composite reliability and average variance extracted in Zhou (2011)	
		CR	AVE
I use mobile banking regularly.	Zhou (2011)	0.84	0.64
I use mobile banking to manage my accounts.			
I use mobile banking to make transfers, pay bills and buy goods and services.			
I subscribe to financial products and/or services that are accessible via mobile banking.			

Overall, your use of mobile banking can be classified as very strong.			
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4.12.8 Customer satisfaction

Satisfaction was conceptualised as part of the confirmation/disconfirmation paradigm that involves a consumer’s post-choice evaluation of a product or service (Swan & Oliver, 1989). It was empirically assessed using six items using an agree/disagree Likert-type scale adapted from Thakur (2014). The scale was adapted for this study because it showed adequate convergent validity as depicted in Table 4.8, in terms of the values of both CR and AVE. The scale items were also contextually relevant to this m-banking study regarding the experiential and attitudinal information asked from respondents.

Table 4.8: Measurement scale for customer satisfaction

Item statement	Adapted from	Composite reliability and average variance extracted in Thakur (2014)	
		CR	AVE
I am satisfied that my bank’s mobile banking steps on my device are easy to follow and remember.	Thakur (2014)	0.883	0.655
I am satisfied with mobile banking efficiency.			
I am satisfied with the effectiveness of mobile banking.			
I am satisfied with the quality of mobile banking.			
Overall, I am satisfied with mobile banking.			

4.12.9 Trust

Trust was conceptualised as depicting a willingness to be vulnerable to an expectation that another party will, in good faith, accomplish an obligation (Mayer et al., 1995). Accomplishing the obligation is premised on the other party's integrity, ability and benevolence (Kim, Ferrin, & Rao, 2008; McKnight, Choudhury, & Kacmar, 2002). Ability depicts that the other party can deliver on an obligation and will not be deceptive (integrity) but act selflessly (benevolence) (Zhou, 2013). The scale operationalised in this study was adapted from Zhou (2013) and it shows good convergent validity as depicted by the AVE and CR values (Table 4.9). The survey tool asked five attitudinal questions about m-banking and responses were similarly pitched on a disagree-agree Likert-type scale.

Table 4.9: Measurement scale for trust

Item statement	Adapted from	Composite reliability and average variance extracted in Zhou (2013)	
		CR	AVE
Mobile banking seems trustworthy.	Zhou (2013)	0.83	0.56
Mobile banking is very reliable in safeguarding my assets.			
I believe my bank has my best interests on the mobile banking platform.			
I consider conducting transactions on mobile banking to be safe and low-risk.			
Overall, I trust the mobile banking platform.			

4.12.10 Credibility

According to Wang et al. (2003), credibility is a primary dimension of trust and it depicts an expectation that the exchange partner has the expertise and wherewithal to fulfil their end of the bargain effectively and consistently. Perceived credibility is pertinent within an m-banking context because of the inherent risk of a platform liable to compromise due to hackers and scammers (Wang et al., 2003; Zhou, 2013). Credibility was empirically measured using five items that were adapted from Wang et al. (2003) as depicted in Table 4.10. The scale was adapted for this study because it was originally operationalised within the context of a related internet banking study, thus providing items that provide content validity. Furthermore, the convergent validity depicted in Table 4.10 also shows that it was confirmed to be reliable and valid in the original study. Survey items asked respondents attitudinal questions about their experience and/or expectation of m-banking use.

Table 4.10: Measurement scale for perceived credibility

Item statement	Adapted from	Composite reliability and average variance extracted in Wang et al. (2003)	
		CR	AVE
Using mobile banking would not divulge my personal information.	Wang et al. (2003)	0.95	0.81
I consider/would consider mobile banking secure for conducting my banking transactions.			
I find/would find mobile banking secure in requiring and receiving other information, e.g. bank statements.			

I see no risk of me losing my money through mobile banking use.			
Overall, I consider mobile banking to be a credible and authentic transaction platform.			

4.12.11 Loyalty

Loyalty has been conceptualised within the service industry as two-fold: attitudinal loyalty refers to what customers feel, and behavioural loyalty refers to what customers do (Özkan et al., 2020). Both forms of loyalty manifest themselves in terms of customer affinity to a brand/product/service as they show a desire to repurchase (attitudinal) (Bowen & Shoemaker, 2003; Hennig-Thurau et al., 2002; Turkyilmaz, Oztekin, Zaim, & Fahrettin Demirel, 2013) or to seek a long-term relationship with the product or service and provide positive feedback to others about their experience (behavioural) (Tabrani, Amin, & Nizam, 2018; Zeithaml et al., 1996). Loyalty was assessed using eight items adapted for the study from a scale by Özkan et al. (2020) which provided convergent validity and reliability indices above the recommended cut-offs for AVE and CR, as shown in Table 4.11. Survey items were phrased to seek respondents' attitudinal and behavioural views about m-banking.

Table 4.11: Measurement scale for loyalty

Item statement	Adapted from	Composite reliability and average extracted in Özkan et al. (2020)	
		CR	AVE
I will use mobile banking for other available services and products I need from my bank.	Özkan et al. (2020)	0.92	0.64
I am glad to use mobile banking rather than go to the bank branch.			
I would expend extra effort to continue using mobile banking.			
I am committed to making repeated use of mobile banking going forward.			
I would continue using mobile banking, even at a higher access cost.			
If my bank offered incentives for using other access options (e.g. visiting a branch), I would switch from mobile banking.			
As long as I remain a bank customer, I do not foresee myself stopping using mobile banking.			
Overall, I consider myself a loyal mobile banking customer.			

4.12.12 Word of mouth (WoM)

Conceptualised as dissemination of information about a product, service or brand to friends, family and acquaintances through the spoken word that may convey positive (positive WOM) or even negative customer disposition (negative WOM) about the product or service (East, Hammond, & Wright, 2007; Mason, 2008). This dissemination occurs informally and is often viewed by recipients as genuine and authentic because it occurs person-to-person with no commercial imperative (Nyilasy, 2007; Zhang, Ma, & Cartwright, 2013). WOM was measured using five scale items adapted from Zeithaml et al. (1996) to solicit information from respondents about their likelihood to spread positive or negative views about m-banking to the people they speak to in various settings. The adapted scale had high reliability as depicted by the Cronbach alpha value in Table 4.12, which is above the threshold of 0.70 for scale reliability. Respondents captured their opinions on a five-point agree/disagree Likert-type scale for each scale item.

Table 4.12: Measurement scale for Word of mouth

Item statement	Adapted from	Cronbach alpha in Zeithaml et al. (1996)
I would recommend mobile banking to my family, friends and anyone who may seek my advice.	Zeithaml et al. (1996)	0.94
I say positive things about mobile banking to other people.		
I have previously recommended mobile banking to other people.		
I am likely to make negative comments about mobile banking to my friends and family.		
Overall, I say negative things about mobile banking.		

4.12.13 Continuity

The sustainability of m-banking as a business channel for the banking industry hinges on continued use, instead of once-off adventures by customers (Geebren et al., 2021). Continuity refers to an undertaking for a long duration of synergistic mutual benefits between exchange parties (Hutchinson, Singh, Svensson, & Mysen, 2012). It is premised on current satisfaction that leads to a projection that the other party will sustainably meet their obligation going forward (Kim, 2014; Shamdasani & Sheth, 1995). In this study's m-banking context, continuity was assessed using five behaviourally pitched items adapted from Thakur (2014) in which respondents chose from a five-point agree-disagree Likert-type scale. The adapted scale had good reliability and convergent validity as shown by the CR and AVE values in Table 4.13.

Table 4.13: Measurement scale for continuity

Item statement	Adapted from	Composite reliability and average variance extracted in Thakur (2014)	
		CR	AVE
I intend to continue using mobile banking going forward.	Thakur (2014)	0.942	0.844
I feel a commitment to continue using mobile banking.			
I would continue to use mobile banking even if it becomes more expensive to access.			
I will continue to be a customer of mobile banking.			
Overall, I intend to continue using mobile banking for most of my transactions			

4.13 SCALE RELIABILITY AND VALIDITY

The characteristics of a good measurement tool in a survey are its ability to measure what it is meant to measure (validity), and precision and accuracy (reliability) efficiently and conveniently (practicality) (Cooper & Schindler, 2014). The statistically measured and verified parameters are the scale's reliability and validity. Since all measurement systems inherently present degrees of error (Fuller et al., 2016), the objective is to try and operationalise measurement scales that have been established to be valid and reliable in comparable contexts. This study adapted predominantly international scales that were validated in Asian, European or American contexts, thus presenting a likelihood of certain hypothesised associations between certain constructs in the study model not being confirmed and even the expected construct indicators showing no consistency in some cases due to uniqueness of the South African banking context. Hence, a need to confirm the validity and reliability of the adapted scale.

4.13.1 Reliability

Reliability refers to the degree of homogeneity of the scale items in terms of how the observed indicators coalesce or align as measures of the latent variable (Turkyilmaz et al., 2013). The precision and accuracy of a measurement instrument are the benchmarks of its reliability (Kerlinger & Lee, 1986). Good reliability is reflected by the minimisation of survey errors, leading to internal consistency and stability of results cross-sectionally and longitudinally (Cooper & Schindler, 2014; Sekaran & Bougie, 2016). The test-retest technique can confirm good temporal reliability, while internal consistency confirms that the scale items resonate around the same latent construct (Pallant, 2020). An empirical study must demonstrate the reliability and validity of the scale operationalised in providing data that generates the measurement model (Fornell & Larcker, 1981). Two alternative indices for assessing reliability include the Cronbach's coefficient alpha (α) and the other one is composite reliability (CR).

Cronbach's coefficient alpha (α) (Cronbach, 1951) has been used over the years as the standard bearer of determining test and scale reliability in social sciences research (Peterson & Kim, 2013). However, coefficient alpha has been documented as providing a lower bound of true reliability unless data provides near-perfect tau

equivalency (Bacon, Sauer, & Young, 1995; Cronbach, 2004; Osburn, 2000). A more stringent and robust alternative technique of estimating scale reliability is derived from structural equation modelling which provides composite reliability (CR) measures that are higher than the suppressed coefficient alpha values. This is because the CR algorithm allows construct loadings or weights to vary, while in coefficient alpha, they are restricted to be equal (Peterson & Kim, 2013). This documented CR superiority over coefficient alpha is the reason why composite reliabilities were used in assessing scales' internal consistency. Furthermore, the study used SEM analysis to assess the measurement model and the structural model, thus making CR a more relevant index than α . Composite reliability coefficients of 0.7 and higher are regarded as demonstrating acceptable scale reliability (Hair, 2013)

4.13.2 Validity

Scale validity refers to the degree to which the scale measures what it intends to measure (Malhotra et al., 2017; Pallant, 2020). Content and construct validity are two relevant forms of validity for this study. Content validity refers to the adequacy an implemented scale sampled from the domain of relevant content for a particular latent variable (Pallant, 2020). Construct validity consists of convergent and divergent validity, both of which are relevant in the context of this study. Convergent validity focuses on how the scale items coalesce to reflect a construct's composition while divergent validity illuminates differences between constructs thus showing their distinctiveness in a proposed research model.

4.13.2.1 Content validity

Content validity, also known as face validity (Cooper & Schindler, 2014), refers to a subjective measure of how well, in terms of depth and breadth, a scale's composition encompasses all aspects of the latent variable propositioned (Blumberg et al., 2014; Sekaran & Bougie, 2016). As such, it considers whether an implemented scale captures the sub-dimensional universe of the construct in question (Straub, Boudreau, & Gefen, 2004). According to Luarn and Lin (2005), content validity is attained when the operationalised measurement indicators represent the concept around which generalisations will be made. Content validity can be assessed by comparing a

construct's scale items with a predetermined set of construct sub-dimensions (Sekaran & Bougie, 2016). A scale's adequate sub-dimensional domain is subjectively extrapolated from an exhaustive study of relevant extant studies. This was done in the context of this study for all the constructs postulated in the research model. The focus was on establishing how previous studies on m-banking or related IS studies measured the constructs in their scales. This provided the framework upon which the scales operationalised in this study were adapted to preserved face validity.

4.13.2.2 Construct validity

Construct validity refers to how well the conceptual propositions have been operationalised in a real and functional manner that brings the latent variable to life (Taherdoost, 2016). The traction behind the ideas, concepts and propositions that are brought together to formulate what becomes a theoretical abstraction: the construct. Construct validity consists of two main forms explored in this study: convergent validity (Campbell & Cook, 1979) and discriminant validity (Campbell & Fiske, 1959). Convergent validity refers to the degree to which scores on one scale align with scores on another scale designed to measure the same latent variable (Blumberg et al., 2014). A high correlation between the scores obtained from different scales purported to measure the same construct confirms convergent validity. At a broader level, convergence implies that constructs that are theoretically conjectured to be correlated are empirically confirmed to be strongly associated with each other.

In contrast, the basis of discriminant validity is divergence: the extent to which a latent variable attests to its uniqueness compared to other constructs tested in the study model. The ability of a construct's scale items to account for unique variance in the parent construct can be attributed to measurement error, untested effects or other constructs in a study model. Thus confirming that constructs postulated as unrelated are indeed statistically unique and unrelated (Fornell & Larcker, 1981; Taherdoost, 2016).

In this study context, construct validity was ensured by implementing a systematic procedure that involved firstly selecting, from previous studies, scale items that were validated in extant studies that tested a given construct. Secondly, the internal

consistency of the adapted scale for each construct was assessed before subsequently testing the proposed hypothesis against the null hypotheses.

4.14 LEVELS OF MEASUREMENT

Measurement in quantitative research refers to a systematic process of designing and executing a method to assign numerical measures and/or labels that quantify information about events, objects, occurrences and, in the case of human subjects, their ideas, opinions, views and attitudes towards certain phenomena, events and interactions (Cooper & Schindler, 2014; Hair, Celsi, Ortinau, & Bush, 2017). Assigning numerical measures or labels to observed phenomena and collected responses facilitates subsequent statistical analysis and conventional communication of results to the research community and interested audiences (Malhotra et al., 2017; Sekaran & Bougie, 2016). The measurement process consists of synthesising constructs from theory and extant literature, followed by scale development or adaptation for each construct (Hair, Celsi, et al., 2017).

The measurement consists of assigning descriptors that indicate the range of possible responses to a question about a specific construct. This is done by way of scale points that indicate the degree of intensity attached to the response to each scale item, e.g., “strongly disagree” to “strongly agree” on a numerical categorisation, e.g. 1 to 7 respectively (Hair, Celsi, et al., 2017). Assigning a measurement scale for a specific construct is important because it sets what scale is appropriate for the construct. It also determines the possible multivariate analytical techniques that can be done subsequently. All scale measurements can be classified into one of four categories: nominal, ordinal, interval or ratio (Blumberg et al., 2014).

4.14.1 Nominal scale

The nominal scale is the least powerful and categorises constructs into two or more mutually exclusive groups that do not depict an intensity level (Cooper & Schindler, 2014). The scale allocates numerical measures that distinguish between categories in terms of the presence or absence of a specified property but with no quantitative connotation attached that would indicate the relative intensity of the property or characteristic (Hair, Celsi, et al., 2017; Sekaran & Bougie, 2016). Nominal data

renders itself to basic descriptive analysis that provides frequencies and modes for variables like gender, marital status, employment status, etc. This was relevant in the context of this study for the analysis of some of the collected demographic data.

4.14.2 Ordinal Scale

More powerful than nominal scales, ordinal scales provide hierarchical ranking between responses as they provide relative magnitude between responses (Malhotra et al., 2017). Ordinal scales allow a researcher to rank objects according to the degree of intensity they possess of a specific characteristic even though they cannot provide absolute differences between rankings. Analysis of ordinal data include mode, median, frequency distributions and range (Hair;, Celsi, et al., 2017).

4.14.3 Interval scale

Interval scales can capture absolute differences between scale points. This means that intervals between scale numbers do not just indicate differences. They also depict the magnitude of the difference (Blumberg et al., 2014). Interval scales possess the properties of nominal and ordinal scales, but they also include the equality of interval aspects (Cooper & Schindler, 2014). This means that analysis can be done on measures of central location (mode, median and mean), and also measures of dispersion like variance, standard deviation, skewness and kurtosis (Hair;, Celsi, et al., 2017). This study operationalised attitudinal and behavioural scales, classified as interval scales in the literature (Creswell & Creswell, 2017).

4.14.4 Ratio scale

Ratio scales are the highest-level scales as they specify the differences between scale points and make it possible to make absolute comparisons between responses (Hair;, Celsi, et al., 2017; Sekaran & Bougie, 2016). They provide ranking, categorisation and absolute comparisons. Ratio scales require respondents to provide a specific numerical value in response to a survey item, allowing for an 'absolute zero' as a valid response because they are meant to measure actual quantifiable magnitudes of a substance e.g. height, temperature, mass, distance, etc (Blumberg et al., 2014; Zikmund & Babin, 2015).

Table 4.14 indicates the questions posed to participants in the survey tool and the level of measurement for each question as outlined in the preceding discussion about levels of measurement.

Table 4.14: Variables, scale and corresponding level of measurement

Question	Variable	Scale	Response type	Level of measurement
1	Province of residence	Mpumalanga or Gauteng	Categorical	Nominal
2	Performance expectancy	Likert scale	Rating	Interval
3	Social influence	Likert scale	Rating	Interval
4	System quality	Likert scale	Rating	Interval
5	Information quality	Likert scale	Rating	Interval
6	Service quality	Likert scale	Rating	Interval
7	Use	Likert scale	Rating	Interval
8	Satisfaction	Likert scale	Rating	Interval
9	Credibility	Likert scale	Rating	Interval
10	Trust	Likert scale	Rating	Interval
11	Compatibility	Likert scale	Rating	Interval
12	Loyalty	Likert scale	Rating	Interval
13	Word of Mouth	Likert scale	Rating	Interval
14	Continuity	Likert scale	Rating	Interval
15	Age	Year of birth	Numeric	Ratio
16	Income	Gross monthly income	Categorical	Ordinal
17	Ethnicity	Multiple choice, seven items	Categorical	Nominal
18	Education level	Multiple choice, six items	Categorical	Nominal
19	Employment status	Multiple choice, eight items	Categorical	Nominal

4.15 DATA COLLECTION

An important preliminary step in data collection that is essential to minimise survey error and reduce bias is pre-testing the measurement instrument before engaging in fully-fledged data collection from the target population. Importantly, pre-test respondents should be similar to those who will eventually be involved in the survey (Malhotra et al., 2017).

4.16 PRE-TESTING

Based on theory and extant studies conducted in different contexts, it is not easy to predict how a survey tool will perform and be perceived by actual respondents beforehand, despite any systematic and rigorous measures that may have been followed in its design. This background motivates the need to pre-test the instrument before implementing it fully on a target population. An important aspect is ensuring that pre-test participants mirror the expected survey respondents. This way, survey questions that may be unclear or ambiguous are tested on a relevant audience. Misalignment may be costly and take long to remedy after the fact. The pre-test was very relevant in this study because the adapted scales were developed and proved effective in developed economies with very different cultural perspectives on banking and m-banking in particular. Conducting a pre-test in order to evaluate the effectiveness of a survey tool is considered an essential pre-requisite in marketing research as it helps identify possible faulty research designs and sometimes pinpoints flaws in the research instrument on specific latent variable items (Blumberg et al., 2014; Malhotra et al., 2017).

The pre-test conducted in this study helped identify some language issues that may have led to confusion and lack of clarity as to what some questions were intended to solicit from respondents. Also, the test revealed the need for each section of the questionnaire to be prefaced with a brief statement indicating what the questions would focus on. Each section also needed to remind respondents that they were expected to provide a rating response pitched between 'strongly disagree and strongly agree'. That helped in clarity and improving survey flow. The pre-test was done on selected respondents from the University community who were very familiar with m-

banking and well-versed with both online and paper-based surveys on various social sciences subjects, not just m-banking. Responses from the pre-test were evaluated against the survey objectives and broadly showed that the tool collected relevant data. A total of 40 respondents were involved in the pre-test and this was in keeping with previous studies on m-banking (e.g. Chitungo & Munongo, 2013 pre-tested with 45 participants; Elhajjar & Ouaida, 2020 pretested with 15 participants; Maduku, 2016 pre-tested with 20 participants). Another important aspect of the pre-test exercise was that it revealed that, on average, it took a respondent roughly ten minutes to complete the survey tool. This was important because it provided relevant information regarding possible respondent fatigue that could affect the quality of the collected data.

4.17 ETHICAL CONSIDERATIONS

Research ethics refers to norms, protocols and moral standards expected of the researcher during the various stages of engaging with respondents (Cooper & Schindler, 2014). According to Sekaran and Bougie (2016), ethical behaviour pervades across various stages of the research process: data collection, data analysis, and dissemination of results should all be done in good faith by the researcher. At the data collection phase of the process, the primary ethical obligation of the researcher is to ensure that no harm or any form of detriment befalls respondents due to their participation or refusal to participate in the research (Malhotra et al., 2017). Similarly, those who choose to partake must also be assured of the lack of detrimental consequences if they withdraw during the research project (Bhattacharjee, 2012; Blumberg et al., 2014; Cooper & Schindler, 2014).

Prior to the data collection phase of the research project, ethical clearance was applied for by the researcher with the University of Witwatersrand Human Research Ethics Committee (non-medical). A prerequisite of that application process was that the researcher provided evidence, by way of an ethics training certificate, that ethics training was undertaken. Approval by the ethics committee was granted on 27 January 2023 under protocol number H23/01/09 under the minimal risk category. The researcher's ethics clearance certificate is in Appendix C of this thesis.

Before the data collection process, it was acknowledged that engaging members of the public to solicit views on their banking dispositions may suggest intrusion into sensitive and confidential personal financial information. To pre-empt such reservations, participants were informed upfront that, in accordance with the Protection of Personal Information Act (POPIA), the protection of the privacy of their personal information was paramount and that no such unique personal banking-related information was going to be sought.

The informed consent preamble informed participants that no personal, uniquely identifiable information, except generic biographical data would be requested. Furthermore, the preamble to the questionnaire also indicated that participation was entirely voluntary and respondents had the right, at any point, to withdraw their participation without any need to explain themselves. The consent form is available in Appendix D of this thesis. The preamble also indicated that all responses would be captured anonymously, and that the data pool would be stored in password-protected computers which were accessible to the researcher only. Furthermore, the data would not be shared with any third party. Informed consent was explicitly requested before participants answered the survey questions. Anonymity could not be guaranteed since the survey questionnaires were delivered physically by the field assistants. However, confidentiality was the standard communicated to participants and upheld by the researcher and the field assistants. While anonymity implies that the researcher and readers of the final research report cannot identify a specific response with a specific participant, confidentiality has a lower threshold as a researcher affirms that the participant's responses shall not be divulged in any report or forum (Bhattacharjee, 2012). To this end, the completed questionnaires were stored securely under lock and key by the researcher for the duration of the study, scheduled for a maximum of five years. Also, the study findings shall be made available to interested respondents at the end if requested.

Part of the ethical consideration involved balancing and optimising the time needed for an average respondent to complete the questionnaire with the solicitation of data that would be meaningful in terms of depth and breadth. This was implemented during the questionnaire design and refined after the pre-testing of the survey tool. Each construct requested respondents to answer an average of five questions. The

outcome was that, on average, respondents took approximately ten minutes to complete the survey. This is considered within the time range that would not lead to respondent fatigue, which may cause substantial survey abandonment or non-completion (Hinkin, 1995; Podsakoff & Organ, 1986). Questionnaire items were phrased as concisely as possible, focusing on brevity but maintaining clarity of purpose for each question. Survey questions were phrased to ensure no inherent bias and had no implied acceptable responses. To this end, the preamble to the questionnaire explicitly stated that there were no right or wrong answers in terms of participants' responses.

4.18 DATA COLLECTION METHODS AND PROCEDURES

Once-off primary data was collected from respondents using the structured, self-administered questionnaire distributed in hard copy format to individual bank customers. This was conducted from March 2023 to July 2023. Hence a cross-sectional (snapshot) time frame was implemented. The hard-copy delivery of the questionnaire dissemination approach was used to offset the documented disadvantages of online electronic survey modes: low response rates that are also exacerbated by non-completion (Chang & Vowles, 2013; Evans & Mathur, 2018; Nulty, 2008). In contrast, paper-based surveys have higher response rates and better completion (Malhotra et al., 2017). Their drawback is that they are more expensive and cumbersome to administer and process. The other weakness of online survey dissemination is that online surveys are only accessible to those with internet access (Evans & Mathur, 2018). This would not have been tenable for this study, which was meant to capture a wide cross-section of views regarding socio-economic status. Previous studies on m-banking also implemented the hard-copy delivery strategy of the survey tool (e.g. Chitungo & Munongo, 2013; Luarn & Lin, 2005; Thusi & Maduku, 2020; Van Deventer, 2019).

Prior to the data collection process, assistants were trained by the researcher on essential ethical protocols when collecting data from members of the public. The underlying theme was to ensure assistants were well-versed and able to implement principles of informed consent. Assistants were assigned to deliver the questionnaires in selected locations which were predominantly public spaces: parks, public transport

pick-up and drop-off points, mall vicinities, sports facilities (soccer, netball, etc) taxi ranks, queuing areas in places where the public tended to wait for long periods before accessing the facilities to be served (traffic departments, home affairs, social development). This was done in some cities in Gauteng: Johannesburg, Pretoria, Springs, Krugersdorp and Midrand. In Mpumalanga: Nelspruit, Secunda, Ermelo, Bushbuckridge, Middelburg and Mkhondo. The procedure was that research assistants would introduce themselves briefly, described the purpose of their engagement, and ask for informed consent, which was given by ticking off the questionnaire after the participant had read through the participant information sheet, provided before the actual questionnaire. Those willing to participate were then given the questionnaire to complete independently without the research assistant's guidance or direction. Since the questionnaire required, on average, approximately ten minutes to complete, respondents who preferred to go through it at a later time were allowed to take the questionnaire with them, provided they could be reached by the assistant later. The questionnaire screened respondents for age (18 years and older) and ownership of a bank account, before asking questions on attitudes and experiences of m-banking. The last section asked demographic questions (age, gender, income and education). The questionnaire is available in Appendix B of this thesis.

4.18.1 Response rate

According to Babin and Zikmund (2016), response rate refers to the ratio of legitimately completed questionnaires returned to the total number of sample elements provided a chance to participate. For this study, the total number of sample elements given a chance to complete the questionnaire in both Mpumalanga and Gauteng provinces was 600. Out of the 600 questionnaires sent, 569 were brought back by the assistants for data capture. The 31 unreturned questionnaires were attributed to participants who requested to complete the survey later but were not accessible after that despite assistants' concerted attempts to reach them subsequently. However, from the 569 returned questionnaires, 84 were found to be inadmissible mostly because they were incomplete with a lot of missing data that could not be handled adequately by the data analysis software. This left a total of 485 questionnaires that were captured into the computer, providing a response rate of 81%. This high

response rate can mostly be attributed to the physical delivery of pen-and-paper questionnaires to respondents. However, not all 485 responses were eventually analysed fully as further data cleaning led to more responses being excluded from the spreadsheet. Details on data analysis are provided in the next chapter of this thesis.

4.18.2 Data preparation

Preliminary data preparation involved a case-by-case review of each returned questionnaire to ensure that, firstly, the screening questions were answered affirmatively. A negative answer to any screening question led to the questionnaire being rejected as it meant that no informed consent was explicitly given, or that the respondent did not reside in the prescribed provinces, was not 18 years and above, or did not have a bank account. Afterwards, questionnaires were checked page by page and question by question to confirm that all questions were answered. The researcher did this meticulously with the assistance of a couple of assistants, and quality controlled to ensure no unfit cases slipped through due to sloppy workmanship. Subsequent data analysis and the resulting inferences and conclusions relied on how thoroughly this process was conducted. This is outlined in the next sub-sections.

4.18.3 Data capturing

Data capture refers to systematically logging participants' responses to a survey tool into a platform that can be viewed and manipulated using various analysis software (Cooper & Schindler, 2014; Sekaran & Bougie, 2016). The actual data collection in the field involved respondents using pens to indicate their responses to each question by mostly ticking off on the hard-copy document provided by the field assistant. This was done without assistance or guidance by the assistant as per the research design. Once the data collection phase was completed, the field assistants collected all completed questionnaires and numbered them sequentially for easy identification when capturing the data onto the Microsoft Excel spreadsheet. As alluded to before, some returned questionnaires had omissions and non-completion. The data capturing phase involved capturing all the legible data from all the questionnaires. The researcher decided on rejections during the data editing phase of the cleaning process. This was a detailed process over several days, as many cases required editing and cleaning decisions on a case-by-case basis.

4.18.4 Data editing

Data editing refers to screening completed survey questionnaires to identify and decide on how to deal with inconsistencies (Malhotra et al., 2017; Sekaran & Bougie, 2016). Examples of inconsistencies that had to be handled and were prevalent on the returned questionnaires were: incomplete questionnaires, questionnaires with multiple options selected on items in which only one was required, incompatible/inadmissible responses (for example a respondent was supposed to give a Likert-scale rating but chose to write a statement). Questionnaires with multiple options selected on items requiring a single rating were excluded from the data pool. Similarly, questionnaires with unanswered questions were also excluded. Data was captured and edited in Microsoft Excel, and the pooled data was exported into the Statistical Package for the Social Sciences (SPSS 28) and Smart-PLS 4 for detailed analysis.

4.18.5 Data coding

Data coding refers to assigning numbers to participants' responses to facilitate statistical analysis: descriptive, categorisation, multivariate, inferential, etc (Cooper & Schindler, 2014). Data coding was done at the design phase of the questionnaire for the nominal as well as ordinal data. This was possible because the questionnaire made use of close-ended questions only. For example, gender was categorised as male= 1, female=2, non-binary=3, chose not to say=4. Similarly, the province of residence was coded as Gauteng=1, Mpumalanga=2. The rest of the construct-related data was captured using Likert-type rating scales and thus captured numerically.

4.19 COMMON METHOD BIAS AND REVERSE CODING

Since the survey data addressing both the independent and dependent variables was self-reported, and from the same sources, measures were undertaken to ensure that common method variance (CMV) did not confound the true relationships envisaged in the research model (Chang, Witteloostuijn, & Eden, 2020; Cooper et al., 2020), which may have resulted in common method bias. To handle this, some survey items were reverse coded and the order of questions was also counter-balanced as recommended by Podsakoff, MacKenzie, Lee, and Podsakoff (2003).

Reverse coding refers to the inclusion of negatively worded questionnaire items for certain constructs in the survey tool to minimise response set bias (e.g., acquiescence bias) (Chyung, Barkin, & Shamsy, 2018). Acquiescence bias occurs when respondents default to agreeing (or disagreeing) with all survey statements without paying attention to the content of the question statements (Podsakoff et al., 2003; Winkler, Kanouse, & Ware, 1982). This threatens the validity and reliability of collected data (Cronbach, 1950) as it may contribute to endogeneity in which the effect of an independent variable on a proposed criterion variable is biased (inflated or deflated) due to a wide range of omitted causes (e.g. simultaneity; covariance with the error term, etc) (Antonakis, Bendahan, Jacquart, & Lalive, 2010, 2014). An effort was made at the questionnaire design phase to mitigate this by selecting a few items for reverse coding, as the literature suggests that negative phrasing of scale items needs to be done sparingly as it can create unintended consequences (Chyung et al., 2018). Questionnaire items in which this was implemented fall under the word-of-mouth and continuity construct of the survey tool (see Appendix A). The data collected from reverse-coded items was re-coded before the data analysis was done so that it aligned with other constructs.

Analytically, Harman's single-factor test was computed to establish if there was a single factor that explained most of the variance in customer satisfaction from m-banking as well as the proposed behavioural outcomes (Aguirre-Urreta & Hu, 2019; Fuller et al., 2016).

4.20 DATA ANALYSIS

Quantitative data analysis is a comprehensive and systematic process of organising, synthesising, aggregating and dis-aggregating collected data to search for patterns, trends, differences, divergences and convergences that may help categorise, hypothesise, theorise, and reach certain conclusions about specific constructs (Blumberg et al., 2014; Sekaran & Bougie, 2016). The three levels of quantitative data analysis are: descriptive data analysis, univariate and bivariate data analysis and multivariate data analysis (Hair, Celsi, et al., 2017). The next subsections provide an overview of the descriptive statistics undertaken, the measures of central tendency,

measures of variability, and multivariate analysis (factor analysis and structural equation modelling). Ultimately, in a research study such as this one, the objective of data analysis was to test the proposed research hypotheses posed at the study's inception (Sekaran & Bougie, 2016).

4.20.1 Descriptive statistics

According to Babin and Zikmund (2016), descriptive analysis is the most elementary transformation of collected data that provides basic distribution in the form of central tendency, spread and variance. This can be captured using frequency counts, frequency distributions, means, modes, deviations and medians. In this thesis, descriptive statistics, were computed in the form of frequency counts, frequency distributions, percentages, means, standard deviations as well as maxima and minima.

4.20.2 Measures of central tendency

Central tendency is captured by numerical values that depict data centrality, typically the mean, the median or the mode (Cooper & Schindler, 2014). They measure how a typically representative element of the sample population would behave. Hence, a sample element displaying midpoint characteristics typifies a central location (Sekaran & Bougie, 2016). The median is the midpoint value of an ordered data set, either ascending or descending (Babin & Zikmund, 2016). Since the centrality of position identifies it, it is not affected by the presence of outliers in the data set.

In contrast, the mean is affected by outliers because it is the sum of all the data values divided by the number of data items or the sum of the frequencies. Outliers may lead to a mean value skewed positively or negatively. In categorical data, the mode is the data value(s) or class interval with the highest frequency in the data pool (Blumberg et al., 2014). In this thesis, the arithmetic mean is the measure of central tendency computed when presenting the sample profile and for the individual latent variable indicators. The reason is that the mean is the better measure of central tendency in a data pool that is not heavily skewed due to the presence of outliers (Cooper & Schindler, 2014). This was established first, and outliers had already been removed in the preliminary analysis step.

4.20.3 Measures of dispersion

Measures of dispersion refer to sample statistics that give the degree of spread of the data distribution about the central location value (Cooper & Schindler, 2014). They indicate the variability of data and provide a yardstick that indicates the representativeness and reliability of the central location measures (Wegner, 2016). This means that high variability may imply less reliability of the central location parameters. Common measures of dispersion are the range, the interquartile range, the quartile deviation, the variance and the standard deviation (Sekaran & Bougie, 2016). The range is the difference between the data set's upper quartile and the lower quartile (Babin & Zikmund, 2016; Wegner, 2016). According to Wegner (2016), the quartile deviation measures the spread of the data values about the median, which is least affected by the presence of outliers. The variance and the standard deviation are superior measures of spread because their computation involves all the data values. The variance measures the average squared deviations from the mean while the standard deviation is the square root of the variance (Blumberg et al., 2014). In this thesis, the population standard deviation S was computed because, besides its stability, it also provided more insight into the spread of all the data values about the mean for each construct when compared to the quartiles (Wegner, 2016). Exclusion of outliers from the data pool also validated the computation of the standard deviation.

4.20.4 Hypotheses testing

The theory behind hypothesis testing is that in statistical analysis, inferences are made about populations on data from samples that inherently contain incomplete information. A hypothesis is an empirically testable tentative predictive relationship between two or more variables in a research model (Bhattacharjee, 2012; Hair, Celsi, et al., 2017). Hypotheses are tested using empirical data to establish the validity of the underlying propositions between the latent variables (Cooper & Schindler, 2014). The empirical test may reject or fail to reject the null hypothesis with a certain level of probability (Hair, Celsi, et al., 2017; Sekaran & Bougie, 2016). The hypotheses tested in this thesis are restated in Table 4.15. Hypotheses testing was done using partial least square structural equation modelling (PLS-SEM).

Table 4.15: Hypotheses and objectives

HYPOTHESES	OBJECTIVE
There is a significant positive relationship between the compatibility of m-banking and its use.	<i>To establish the effect of compatibility, performance expectancy and social influence on the use of m-banking by customers in the South African banking context.</i>
There is a significant positive relationship between performance expectancy and the use of m-banking.	
There is a significant positive relationship between social influence about m-banking and its use.	
There is a significant positive relationship between the service quality of m-banking and the use of m-banking.	<i>To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with the use of m-banking and with performance expectancy in the South African banking context.</i>
There is a significant positive relationship between the system quality of m-banking and its use.	
There is a significant positive relationship between the quality of the information available on m-banking and its use.	
There is a significant positive relationship between m-banking system quality and performance expectancy.	
There is a significant positive relationship between m-banking information quality and performance expectancy.	
There is a significant positive relationship between m-banking service quality and performance expectancy.	
There is a significant positive relationship between system quality of m-banking and customer satisfaction.	

There is a significant positive relationship between m-banking information quality and customer satisfaction.	<i>To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with satisfaction with m-banking and performance expectancy, trust and credibility with satisfaction with m-banking.</i>
There is a significant positive association between the service quality of m-banking and customer satisfaction.	
There is a significant positive relationship between m-banking performance expectancy and customer satisfaction.	
Perceived credibility of m-banking is positively related to customer satisfaction with m-banking.	
Trust in m-banking is positively related to customer satisfaction.	
There is a significant positive relationship between the use of m-banking and customer satisfaction.	<i>To test and evaluate associations of the use of m-banking with customer satisfaction and the behavioural outcomes of m-banking.</i>
The use of m-banking is positively related to relationship continuity	
The use of m-banking is positively related to customer loyalty.	
The use of m-banking is positively associated with customer WoM.	
Satisfaction with m-banking is positively and directly related to customer continuity when transacting through m-banking.	<i>To test and evaluate associations of customer satisfaction from m-banking with the behavioural outcomes of m-banking.</i>
Satisfaction with m-banking is positively and directly related to customer dissemination of positive word of mouth about m-banking.	
Satisfaction with m-banking is positively and directly related to customer loyalty to m-banking.	

<p>Use of m-banking mediates the relationship between the information quality of m-banking and customer satisfaction.</p>	<p><i>To examine the proposed mediation effect of use of m-banking in the relationship between the quality dimensions and customer satisfaction, and the mediation effect of customer satisfaction in the relationship between the use of m-banking and behavioural outcomes.</i></p>
<p>The use of m-banking mediates the relationship between the system quality of m-banking and customer satisfaction.</p>	
<p>The relationship between the service quality of m-banking and customer satisfaction is mediated by its use.</p>	
<p>The relationship between the use of m-banking and customer dissemination of positive WoM is mediated by customer satisfaction.</p>	
<p>The relationship between the use of m-banking and customer loyalty is mediated by customer satisfaction.</p>	
<p>The relationship between the use of m-banking and customer disposition to continue using it is mediated by customer satisfaction.</p>	
<p>The relationship between the system quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.</p>	<p><i>To examine a proposed serial mediation effect of performance expectancy and use of m-banking on the associations between the quality dimensions and customer satisfaction with m-banking.</i></p>
<p>The relationship between the information quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.</p>	
<p>The relationship between the service quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.</p>	

<p>M-banking perceived credibility moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the relationship.</p>	<p><i>To examine and empirically test proposed moderation effects of perceived credibility and perceived trust on the association between the use of m-banking and customer satisfaction, as well as the moderation effect of perceived trust on associations between service quality and customer satisfaction as well as information quality and customer satisfaction.</i></p>
<p>Trust in m-banking moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the association.</p>	
<p>Trust in m-banking moderates the significant positive relationship between the service quality of m-banking and customer satisfaction, such that the association is weakened.</p>	
<p>Trust in m-banking moderates the significant positive relationship between the information quality of m-banking and customer satisfaction, such that the association is enhanced.</p>	
<p>The indirect effect of service quality on customer loyalty through satisfaction is moderated by trust such that higher levels of trust have significant and negative suppressing effect on the association.</p>	<p><i>To examine and empirically test proposed moderated mediation by trust on the association between service quality and the behavioural outcomes of m-banking use (WOM, loyalty, continuity).</i></p>
<p>The significant indirect effect of service quality on customer WOM through satisfaction is moderated by trust such that higher levels of trust have a significant and negative suppressing effect on the association.</p>	
<p>The significant indirect effect of service quality on continuity with m-banking through satisfaction is moderated by trust such that</p>	

higher levels of trust have a significant and negative suppressing effect on the relationship.	
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4.20.5 Level of significance

The significance level is a type 1 error indicating the probability of rejecting a true null hypothesis. This likelihood is called the p or alpha (α) value and is specified by the area in the tails of a probability sampling distribution (Wegner, 2016). The alpha value indicates the probability at which the researcher accepts that a difference is statistically significant and is not attributable to error. The level of significance is usually set at the 1% level ($p=0.01$), the 5% level ($p=0.05$) or the 10% level ($p=0.1$) (Babin & Zikmund, 2016). A 0.01 significance level implies that there is a 1% chance that results deduced from the collected data are due to chance. According to Cooper and Schindler (2014), the exact significance level to choose depends on the level of risk a researcher is willing to accept, noting that the chosen significance level influences type II error (β). This thesis used a 0.05 significance level, as it is the most common level used in marketing research studies (Cooper & Schindler, 2014).

4.20.6 Rejection or non-rejection of hypotheses

Significance tests on data associated with specific proposed associations between constructs were used to support or reject specific hypotheses (Sekaran & Bougie, 2016). The alternative hypothesis (H_1) that is being investigated using empirical data cannot be tested directly but indirectly by defining a null hypothesis (H_0), which, if rejected, provides indirect support for the alternate hypothesis to a certain level of probability (Bhattacharjee, 2012; Cooper & Schindler, 2014). This inference is subject to type I error (α), in which the null hypothesis is rejected when it is correct. The other possibility is type II error (β) in which the researcher inferentially fails to reject the null hypothesis when, in fact, the alternative hypothesis is true (David, 2017; Sekaran & Bougie, 2016; Wegner, 2016). The precision of statistical inferences is specified by a confidence interval (CI), with a 95% CI denoting that 95% of the time the researcher is confident that the population parameter is within two standard deviations of the computed sample estimate (Bhattacharjee, 2012). In this thesis, the 0.05 p -value (95% CI) was used to test hypotheses, keeping with previous studies on m-banking (e.g. Ntseme & Chukwuere, 2017; Sharma & Sharma, 2019).

4.21 MULTIVARIATE ANALYSIS

According to Sekaran and Bougie (2016), multivariate analysis simultaneously examines relationships between several variables and their associations. These are higher order and more rigorous analysis techniques in contrast with bivariate analysis, in which two variables are involved and univariate analysis, which consists of one variable. There are several multivariate analytical techniques commonly used in marketing research: factor analysis (Exploratory Factor Analysis and Confirmatory Factor Analysis), cluster analysis, multidimensional scaling, multiple analysis of variance, discriminant analysis and structural equation modelling (SEM) (Hair, Anderson, Babin, & Black, 2010). This thesis utilised factor analysis as well as structural equation modelling. This choice was motivated by the predictive research model and study objectives proffered at the beginning and the techniques utilised by related extant studies in the marketing context.

4.21.1 Factor analysis

According to Cooper and Schindler (2014), factor analysis refers to techniques that use algorithms that isolate linear patterns among the variables to determine if an underlying combination of the original variables can summarise the original data. The desired outcome is to transform a set of nominally unrelated variables into distinguishable composite variables (factors). According to Yong and Pearce (2013), factor analysis identifies latent constructs, often from a large data pool, thus saving time and facilitating subsequent analysis steps that focus solely on the isolated factors. Factor analysis algorithms are premised on data reduction, which takes many variables and looks for intercorrelations that produce a smaller, but representative set of factors or components (Pallant, 2020). The algorithm examines the underlying structure of the data pool and isolates factors that emanate from variables that display shared variances, hence high correlation (Yong & Pearce, 2013). The basic premise of factor analysis is to produce the least number of constructs that can reproduce the original data (Gorsuch, 1997). The two main approaches are exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

4.21.1.1 Exploratory factor analysis

Exploratory factor analysis (EFA) is predominantly done at the early stages of a study in order to explore the interrelationships within a set of variables (Child, 2006; Pallant, 2020). EFA aims to identify variables that resonate and thus fall under the same factor. Resonance is defined by linear relationships between the underlying factors and the variables in a data pool. Many variables are then isolated into meaningful and manageable categories (factors) that can be subjected to further data analysis, e.g., scale testing and development and multiple linear regression (Gorsuch, 1997; Yong & Pearce, 2013). In scale testing, an EFA algorithm examines all the pairwise associations between individual variables and seeks to isolate latent factors from the observable variables (Osborne, 2015). As a dimensional reduction technique, EFA is premised on the acceptance that model variance consists of shared, unique and error variance. In isolating a factor, EFA examines only the common shared variance (Costello & Osborne, 2005; Osborne, 2015). This thesis carried out an EFA as a preliminary multivariate analytical step to investigate the underlying factor structure of the proposed constructs in the research model. This provided a broad overview of the validity of the operationalised research model. It served as a precursor to the more detailed partial least squares SEM analysis.

4.21.1.2 Confirmatory factor analysis

In contrast to EFA, confirmatory factor analysis (CFA) utilises more rigorous techniques that can be used to test specific hypotheses (confirm) or theoretical propositions about the relational structure between a set of variables (Pallant, 2020). According to Schmitt (2011), CFA primarily verifies or confirms hypothesised path models. However, this is not restrictive as CFA can be used exploratively, meaning that the two exist on an analytic continuum and are not mutually exclusive. This study undertook EFA only as a precursor to the PLS SEM analysis as it aligned better with the predictive study model.

4.22 Data distribution

Before detailed analysis of the collected data, its normality distribution was analysed by looking at its skewness and kurtosis parameters. Skewness is evident when the data's dispersion curve is asymmetrical, either skewed to the left or the right. Kurtosis

is a measure of how flat or peaked the data is. Data is peaked if most of it is clustered at the centre, otherwise it is flat (Cooper & Schindler, 2014). This skewness and kurtosis assessment was undertaken using the WebPower online Skewness and Kurtosis calculator. This is because extremely non-normal data may adversely affect the output of multivariate data analysis that gets done. It also impacts the feasibility of certain multivariate analysis techniques that may be premised on normal distributions (Hair Jr, Matthews, Matthews, & Sarstedt, 2017). The WebPower analysis algorithm calculates Mardia's Skewness and Kurtosis test parameters to assess a data's multivariate normality. The Mardia test parameters test the null hypothesis that the collected data displays univariate or multivariate normality (Cain, Zhang, & Yuan, 2017). Table 4.16 captures the results of the multivariate normality test.

Table 4.16: Results of Mardia skewness and kurtosis

Test statistic	Sample size	Number of variables	Value	Probability
Mardia	453	76	153841.55	0
Skewness				
Mardia	453	76	140.52	0
Kurtosis				

According to Cain et al. (2017), the data distribution is considered non-normal if the test statistics for both skewness and kurtosis are significantly greater than +1 or smaller than -1. From Table 4.16, the test statistic for Mardia skewness was 153841.55 ($p < 0.05$), and Mardia kurtosis was 140.52 ($p < 0.05$). Hence, the null hypothesis that the data distribution was normal was rejected; thus, the alternative hypothesis of non-normality was accepted.

4.23 STRUCTURAL EQUATION MODELLING

Structural equation modelling (SEM) is a very general statistical modelling technique that combines mostly traditional multivariate analytical techniques in the form of factor analysis, regression analysis, discriminant analysis and canonical correlation (Hox & Bechger, 1998). There are two broad categories of SEM: covariance-based SEM (CB-SEM Jöreskog, 1978, 1993) and variance-based SEM (PLS-SEM; Lohmöller, 1989;

Wold, 1982) (Gefen, Rigdon, & Straub, 2011). In structural equation modelling, data is modelled by matrix equations visualised by path diagrams. A key feature of SEM is the simultaneous presentation of a theoretical network of manifest (observable) and latent (unobservable) variables. This is typically referred to as the measurement and structural models (Anderson & Gerbing, 1988; Chin, Peterson, & Brown, 2008). The measurement model depicts the front-end input side of the operationalised model. It assesses the scale reliability and validity while the structural model provides the path analysis done in the inner model. As second-generation analytical techniques, the unique analytical power of SEM compared to first generation analytical techniques like regression is its ability to robustly handle and analyse multiple independent and dependent variables simultaneously (Bagozzi & Yi, 2012). Thus, it is well suited for testing proposed hypotheses and theoretical associations between constructs in a research model.

- *Covariance-based SEM*- the method is based on the common factor model in which the analysis is based on estimating the common variance matrix (covariance), thus excluding the specific and error variance. CB-SEM estimators are designed to compute model fit indices by minimising the differences between the observed sample covariance matrix and the covariance matrix arising from the confirmed theoretical model (Hair Jr et al., 2017). As a result, it is ideally suited for confirming or rejecting propositions based on strong theoretical frameworks.
- *Variance-based SEM*- the method is based on the composite model in which the analysis is premised on aggregating the common, specific and error variances in order to maximise the extent to which the independent variables predict the variance in the dependent variable (Hair, Risher, Sarstedt, & Ringle, 2019).

According to Hair, Ringle, and Sarstedt (2011), choosing between CB-SEM and PLS-SEM can be based on the following 'rules of thumb':

- Research goals
- Measurement model specification
- Structural model complexity

- Data characteristics and algorithm
- Model evaluation

In this study, PLS-SEM was the chosen SEM method over CB-SEM for the following reasons emanating from Hair et al. (2011) 'rules of thumb':

- Research goals- The research objectives of this study were premised on amalgamating, exploration and extrapolating existing behavioural theories, thus being in line with the recommendation of Hair et al. (2011) to use PLS-SEM. The primary objective of the operationalised framework was to establish how well the assigned exogenous constructs predicted the variance in the use of m-banking, customer satisfaction and subsequent behavioural outcomes. This objective is better pursued via PLS-SEM because PLS predominantly yields superior endogenous construct-explained variances than CB-SEM estimators (Hair Jr et al., 2017). Also, PLS-SEM is better suited for prediction-oriented research models as it is less susceptible to factor indeterminacy and model misspecification, which factor-based estimators are (Henseler et al., 2014; Nitzl, 2016).
- Structural model- The operationalised research model shown in Figure 3.1 has 13 constructs with a total of 68 manifest indicators, which were reduced to 60 after outer model confirmation. The model also consisted of simple mediation, simple moderation, serial mediation and moderated mediation. Such complexity that is accentuated by multiple interaction effects is better handled by PLS-SEM estimators due to their statistical rigour and stability (Hair et al., 2011; Hair Jr et al., 2017; Nitzl, 2016; Shaikh et al., 2021).
- Data characteristics and algorithm- Unlike CB-SEM which is sensitive to the absence of normality and the presence of outliers in the distribution, PLS-SEM estimators are designed to handle skewness with a high degree of robustness. The data used in this thesis displayed a certain degree of skewness and kurtosis according to Mardia's skewness and kurtosis test of multivariate normality captured in Table 4.16. Hence, PLS-SEM was deemed appropriate for this study.

Having chosen PLS-SEM, all proposed study hypotheses were tested on results obtained from the variance-based statistical analysis package *Smart-PLS 4 v. 4.0.9.5* (Ringle, Wende, & Becker, 2022). The application of the SEM-PLS analytical procedure involved two stages. First, the measurement model was evaluated to establish quality metrics of the collected data for the operationalised research model. Second, after verifying the reliability and validity of the measurement model, the structural model (inner model) evaluation was done, consisting of the path analysis and, thus, hypotheses testing (Hair, Babin, & Krey, 2017; Hair, Ringle, & Sarstedt, 2013; Hair Jr, Sarstedt, Hopkins, & Kuppelwieser, 2014).

4.24 MEASUREMENT MODEL

In the context of this study, the measurement model refers to a schematic depiction of the research model's latent variables and their observable indicators. The depiction excludes the structural part of the complete research model, which is in line with Cooper and Schindler (2014), who assert that a model can be an extracted depiction of a bigger composite system. The measurement model represents the proposed constructs and the specific formative or reflective indicators. Formative measurement models arise when the manifest variables are deemed to produce or cause the construct, whereas reflective measurement models depict constructs regarded as producing or causing the manifest variables (Chin et al., 2008). Operationalised indicators in this thesis were predominantly classified as reflective based on two reasons: the format of the attitudinal and behavioural scale items presented in the measurement instrument (Chin et al., 2008) as well as the theoretical formulations motivated in each construct's conceptualisation (Pedhazur & Schmelkin, 1991). The measurement model is shown in Figure 4.1.

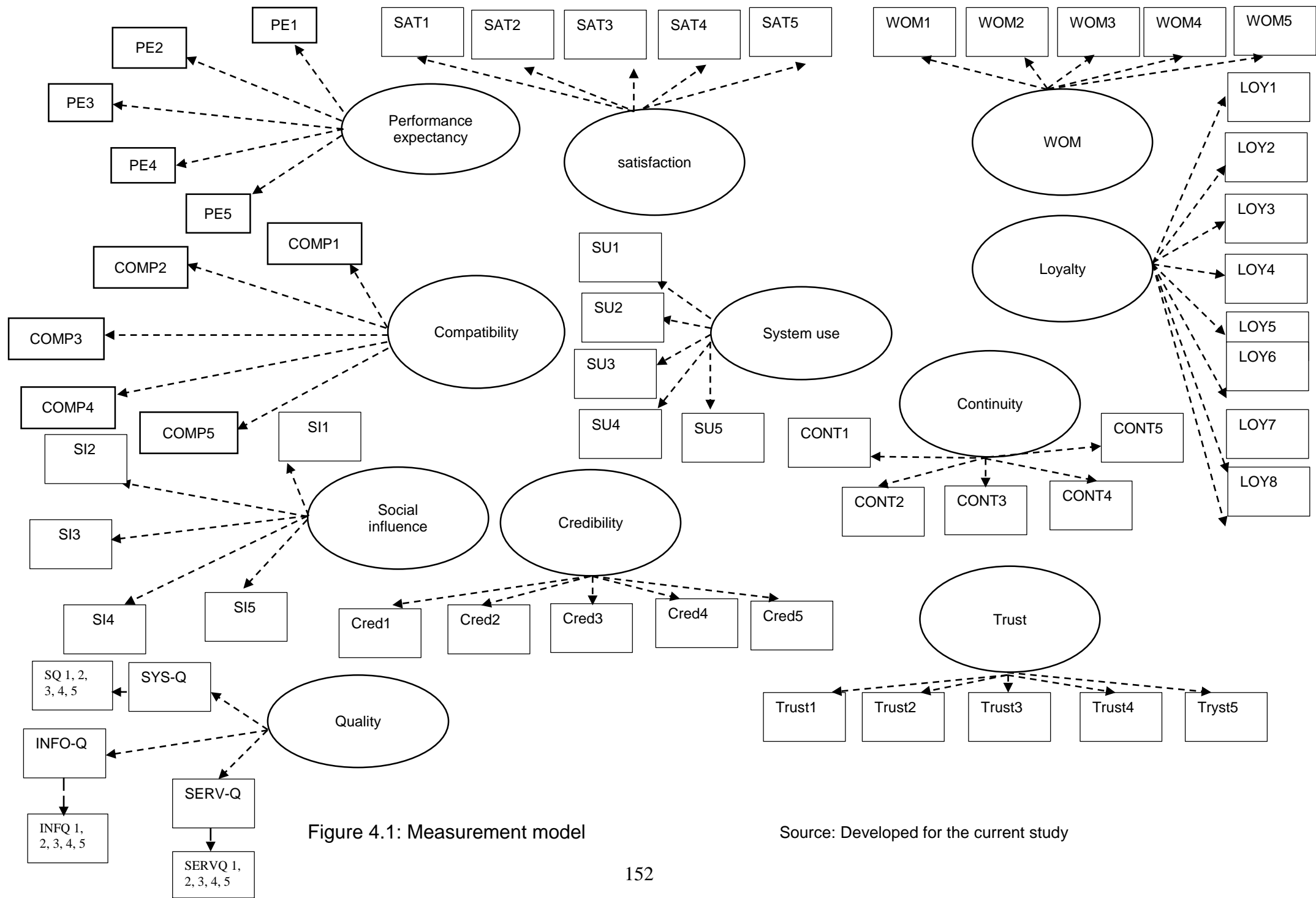


Figure 4.1: Measurement model

Source: Developed for the current study

Figure 4.1 identifies the measurement indicators (observable variables) of each latent variable. It also indicates that the measurement model consists of reflective constructs, as the indicators result from the underlying construct. For example, this means that performance expectancy was measured by five closely related items with a high correlation. The reflective association between performance expectancy and the five indicators is derived from extant studies and theory. The same applies to the other constructs.

4.25 CHAPTER SUMMARY

This chapter presented the research paradigm and philosophy, followed by the research design, instrument design and measurement. This was followed by the empirical operationalisation of the instrument. The last part was an outline of the implemented data analysis procedures. The next chapter presents a detailed outline of the results, analysis and subsequently interpretation of the results.

CHAPTER 5

RESEARCH RESULTS, DATA ANALYSIS AND INTERPRETATION

5.1 INTRODUCTION

Statistical techniques undertaken in the study are: exploratory factor analysis (EFA), and structural equation modelling (SEM). These statistical techniques were deemed appropriate for this study because they were considered rigorous and relevant for this quantitative study as they provided metrics that supported or rejected the proposed research hypotheses. This provided answers to the research questions proposed at the beginning of the study. Furthermore, this was in line with quantitative techniques used on primary data collected in previous quantitative m-banking studies: Chitungo and Munongo (2013), Govender and Sihlali (2014), Talukder et al. (2014), Van Deventer (2019)- implemented EFA and regression analysis; Jouda, Jarad, Obaid, Mdallalah, and Awaja (2020), Saji and Paul (2018), Shankar and Rishi (2020), Shareef et al. (2018), Vuong et al. (2020); Sharma and Sharma (2019)- all implemented SEM. This SEM-dominated background prompted the pre-cursory EFA, followed by in-depth SEM analysis for testing the study's hypotheses.

5.2 DATA CODING AND CAPTURING

In quantitative data analysis that utilises quantitative analytical packages like SPSS and Smart-PLS, data coding refers to the assignment of numerical values to all responses that may have been captured non-numerically from participants, or the re-coding of variables so that more meaningful outputs are obtained (Pallant, 2020). In the case of data collected using paper-based questionnaires, data capturing involves the transfer of participants' responses from the returned papers into the statistical software interface in the computer (Sekaran & Bougie, 2016).

This study's operationalised survey tool was designed to capture all responses numerically for both categorical (demographic) and continuous data (construct-specific). The nominal and ordinal data were pre-coded, so respondents chose numerical codes that captured their positions. Similarly, the metric data specific to each model construct was coded using a Likert-type one through five scale

("1"=strongly disagree; "5"=strongly agree). The collected data needed rigorous vetting and cleaning at the end of the field work as it was subject to non-completion, respondent misconduct, and sloppiness. The returned questionnaires were firstly numbered sequentially, starting with the number two, so they could be uniquely identifiable. The responses on each questionnaire were then captured into a pre-designed Excel spreadsheet with all the column headings representing each of the 76 individual survey items (see Appendix A). After vetting questionnaires and separating inadmissible ones, the researcher and assistants captured data one questionnaire at a time.

5.3 DATA SCREENING, CLEANING AND RESPONSE RATE

Data screening and cleaning refers to the rigorous process of checking each paper-based questionnaire for inadmissibility and thus rejection (Sekaran & Bougie, 2016). Data screening was done in this study prior to capture into the computer. Inadmissibility was mostly for questionnaires in which respondents had left some questions unanswered. All questionnaires that had any missing responses were isolated and rejected. A total of 569 questionnaires out of the 600 that were distributed were returned from the field by the research assistants. The screening process identified 84 inadmissible questionnaires, which were set aside and excluded. This left 485 viable responses, none of which had any missing data, which were then captured into the Excel spreadsheet. This translates to a relatively high response rate of 81%, for manual survey data collection. Data cleaning was done after the data was captured on the computer. Cleaning involved checking for data capture errors, respondent negligence and/or misconduct. Respondent negligence was typified by cases where the same Likert level was chosen for all questionnaire items, including the reverse-coded ones. Data capture errors were checked using the minimum and maximum tools in Excel. Only three cases were detected and rectified by referring back to the documents as they had been numbered before capturing the data. Checking for respondent negligence was done by using the standard deviation tool in MS-Excel. Entries with standard deviations below 0.25 were isolated and deleted in their entirety as they were likely to result in collinearity issues in the final model specification (Hair Jr, Hult, Ringle, & Sarstedt, 2021). This led to the deletion of 32 captured entries, leaving a final sample size of 453.

5.4 MISSING DATA

Missing data was a pertinent issue observed upon examining the returned survey tools. Questionnaires with missing values were identified and excluded at this stage (84 cases). Median or mean replacement (Cook, 2021; Pallant, 2020) was not implemented in this study, as no cases with missing data were captured in the spreadsheet. The response rate with complete responses was relatively high, making it tenable to exclude all cases that had missing values. So, there was no need to implement a missing value marker in the software during the data analysis, as no cases were captured with missing responses.

5.5 ANALYSIS OF SURVEY RESPONSES

5.5.1 Sample profile

A sample profile is a demographic outline of the key characteristics of the sampled elements of the population that may impact the research results regarding the survey responses that emerge. The sample demographics captured in this study were: gender, education, employment status, income category, age and ethnicity. Table 5.1 summarises the sample profile for the study's total respondent pool. It provides the frequencies and the percentage proportion of the sub-category for each demographic segment.

5.5.2 Sample demographic profile

The demographic profile of the sample is captured in Table 5.1.

Table 5.1: Demographic breakdown of the sample

VARIABLES		FREQUENCY	TOTAL	PERCENT
	Male	152		33.6

GENDER	Female	299	453	66.0
	Non-binary	2		0.4
EDUCATION	Secondary/High School	100	453	22.1
	Certificate/Vocational	142		31.3
	Diploma	72		15.9
	Degree	85		18.8
	Postgraduate degree	22		4.9
	Prefer not to answer	32		7.1
EMPLOYMENT STATUS	Unemployed	68	453	15.0
	Student (College/Technikon/University etc)	201		44.4
	Half day	3		0.7
	Temporary position	24		5.3
	Contract basis	44		9.7
	Full time employee	69		15.2
	Self-employed	28		6.2
	Prefer not to answer	16		3.5
INCOME CATEGORY	R5000 or less	179	453	39.5
	R5001-R10000	49		10.8
	R10001-R20000	59		13.0
	R20001-R30000	36		7.9
	R30001-R40000	13		2.9
	R40001-R50000	1		0.2
	Above R50000	3		0.7
	No regular income	51		11.3
	Prefer not to answer	62		13.7
	18-25	249		55.0

AGE	26-35	130	453	28.7
	36-45	42		9.3
	46-55	28		6.2
	56+	4		0.9
ETHNICITY	African (Black)	405	453	89.40
	Asian	9		1.99
	Caucasian (White)	21		4.63
	Coloured	8		1.77
	Indian	6		1.32
	Other	4		0.88
	Prefer not to answer	5		1.10

Table 5.1 shows that from the total sample size of 453, the gender split was skewed towards females (66.0%) compared to males (33.6%). The sample's education profile shows that possession of a post-high school certificate/vocational training had the highest frequency (31.3%), followed by high school-level academic competency (22.1%). Just over a third of the sample (34.7%) can be considered to be well-educated as they had either a diploma or degree qualification (15.9%+18.8%). On a similar theme, the employment status shows that the majority of the sample consisted of college/university students (44.4%), followed by parity for unemployed respondents (15%) and those in full-time employment (15.2%). Furthermore, the Table shows that the sample can be classified as predominantly made of low-income earners as nearly 40% of respondents earned R5000 or less. The sample can be categorised as overwhelmingly black (African) (89.4%), and fairly young as the majority [83.7% (55+28.7)] were in the 18 to 35 years age band.

5.6 DESCRIPTIVE STATISTICS

The overall scores for each of the thirteen model constructs measured by at least five observable indicators were computed using SPSS version 28. The relevant central tendency and dispersion measures were subsequently calculated and shown in Table 5.2. These are the minima, maxima, means and standard deviations.

Table 5.2: Descriptive statistics

LATENT VARIABLE	SUMMARY STATISTIC				
	N	Minimum	Maximum	Mean	Std. Deviation
Performance expectancy (overall)	453	1	5	4.46	0.593
Social influence (overall)	453	1	5	4.03	0.686
System quality (overall)	453	1	5	4.10	0.697
Information quality (overall)	453	1	5	4.23	0.680
Service quality (overall)	453	1	5	3.79	0.884
Use (overall)	453	1	5	4.21	0.671
Satisfaction (overall)	453	1	5	4.31	0.638
Credibility (overall)	453	2	5	3.91	0.717
Trust (overall)	453	1	5	4.00	0.790
Compatibility (overall)	453	1	5	4.35	0.631
Loyalty (overall)	453	2	5	4.04	0.640
Word of mouth (overall)	453	1	5	3.62	0.721
Continuity (overall)	453	1	5	4.10	0.686

Table 5.2 shows that nine of the thirteen average scores were above four, thus mostly soliciting an “agree” or “strongly agree” response. Performance expectancy had the highest mean score of 4.46 and was the most statistically predictable response, with the lowest standard deviation of 0.593. In contrast, Word of Mouth had the smallest mean score of 3.62 and thus trended more towards “neither agree nor disagree” in captured responses. The standard deviation for WOM was on the high end at 0.721, suggesting marked response divergence. However, the biggest standard deviation (0.884) was for responses to service quality questions, with a mean score of 3.79. This depicted the highest response variance among all the constructs.

5.7 DATA ANALYSIS

5.7.1 Exploratory factor analysis

Exploratory factor analysis was conducted to obtain the preliminary data structure in the form of factors from which construct reliability, and validity could be tested in the subsequent PLS SEM. The suitability of factor analysis of the data was premised on the fact that the sample size of 453 met the rule of thumb of a minimum sample size of 300 as well as 10 to 15 participants per variable (Pallant, 2020; Tabachnick, Fidell, & Ullman, 2007). Factor extraction was done using the statistical package for the social sciences (SPSS) version 28, using a minimum eigenvalue of one, premised on Kaiser's criterion (Costello & Osborne, 2005; Yong & Pearce, 2013). Principal axis factor extraction, with orthogonal varimax rotation and Kaiser normalisation method, was used to obtain the rotated factor matrix (Gorsuch, 1997; Tabachnick et al., 2007; Yong & Pearce, 2013). The standard benchmarking procedure of requesting the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy as well as Bartlett's test of sphericity was done, with an expectation of a minimum KMO value of 0.6 for valid factor extraction (Humble, 2020; Yong & Pearce, 2013) and a significant Bartlett's test of sphericity ($p < 0.05$). These benchmarks were met, as shown in Table 5.3 (KMO=0.934; $p=0.000$). The EFA was done as a pre-cursor for the structural equation modelling analysis to test the proposed hypotheses between performance expectancy, compatibility, quality dimensions, social norms and m-banking use, and the mediation and moderation effects (H1-H13).

Table 5.3: KMO and Bartlett's test statistics

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.934
Bartlett's Test of Sphericity	Approx. Chi-Square	17024.900
	Df	2278
	Sig.	.000

Table 5.4: EFA- total variance explained

Total Variance Explained									
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	20.409	30.013	30.013	20.409	30.013	30.013	5.194	7.639	7.639
2	3.365	4.949	34.961	3.365	4.949	34.961	4.973	7.313	14.951
3	2.622	3.856	38.817	2.622	3.856	38.817	4.440	6.530	21.481
4	2.314	3.403	42.220	2.314	3.403	42.220	3.815	5.610	27.092
5	1.894	2.785	45.005	1.894	2.785	45.005	3.552	5.224	32.316
6	1.834	2.697	47.702	1.834	2.697	47.702	3.443	5.063	37.379
7	1.770	2.603	50.304	1.770	2.603	50.304	3.279	4.822	42.201
8	1.699	2.498	52.802	1.699	2.498	52.802	2.464	3.624	45.825
9	1.477	2.172	54.974	1.477	2.172	54.974	2.295	3.375	49.199
10	1.306	1.921	56.895	1.306	1.921	56.895	2.284	3.358	52.558
11	1.202	1.768	58.664	1.202	1.768	58.664	2.121	3.119	55.676
12	1.171	1.722	60.386	1.171	1.722	60.386	1.888	2.776	58.452
13	1.163	1.710	62.096	1.163	1.710	62.096	1.729	2.543	60.995
14	1.055	1.551	63.647	1.055	1.551	63.647	1.590	2.338	63.333
15	1.008	1.482	65.129	1.008	1.482	65.129	1.222	1.797	65.129

Extraction Method: Principal axis factoring

As shown in Table 5.4, Kaiser's criterion was used wherein only factors with an eigenvalue greater than one were isolated from the factor matrix. Eigenvalues account for a factor's total amount of explained variance with greater than one regarded as substantial (Field, 2007). As shown in Table 5.4, the 15 isolated factors accounted for 65.1% of the variance. The rotated factor matrix showed that factor 1 was made of satisfaction latent variables; factor 2 trust latent variables; factor 3 WOM latent variables; factor 4 compatibility latent variables; factor 5 service quality latent variables; factor 6 credibility latent variables; factor 7 performance expectancy latent variables; factor 8 information quality latent variables; factor 9 continuity latent variables; factor 10 social influence latent variables; factor 11 system quality latent variables. The other four factors with eigenvalues greater than one had less than three latent indicators, and cross-loadings were also evident. The analysis showed that the objective of using the EFA to explore and establish if the empirical data had a viable factor structure was achieved. Further analysis of the data was done using Smart-PLS SEM.

5.7.2 Model Evaluation

5.7.2.1 Structural Equation Modelling

The study undertook variance-based (regression) structural equation modelling using Smart Partial Least Squares (Smart-PLS) data analysis software (Ringle, Da Silva, & Bido, 2015). This is because Smart-PLS is suitable for predictive and exploratory research, unlike covariance-based SEM, which is suited to confirmatory research (Hair et al., 2013). Furthermore, the Smart-PLS algorithm is designed to compute metrics for cause-and-effect type propositions robustly in complex structural models that may consist of reflective constructs, formative constructs or both (Asnakew, 2020). Prediction entails establishing how well postulated exogenous constructs explain the variance in the endogenous constructs in the model. Previous empirical work on IS success and m-banking used this analytical approach: Damabi et al. (2018); Shaikh et al. (2021); Kumar et al. (2020); Khan et al. (2021). PLS-SEM was used because the research objectives were premised on a predictive paradigm, hence aligned with theory development and not theory testing (Hair, Matthews, Matthews, & Sarstedt, 2017). This was because the conceptual framework amalgamated constructs from three theories, as outlined in Chapter 2 of this thesis.

The two-step analysis procedure, as per Anderson and Gerbing (1988) guidelines, was conducted using the Smart-PLS software. Firstly, to analyse the validity and reliability of the measurement model and assess associations between the proposed latent variables (quality, performance expectancy, social influence, compatibility) and their measures, thus establishing model validity and reliability. Secondly, to test the proposed relationships between the unobservable latent variables (including the mediators and moderators) and produce the structural model which provided the path analysis with the relevant metrics for testing the study hypotheses.

5.8 COMMON METHOD VARIANCE ASSESSMENT

Common method variance refers to the systematic variance shared between constructs that is attributable to the measurement method and not to the intrinsic association between the underlying constructs (Podsakoff, MacKenzie, & Podsakoff, 2012; Spector, Rosen, Richardson, Williams, & Johnson, 2019). Unmitigated, CMV threatens the validity and reliability of the inferences made, especially for cross-sectional survey studies (Cooper et al., 2020; Podsakoff et al., 2003). An over-arching principle behind handling possible CMV post-ante is that, due to the complexity and diversity of its provenance in cross-sectional survey data (Podsakoff et al., 2003) estimators are simply diagnostic at best and referenced cut-offs are subjective (Guide Jr & Ketokivi, 2015). Two post-hoc techniques were implemented to statistically test and diagnose common method variance in the operationalised model. The first one was Harman's single-factor test. Implementing the single-factor test involved loading all the items of all 13 latent variables into an exploratory factor analysis algorithm in SPSS V28 and then examining the unrotated factor matrix that emerged (Kock, 2020; Schriesheim, 1979). The first factor that emerged accounted for 30.2% of the explained variance, thus suggesting a lack of CMV as it was well below the 50% minimum threshold (Cooper et al., 2020).

Since Harman's single-factor test has been documented as unable to adequately account for CMV (Baumgartner & Weijters, 2021; Cooper et al., 2020), a more rigorous random marker variable technique was implemented (Baumgartner & Weijters, 2021). The marker variable technique requires introducing a variable that is theoretically

unrelated to the model's substantive variables but shares similar CMV causes as those variables (Fuller et al., 2016; Steenkamp & Maydeu-Olivares, 2021). Using Smart-PLS, a recommended technique is a full collinearity variance inflation (FCVIF) test by introducing a random dummy variable into the model and regressing all latent variables on this 'random' criterion variable (Kock, 2020; Kock & Lynn, 2012). This is followed by an assessment of the VIF values of the inner model, with values greater than 3.3 indicating collinearity, which is suggestive of CMV issues (Kock, 2020). This was done in the analysis using latent variable scores derived from PLS results. The model is shown in Figure 5.1.

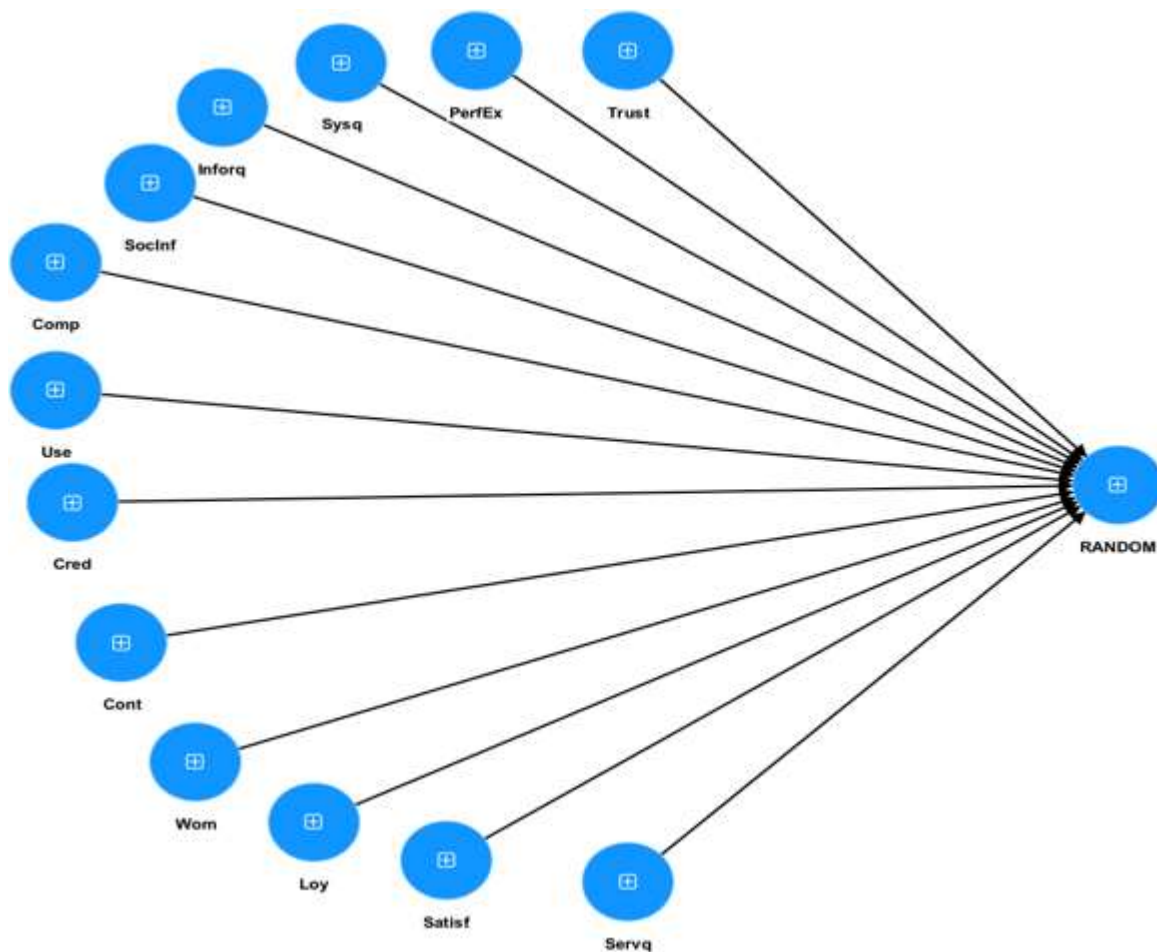


Figure 5.1: Latent variables association with random marker variable

Table 5.5: Latent variable collinearity variance inflation values with random factor

PATH	VIF
Loy -> RANDOM	3.139
Satisf -> RANDOM	2.813
Servq -> RANDOM	1.500
Trust -> RANDOM	2.406
Comp -> RANDOM	2.652
Cont -> RANDOM	2.757
Cred -> RANDOM	2.220
Inforq -> RANDOM	2.279
PerfEx -> RANDOM	1.438
SocInf -> RANDOM	1.439
Sysq -> RANDOM	1.734
Use -> RANDOM	2.886
Wom -> RANDOM	2.224

The VIF values of the inner model obtained from the PLS regression model are shown in Table 5.5. It shows that all VIF values are below the threshold of 3.3, thus suggesting no pathological collinearity (Kock, 2015). Hence, the data displays measurement invariance (Kock & Lynn, 2012).

5.9 PLS MEASUREMENT MODEL (OUTER MODEL)

5.9.1 Factor loadings and multicollinearity assessment

The measurement model's validation involves firstly analysing the item loadings for indicator reliability. Factor loading (λ) refers to how well an indicator measures the underlying construct. It depicts the representation of each item in the latent variable and should ideally be above 0.708 because this would indicate that the construct explains more than 50% of the indicator's variance, thus providing sufficient indicator reliability in the operationalised scale (Hair et al., 2019; Henseler, Ringle, & Sarstedt, 2015). Theoretically, indicators with loadings below 0.400 should be removed from the construct's operationalised scale. In contrast, those with loadings between 0.400 and

0.708 should be considered for removal from the model if such removal leads to the improvement in the internal consistency reliability and/or convergent validity in terms of the stipulated benchmarks (Hair Jr et al., 2021; Ramayah, Cheah, Chuah, Ting, & Memon, 2018). However, removal of indicators should not adversely impact a construct's content validity (Hair et al., 2019)

Twelve of the thirteen latent variables in this study were measured with five manifest indicators each, except loyalty which was measured with eight indicators. Running the full measurement model with all construct indicators loaded in Smart-PLS 4 produced reliability and validity quality metrics, presented in a consolidated format in Table 5.6. These are: the outer loadings (λ), the Cronbach alpha (α), Henseler-Dijkstra's rho (ρ), composite reliability (CR), and average variance extracted (AVE). These quality metrics were all above the designated thresholds (0.70 for α , ρ and CR; 0.50 for AVE, (Hair Jr et al., 2021), except for social influence (AVE=0.465), word of mouth [α =0.594, CR=0.679, AVE=0.407] and loyalty (AVE=0.465).

Table 5.6: Original outer (measurement) model quality metrics

CONSTRUCT	ITEMS	Outer loadings (λ)	ALPHA (α)	RHO (ρ)	CR	AVE
PERFORMANCE EXPECTANCY	PerfEx1	0.701	0.795	0.802	0.859	0.551
	PerfEx2	0.807				
	PerfEx3	0.760				
	PerfEx4	0.766				
	PerfEx5	0.670				
SERVICE QUALITY	Servq1	0.772	0.847	0.849	0.891	0.621
	Servq2	0.833				
	Servq3	0.836				
	Servq4	0.717				
	Servq5	0.777				
SYSTEM QUALITY	Sysq1	0.733	0.780	0.792	0.849	0.531
	Sysq2	0.761				
	Sysq3	0.790				
	Sysq4	0.621				
	Sysq5	0.729				
INFORMATION QUALITY	Inforq1	0.758	0.839	0.841	0.886	0.608
	Inforq2	0.820				
	Inforq3	0.787				
	Inforq4	0.777				
	Inforq5	0.757				

SOCIAL INFLUENCE	SocInf1	0.716	0.712	0.728	0.814	0.470
	SocInf2	0.658				
	SocInf3	0.809				
	SocInf4	0.658				
	SocInf5	0.561				
COMPATIBILITY	Comp1	0.820	0.841	0.857	0.886	0.609
	Comp2	0.829				
	Comp3	0.763				
	Comp4	0.747				
	Comp5	0.740				
SYSTEM USE	Use1	0.779	0.804	0.809	0.865	0.563
	Use2	0.825				
	Use3	0.744				
	Use4	0.650				
	Use5	0.742				
CUSTOMER SATISFACTION	Satisf1	0.758	0.845	0.845	0.890	0.618
	Satisf2	0.830				
	Satisf3	0.777				
	Satisf4	0.800				
	Satisf5	0.762				
TRUST	Trust1	0.832				
	Trust2	0.834				

	Trust3	0.815	0.881	0.886	0.913	0.676
	Trust4	0.788				
	Trust5	0.842				
CREDIBILITY	Cred1	0.673				
	Cred2	0.808				
	Cred3	0.776	0.759	0.791	0.835	0.506
	Cred4	0.604				
	Cred5	0.677				
CONTINUITY	Cont1	0.732				
	Cont2	0.784				
	Cont3	0.499	0.796	0.830	0.860	0.558
	Cont4	0.839				
	Cont5	0.829				
WORD OF MOUTH	Wom1	0.827				
	Wom2	0.868				
	Wom3	0.769	0.594	0.778	0.679	0.407
	Wom4	0.053				
	Wom5	-0.012				
LOYALTY	Loy1	0.737				
	Loy2	0.667				
	Loy3	0.717				
	Loy4	0.696	0.831	0.848	0.872	0.465

Loy5	0.570			
Loy6	0.476			
Loy7	0.763			
Loy8	0.773			

Assessment of the indicator loadings shown in Table 5.6 revealed the following detrimental indicators on the quality metrics: socInf5, cont3, WOM4, WOM5, Loy5 and Loy6. All of them had loadings that were below 0.60. Further iterative analysis showed that even if Loy7 and Loy8 had loadings higher than 0.700, they also loaded highly on the continuity construct, thus displaying undesirable multicollinearity. These items were all deleted and removed from the model. This led to AVE values above 0.500 for all constructs and reliability values above 0.700. It also got rid of the manifest cross-loading from the model. Removal of the stated indicators had little effect on the construct content validity as WoM is the latent variable that subsequently had the least indicators with three. The rest were above three.

It should be noted that sysq4, socinf2, socinf3, use4, cred1, cred4 and cred5 all loaded below 0.708 but were above 0.600. Their loadings did not adversely affect the quality criteria, so they were retained in the model. The subsequent structural model assessment emanated from the constructs as reflected in the modified measurement indicator loadings shown in Table 5.7. The modified measurement model assessment is presented in the following section.

Table 5.7: Factor loadings- the modified measurement model

CONSTRUCT	PerfEx	Servq	Sysq	Inforq SocInf Comp Use	SatisfTrust Cred Cont WOM Loy
PerfEx1	0.702				
PerfEx2	0.806				
PerfEx3	0.764				
PerfEx4	0.767				
PerfEx5	0.665				
Servq1		0.774			
Servq2		0.834			
Servq3		0.834			
Servq4		0.717			
Servq5		0.775			
Sysq1			0.742		
Sysq2			0.770		
Sysq3			0.794		
Sysq4			0.600		
Sysq5			0.717		
Inforq1				0.759	
Inforq2				0.822	
Inforq3				0.784	
Inforq4				0.777	
Inforq5				0.756	

SocInf1	0.741
SocInf2	0.689
SocInf3	0.840
SocInf4	0.667
Comp1	0.820
Comp2	0.829
Comp3	0.763
Comp4	0.747
Comp5	0.740
Use1	0.781
Use2	0.826
Use3	0.746
Use4	0.646
Use5	0.741
Satisf1	0.759
Satisf2	0.833
Satisf3	0.774
Satisf4	0.796
Satisf5	0.765
Trust1	0.832
Trust2	0.834
Trust3	0.815

Trust4	0.788
Trust5	0.842
Cred1	0.673
Cred2	0.808
Cred3	0.776
Cred4	0.604
Cred5	0.677
Cont1	0.755
Cont2	0.781
Cont4	0.838
Cont5	0.838
Wom1	0.832
Wom2	0.869
Wom3	0.765
Loy1	0.755
Loy2	0.772
Loy3	0.756
Loy4	0.773

5.9.2 Indicator multicollinearity in the modified model

Indicator multicollinearity was assessed using the Variance Inflation Factor (VIF) parameter, as per Fornell and Bookstein (1982) recommendations. A VIF statistic smaller than five suggests the absence of indicator multicollinearity (Hair, Celsi, et al., 2017), considering the relatively large sample size greater than 400 in this study context. VIF cut-offs are subjective rules of thumb with little statistical rigour (Guide Jr & Ketokivi, 2015). Other authors cite a 3.3 VIF cut-off (e.g. Kock & Lynn, 2012). The VIF values for all the indicators in the model are shown in Table 5.8.

Table 5.8: Multicollinearity statistics (VIF) for indicators

	VIF
PerfEx1	1.439
PerfEx2	1.699
PerfEx3	1.695
PerfEx4	1.642
PerfEx5	1.357
Servq1	1.864
Servq2	2.300
Servq3	2.391
Servq4	1.494
Servq5	2.057
Sysq1	1.426
Sysq2	1.646
Sysq3	1.698
Sysq4	1.514
Sysq5	1.637
Inforq1	1.601
Inforq2	1.925
Inforq3	1.754
Inforq4	1.752
Inforq5	1.653
SocInf1	1.410
SocInf2	1.522
SocInf3	1.708

SocInf4	1.207
Comp1	1.965
Comp2	1.977
Comp3	1.762
Comp4	1.642
Comp5	1.668
Use1	1.782
Use2	1.961
Use3	1.533
Use4	1.370
Use5	1.556
Satisf1	1.817
Satisf2	2.270
Satisf3	1.824
Satisf4	1.860
Satisf5	1.634
Trust1	2.030
Trust2	2.288
Trust3	2.060
Trust4	1.983
Trust5	2.216
Cred1	1.506
Cred2	1.731
Cred3	1.450
Cred4	1.345
Cred5	1.434
Cont1	1.494
Cont2	1.609
Cont4	1.962
Cont5	1.906
Wom1	1.536
Wom2	1.717
Wom3	1.476
Loy1	1.345
Loy2	1.490

Loy3	1.509
Loy4	1.566

Table 5.8 shows that all the VIF values are below both the 3.3 (Kock & Lynn, 2012) and 5 (Humble, 2020; Pallant, 2020) subjective cited cut-offs. More pertinent is that three of the five indicators for service quality have VIFs above two. Similarly, four of the five trust indicators have VIFs greater than two. This suggests inferential caution regarding these two latent constructs in the model re-specification.

5.9.3 Reliability analysis of the modified measurement model

The essence of scale reliability is stability, repeatability and consistency (Kimberlin & Winterstein, 2008). It is demonstrated by an instrument that shows precision in repeated measurements of the same phenomena (Cooper & Schindler, 2014). Indicator reliability measures how much indicator variance can be attributed to the underlying construct. Secondly, internal consistency reliability was evaluated in terms of the traditional Cronbach alpha (α), which, for each scale, has a rule of thumb of a minimum of 0.7 (William, Babin, Carr, & Griffin, 2013). More recent parameters are the composite reliability rho_C, and rho_A. Cronbach alpha has the limitation of being a conservative measure because it assumes that all indicator loadings are the same in the population (tau equivalence). Also, normatively benchmarked at a minimum of 0.7 (Hair Jr et al., 2014), composite reliability (rho_c) is more liberal and the more reliable measure of reliability tends to be between the alpha and rho_c values. Hence the relevance of the reliability coefficient, rho_a, (Dijkstra-Henseler's rho) (Dijkstra & Henseler, 2015; Henseler et al., 2015). The reliability of the variables was assessed using the Cronbach alpha (α) as well as the Composite Reliability (CR) values as well as rho_a. These are captured in Table 5.9 for each construct.

Table 5.9: Construct reliability analysis (Cronbach alpha and Composite reliability)

	Cronbach's alpha	Composite Reliability	
	α	ρ_a	ρ_c
PerfEx	0.795	0.802	0.860
Servq	0.847	0.849	0.891
Sysq	0.780	0.796	0.848
Inforq	0.839	0.841	0.886
SocInf	0.721	0.734	0.825
Comp	0.841	0.857	0.886
Use	0.804	0.811	0.865
Satisf	0.845	0.846	0.890
Trust	0.881	0.886	0.913
Cred	0.759	0.791	0.835
Cont	0.817	0.820	0.879
Wom	0.763	0.782	0.863
Loy	0.763	0.765	0.849

Table 5.9 shows that each construct meets the cited normative benchmarks of 0.70 for both reliability indices, with rho_a between the two for each construct. Alpha values range from a minimum of 0.721 for social influence to a maximum of 0.881 for trust. Rho_c has a minimum of 0.825 for social influence and a maximum of 0.913 for trust. The values confirm that alpha tends to be lower than the CR values for each construct.

5.9.4 Construct validity of the modified measurement model

5.9.4.1 Content validity

In order to ensure that stipulated indicators have face validity (direct relation to the underlying construct), survey items were phrased unambiguously, using terminology that was easily relatable for respondents, without any technical or academic jargon (Bhattacharjee, 2012). Even though survey items were synthesised from the theories and conceptualisation from the reviewed literature, most questions posed to respondents were pitched at Bloom's basic taxonomic level (recall, knowledge, etc.). The suitability of the questionnaire items (wording, meaning, clarity) was established

through a pre-test survey targeted at bank customers within the university community who had years of m-banking experience, followed by a review of the survey tool. This was essential as it ascertained the face validity of the instrument (Blumberg et al., 2014). The pre-test survey established the tool's suitability for sticking to the recommended 15 minute maximum time to minimise respondent fatigue (Hinkin, 1995; Podsakoff & Organ, 1986).

5.9.4.2 Convergent validity

Statistically, construct validity is ascertained in structural equation modelling using PLS by establishing convergent and discriminant validity. Convergent validity refers to the degree to which numerous attempts at measuring a similar construct through maximally distinct methods show coalescence and alignment (coming together) (Bagozzi & Phillips, 1982). According to Bagozzi and Phillips (1982), the essence of convergence is that two or more measures of the same latent construct should demonstrate a high degree of covariance if they are validly measuring the same thing. Statistically, this was computed by evaluating the average variance extracted (AVE) in the underlying latent variable by the observable indicators. The AVE is the grand mean value of the squared outer loadings (λ) of the manifest indicators that measure the latent variable. This extracted variance should be at least 50% according to Fornell and Larcker (1981), for it not to be attributable to error, as it will then suggest that it represents more than 50% of the variance of its indicators. To attain the minimum convergent validity AVE benchmark of 0.500 as per Fornell and Larcker (1981), the observable indicators need to load highly on the respective latent constructs, at greater or equal to the square root of this shared variance. Hence a minimum indicator loading of 0.708 (Anderson & Gerbing, 1988; Hair et al., 2019; Pallant, 2020; Sarstedt, Ringle, Henseler, & Hair, 2014), which is commonly expressed as a threshold of 0.70 for simplicity (Chin, 1998; Hair Jr et al., 2021). The AVE values are shown in Table 5.10, which are above the 0.500 benchmark, with a minimum of 0.506 for perceived credibility and a maximum of 0.678 for word of mouth. Hence, convergent validity was established for this study's operationalised model.

Table 5.10: Construct convergent validity (AVE)

	Average variance extracted (AVE)
PerfEx	0.551
Servq	0.621
Sysq	0.530
Inforq	0.608
SocInf	0.544
Comp	0.609
Use	0.563
Satisf	0.618
Trust	0.676
Cred	0.506
Cont	0.646
Wom	0.678
Loy	0.584

5.9.4.3 Discriminant Validity

Discriminant validity refers to the distinctiveness of each construct. Hence, the differentiation between the constructs is such that each construct, when compared to the other constructs in the measurement model, has its own unique statistical identity with minimal overlap. Discriminant validity can be established through the Fornell-Larcker criterion, the cross loadings technique, and the more recent and stringent Heterotrait Monotrait (HTMT) ratio criterion.

To confirm discriminant validity, the Fornell-Larcker criterion states that AVEs, representing the within-construct variance in the correlation matrix, must be greater than the shared variances between constructs. This means that the square root of the AVE of each construct should be greater than the correlations with all other constructs, thus showing that each construct explains better the variance of its items than that of other constructs (Anderson & Gerbing, 1988; Hair Jr et al., 2014). However, the Fornell-Larcker criterion is less sensitive when indicator loadings on a construct differ by a small amount (Hair et al., 2019). Hence a much more sensitive discriminant validity test is the recently adopted HTMT ratio by Henseler et al. (2015).

The Heterotrait Monotrait (HTMT) ratio of correlations, benchmarked at less than 0.90 (Henseler et al., 2015), provides a ratio that compares the cross-construct correlation (hetero-trait) with the within-construct correlations (mono-trait) to ascertain discriminant validity (Henseler et al., 2015). This means that it is the ratio of the mean value of correlations of indicators that measure different constructs to the mean value of the correlations of indicators that measure the same construct. It has been established as more robust and sensitive than the Fornell-Larcker criterion and the cross-loadings technique. The cross-loadings technique involves confirmation that construct indicators load more strongly in their designated construct than on other constructs in the model.

Discriminant validity was assessed through all three techniques for statistical rigour. Table 5.11 shows the correlation matrix that captures the inter-construct correlations with the diagonal italicised elements showing the square roots of the AVE. The Table shows that the Fornell-Larcker criterion is established because the diagonal elements are higher than the associated correlations for each construct.

Table 5.11: Discriminant validity- Fornell-Larcker matrix

	PerfEx	Servq	Sysq	Inforq	SocInf	Comp	Use	Satisf	Trust	Cred	Cont	Wom	Loy
PerfEx	0.743												
Servq	0.315	0.788											
Sysq	0.405	0.376	0.728										
Inforq	0.441	0.447	0.577	0.780									
SocInf	0.349	0.310	0.391	0.439	0.737								
Comp	0.417	0.383	0.417	0.499	0.406	0.781							
Use	0.459	0.423	0.450	0.631	0.460	0.647	0.750						
Satisf	0.416	0.486	0.528	0.616	0.412	0.644	0.707	0.786					
Trust	0.312	0.422	0.433	0.533	0.286	0.552	0.570	0.560	0.822				
Cred	0.294	0.474	0.392	0.522	0.360	0.501	0.545	0.534	0.683	0.712			
Cont	0.410	0.435	0.427	0.528	0.432	0.602	0.648	0.638	0.541	0.520	0.804		
Wom	0.352	0.412	0.416	0.441	0.326	0.499	0.459	0.558	0.540	0.488	0.650	0.823	
Loy	0.415	0.394	0.388	0.507	0.400	0.719	0.583	0.599	0.572	0.533	0.702	0.658	0.764

Table 5.12 shows the HTMT ratios, and, similarly, this discriminant validity criterion is met for all constructs as the ratios are below 0.900 (Henseler et al., 2015). The cross-loadings technique was the last criterion checked for further confirmation of discriminant validity. Table 5.13 shows that all the indicators loaded strongly on their respective constructs and less on the other constructs in the model (cross-construct). Hence, this further confirms the distinctiveness of each construct and the robustness of the model in terms of discriminant validity.

Table 5.12: Discriminant validity- HTMT ratios

	PerfEx	Servq	Sysq	Inforq	SocInf	Comp	Use	Satisf	Trust	Cred	Cont	Wom
PerfEx												
Servq	0.378											
Sysq	0.484	0.445										
Inforq	0.535	0.524	0.703									
SocInf	0.439	0.377	0.519	0.549								
Comp	0.501	0.445	0.516	0.584	0.497							
Use	0.567	0.512	0.562	0.771	0.593	0.766						
Satisf	0.506	0.570	0.643	0.731	0.510	0.748	0.853					
Trust	0.372	0.487	0.518	0.620	0.346	0.628	0.676	0.643				
Cred	0.350	0.579	0.510	0.644	0.468	0.599	0.690	0.639	0.849			
Cont	0.509	0.516	0.518	0.637	0.541	0.715	0.794	0.766	0.636	0.643		
Wom	0.443	0.506	0.525	0.540	0.421	0.613	0.586	0.681	0.652	0.624	0.822	
Loy	0.524	0.476	0.489	0.627	0.511	0.886	0.731	0.736	0.696	0.679	0.886	0.856

Table 5.13: Discriminant validity- Cross loadings matrix

	PerfEx	Servq	Sysq	Inforq	SocInf	Comp	Use	Satisf	Trust	Cred	Cont	Wom	Loy
PerfEx1	0.704	0.165	0.284	0.333	0.264	0.275	0.325	0.303	0.242	0.248	0.291	0.262	0.273
PerfEx2	0.805	0.305	0.355	0.370	0.278	0.364	0.396	0.357	0.234	0.228	0.342	0.280	0.350
PerfEx3	0.765	0.213	0.277	0.324	0.271	0.302	0.329	0.282	0.217	0.219	0.323	0.268	0.294
PerfEx4	0.766	0.225	0.315	0.314	0.265	0.298	0.325	0.295	0.240	0.214	0.300	0.254	0.324
PerfEx5	0.665	0.251	0.264	0.289	0.215	0.299	0.323	0.304	0.226	0.183	0.262	0.243	0.294
Servq1	0.255	0.774	0.358	0.441	0.318	0.350	0.372	0.412	0.330	0.386	0.351	0.360	0.354
Servq2	0.270	0.834	0.340	0.393	0.262	0.340	0.358	0.401	0.340	0.390	0.362	0.296	0.348
Servq3	0.203	0.834	0.242	0.308	0.224	0.275	0.329	0.369	0.332	0.393	0.326	0.317	0.283
Servq4	0.279	0.717	0.299	0.335	0.258	0.273	0.315	0.385	0.332	0.359	0.374	0.373	0.332
Servq5	0.225	0.775	0.217	0.252	0.134	0.252	0.276	0.334	0.321	0.333	0.286	0.267	0.210
Sysq1	0.369	0.298	0.742	0.417	0.290	0.321	0.375	0.439	0.319	0.289	0.331	0.316	0.285
Sysq2	0.335	0.267	0.771	0.414	0.268	0.280	0.305	0.364	0.283	0.257	0.332	0.366	0.283
Sysq3	0.333	0.314	0.794	0.484	0.321	0.298	0.334	0.391	0.330	0.313	0.342	0.315	0.314
Sysq4	0.114	0.182	0.600	0.307	0.220	0.252	0.236	0.299	0.267	0.252	0.181	0.166	0.185
Sysq5	0.245	0.281	0.717	0.455	0.313	0.364	0.360	0.406	0.377	0.320	0.327	0.307	0.321
Inforq1	0.369	0.314	0.413	0.759	0.382	0.399	0.503	0.496	0.344	0.424	0.458	0.353	0.408
Inforq2	0.408	0.327	0.495	0.822	0.396	0.379	0.511	0.499	0.402	0.404	0.419	0.375	0.403
Inforq3	0.339	0.359	0.475	0.784	0.278	0.415	0.484	0.503	0.492	0.397	0.386	0.362	0.431
Inforq4	0.281	0.369	0.435	0.777	0.332	0.393	0.501	0.449	0.444	0.404	0.410	0.308	0.359

Inforq5	0.309	0.380	0.430	0.756	0.315	0.359	0.459	0.452	0.403	0.408	0.380	0.318	0.373
SocInf1	0.276	0.235	0.284	0.333	0.741	0.332	0.337	0.317	0.262	0.214	0.275	0.241	0.311
SocInf2	0.123	0.162	0.294	0.249	0.689	0.210	0.256	0.190	0.138	0.213	0.193	0.184	0.170
SocInf3	0.288	0.284	0.327	0.387	0.840	0.343	0.402	0.337	0.237	0.308	0.395	0.281	0.327
SocInf4	0.295	0.209	0.254	0.298	0.667	0.282	0.333	0.332	0.184	0.308	0.361	0.236	0.328
Comp1	0.339	0.316	0.302	0.422	0.393	0.820	0.574	0.556	0.480	0.409	0.525	0.419	0.608
Comp2	0.387	0.323	0.326	0.462	0.343	0.829	0.607	0.586	0.513	0.469	0.531	0.415	0.614
Comp3	0.296	0.291	0.341	0.320	0.275	0.763	0.421	0.448	0.358	0.343	0.455	0.361	0.479
Comp4	0.311	0.310	0.377	0.382	0.327	0.747	0.463	0.475	0.400	0.404	0.429	0.404	0.555
Comp5	0.272	0.246	0.298	0.330	0.218	0.740	0.410	0.410	0.369	0.300	0.378	0.341	0.529
Use1	0.391	0.305	0.330	0.460	0.362	0.518	0.783	0.547	0.381	0.364	0.534	0.326	0.461
Use2	0.407	0.325	0.314	0.497	0.375	0.545	0.828	0.615	0.431	0.406	0.523	0.356	0.506
Use3	0.363	0.308	0.343	0.481	0.325	0.517	0.748	0.534	0.488	0.404	0.538	0.338	0.494
Use4	0.251	0.310	0.307	0.454	0.333	0.392	0.642	0.413	0.433	0.430	0.380	0.376	0.335
Use5	0.288	0.346	0.402	0.479	0.334	0.436	0.737	0.523	0.412	0.457	0.435	0.337	0.366
Satisf1	0.379	0.338	0.481	0.467	0.335	0.547	0.507	0.762	0.425	0.400	0.513	0.444	0.513
Satisf2	0.327	0.368	0.391	0.445	0.386	0.515	0.550	0.835	0.438	0.400	0.511	0.465	0.504
Satisf3	0.301	0.348	0.423	0.463	0.310	0.421	0.557	0.773	0.372	0.391	0.467	0.394	0.374
Satisf4	0.313	0.459	0.415	0.548	0.311	0.486	0.581	0.793	0.491	0.468	0.478	0.407	0.466
Satisf5	0.313	0.394	0.368	0.496	0.274	0.549	0.581	0.765	0.468	0.436	0.531	0.473	0.486
Trust1	0.287	0.366	0.404	0.496	0.294	0.494	0.545	0.527	0.832	0.593	0.487	0.481	0.500
Trust2	0.192	0.351	0.341	0.440	0.184	0.397	0.410	0.430	0.834	0.550	0.406	0.444	0.450
Trust3	0.260	0.334	0.316	0.396	0.236	0.459	0.418	0.435	0.815	0.507	0.439	0.458	0.474
Trust4	0.270	0.342	0.339	0.445	0.238	0.448	0.464	0.413	0.788	0.610	0.453	0.390	0.467
Trust5	0.266	0.338	0.369	0.407	0.216	0.465	0.488	0.483	0.842	0.551	0.436	0.441	0.460

Cred1	0.169	0.313	0.257	0.339	0.289	0.291	0.287	0.315	0.356	0.673	0.334	0.319	0.309
Cred2	0.263	0.376	0.269	0.396	0.274	0.425	0.456	0.440	0.500	0.808	0.388	0.368	0.420
Cred3	0.305	0.391	0.347	0.444	0.307	0.415	0.461	0.496	0.516	0.777	0.461	0.419	0.453
Cred4	0.079	0.265	0.264	0.303	0.174	0.249	0.334	0.247	0.564	0.604	0.243	0.296	0.273
Cred5	0.152	0.318	0.252	0.349	0.212	0.357	0.361	0.327	0.541	0.676	0.378	0.314	0.402
Cont1	0.354	0.290	0.293	0.389	0.336	0.478	0.487	0.490	0.389	0.393	0.755	0.511	0.527
Cont2	0.314	0.325	0.324	0.439	0.330	0.427	0.497	0.487	0.418	0.423	0.780	0.553	0.562
Cont4	0.324	0.386	0.356	0.454	0.372	0.517	0.538	0.517	0.474	0.443	0.838	0.495	0.578
Cont5	0.329	0.389	0.395	0.415	0.349	0.509	0.558	0.554	0.455	0.414	0.838	0.536	0.589
Wom1	0.387	0.340	0.409	0.409	0.340	0.456	0.392	0.487	0.459	0.425	0.549	0.833	0.566
Wom2	0.267	0.371	0.293	0.390	0.267	0.428	0.413	0.511	0.479	0.442	0.568	0.870	0.571
Wom3	0.199	0.302	0.330	0.273	0.181	0.337	0.318	0.357	0.388	0.323	0.483	0.762	0.480
Loy1	0.367	0.368	0.307	0.435	0.381	0.593	0.517	0.496	0.452	0.463	0.562	0.479	0.754
Loy2	0.338	0.301	0.332	0.391	0.307	0.512	0.410	0.507	0.432	0.394	0.522	0.532	0.773
Loy3	0.232	0.278	0.224	0.345	0.238	0.508	0.414	0.394	0.449	0.382	0.513	0.455	0.755
Loy4	0.314	0.242	0.314	0.365	0.277	0.575	0.426	0.418	0.413	0.379	0.543	0.544	0.773

5.10 CONCLUSION OF THE MEASUREMENT MODEL

The measurement model was tested for reliability and validity after establishing that the collected data was not subject to common method bias issues. Inadequate AVE for social influence, loyalty and WoM led to the deletion of seven items from the model and the result was a modified measurement model that preserved the content validity of all the constructs as well as met all the quality metrics in the form of composite reliability, convergent validity as well as discriminant validity. The model was also confirmed not to be subject to multicollinearity issues as the VIF values were all within the established cut-offs. Having confirmed that the measurement model met all quality benchmarks, the next level of analysis was to look at the structural model assessment.

5.11 ASSESSMENT OF THE STRUCTURAL MODEL (INNER MODEL)

5.11.1 Model Goodness of Fit assessment

The structural model was assessed using the systematic approach proposed by Benitez, Henseler, Castillo, and Schuberth (2020). It comprises the collinearity evaluation test; the significance of the path coefficients (using the T values, p values and the bias-corrected confidence interval); effect size (F^2); in-sample coefficient of determination (R^2); Stone-Geiser blindfolding cross-validated redundancy measure (Q^2) (predictive relevance) (Geisser, 1975; Stone, 1974). The model's out-of-sample predictive power (Q^2) was computed using the PLS predict criterion (Hair et al., 2019). All inner model metrics indicated here were computed using the Smart-PLS 4 algorithm with 10 000 bootstraps per Hair Jr et al. (2021) recommendation for structural model analysis.

Unlike covariance SEMs, PLS-SEM does not offer a big pool of universal model fit indices (Dash & Paul, 2021). The coefficient of determination (R^2) has threshold values of 0.25, 0.5 and 0.7, describing a weak, moderate, and strong coefficient of determination respectively (Hair et al., 2013). The out-of-sample predictive relevance (Q^2) has thresholds of 0.50 (large), 0.25 (medium) and 0.0 (small). Unlike CB-SEM model fit indices, these metrics have limited deductive functionality under variance-based SEMs like PLS (Hair, Babin, et al., 2017). However, using smart PLS,

Tenenhaus, Amato, and Esposito Vinzi (2004) provide a functional way to compute the model's global fit index:

$$\text{Global goodness of Fit (GoF)} = \sqrt{R^2 \times \overline{\text{communality}}}, \quad \text{where } \text{communality} = AVE$$

represents the average of all *AVE* values and $\overline{R^2}$ represents the average of all R^2 values in the full structural model. So, the *GoF* is the geometric mean of the average communality and the average R^2 . The cut-off for *GoF* is 0.36 for large effect size (Chen & Sharma, 2015; Wetzels, Odekerken-Schröder, & Van Oppen, 2009). The *GoF* of the current study's structural model was calculated using the *AVE* and R^2 values presented in Table 5.10 and Table 5.16, respectively. It was established to be: $GoF = \sqrt{0.4385 \times 0.5949} = 0.5107$.

A value of 0.51 for *GoF* is greater than the threshold of 0.36, thus indicating a good level of model fit in the context of this study. For model fit assessment using Smart-PLS, Hair, Hollingsworth, Randolph, and Chong (2017), as well as Henseler et al. (2015), suggest the standardised root mean square residual (SRMR). For this study's measurement model, the SRMR value was 0.044. This is below the suggested maximum cut-off rule of thumb of 0.08 for SRMR (Hair, Hollingsworth, et al., 2017; Henseler et al., 2015; Hu & Bentler, 1999). Due to the prevailing debate and documented scholarly divergence about the relevance and subjective efficiency of these fit indices in PLS-SEM studies (Benitez et al., 2020; Hair Jr et al., 2021; Henseler et al., 2015; Russo & Stol, 2021), no further extrapolations from these fit indices are explored in this thesis.

5.11.2 Collinearity test of the inner model

First, to ensure there is no collinearity among predictor constructs (Hair et al., 2019) the variance inflation factor (VIF) was computed for each construct and in each case was found to be below the benchmark collinearity test of 5 (Hair, Babin, et al., 2017). The VIF values are shown in Table 5.14. The absence of multicollinearity showed that the path coefficients were not biased.

Table 5.14: Collinearity statistics (VIF)- inner model

PATH	VIF
PerfEx ->Use	1.388
PerfEx ->Satisf	1.385
Servq ->PerfEx	1.299
Servq ->Use	1.341
Servq ->Satisf	1.486
Sysq ->PerfEx	1.583
Sysq ->Use	1.637
Sysq ->Satisf	1.626
Inforq ->PerfEx	1.751
Inforq ->Use	1.906
Inforq ->Satisf	2.210
SocInf ->PerfEx	1.300
SocInf ->Use	1.371
Comp ->Use	1.535
Cred ->Satisf	2.219
Trust ->Satisf	2.288
Use ->Satisf	2.400
Use ->Cont	1.997
Use ->Wom	1.997
Use ->Loy	1.997
Satisf ->Cont	1.997
Satisf ->Wom	1.997

5.11.3 Structural path analysis (hypotheses testing of direct effects)

The directional associations between the constructs in the research framework were examined by evaluating the robustness of path coefficients. The significance of the hypothesised direct effects was tested using the bootstrapping resampling protocol in Smart-PLS (Hair Jr et al., 2014). This was done for statistical robustness and rigour by executing 10 000 bootstrap iterations in Smart-PLS 4 (Ringle et al., 2022) using the asymptotic two-tailed 95% confidence interval *T* statistic (Becker, Cheah, Gholamzade, Ringle, & Sarstedt, 2023; Hair Jr et al., 2021). The significance of each path's standardised beta (β) value was done using the *T* values that had to be a minimum of 1.96, with *p* values less than 0.05.

Table 5.15 presents the results of the hypotheses testing obtained from Smart-PLS 4

Hypothesis 1 was posed as follows:

There is a significant positive relationship between performance expectancy and the use of m-banking.

The results revealed a significant and positive relationship between performance expectancy and use of m-banking ($\beta=0.102$, $T=2.740$, $p<0.05$). Hence, H_1 was supported.

Hypothesis 2 was posed as follows:

There is a significant positive relationship between m-banking performance expectancy and customer satisfaction.

The results revealed a significant and positive relationship between performance expectancy and satisfaction with m-banking ($\beta=0.101$, $T=2.519$, $p=0.012$). Hence, H_2 was supported.

Hypothesis 3(a) was posed as follows:

There is a significant positive relationship between the system quality of m-banking its use.

The results revealed an insignificant impact of the m-banking system quality on its use ($\beta=-0.003$, $T=0.075$, $p=0.940$). Hence, H_{3a} was not supported.

Hypothesis 3(b) was posed as follows:

There is a significant positive relationship between the quality of the information available on m-banking and its use.

The results revealed a significant and positive relationship between the quality of the information available on m-banking and use of m-banking ($\beta=0.322$, $T=6.406$, $p=0.00$). Hence, H_{3b} was supported.

Hypothesis 3(c) was posed as follows:

There is a significant positive relationship between the service quality of m-banking and the use of m-banking.

The results revealed an insignificant relationship between service quality on the m-banking channel and its use ($\beta=0.071$, $T=1.923$, $p=0.055$). Hence, H_{3c} was not supported.

Hypothesis 4(a) was posed as follows:

There is a significant positive relationship between m-banking system quality and performance expectancy.

The results revealed a significant positive relationship between the system quality of m-banking and its performance expectancy ($\beta=0.171$, $T=2.736$, $p=0.006$). Hence, H_{4a} was not supported.

Hypothesis 4(b) was posed as follows:

There is a significant positive relationship between m-banking information quality and performance expectancy.

The results revealed a significant positive relationship between the information quality of m-banking and its performance expectancy ($\beta=0.149$, $T=2.869$, $p=0.004$). Hence, H_{4b} was not supported.

Hypothesis 4(c) was posed as follows:

There is a significant positive relationship between m-banking service quality and performance expectancy.

The results revealed a significant positive relationship between the service quality of m-banking and its performance expectancy ($\beta=0.102$, $T=2.031$, $p=0.042$). Hence, H_{4c} was supported.

Hypothesis 5 was posed as follows:

There is a significant positive relationship between the compatibility of m-banking and its use.

The results revealed a significant and positive relationship between the compatibility of m-banking and its use ($\beta=0.373$, $T=8.537$, $p=0.000$). , H_5 was supported.

Hypothesis 6 was posed as follows:

There is a significant positive relationship between social influence about m-banking and its use.

The results revealed a significant and positive relationship between social influence and the use of m-banking ($\beta=0.112$, $T=3.072$, $p=0.002$). Hence, H_6 was supported.

Hypothesis 7(a) was posed as follows:

There is a significant positive relationship between system quality of m-banking and customer satisfaction.

The results revealed a significant positive relationship between m-banking system quality and customer satisfaction ($\beta=0.147$, $T=3.354$, $p=0.001$). Hence, H_{7a} was supported.

Hypothesis 7(d) was posed as follows:

There is a significant positive relationship between m-banking information quality and customer satisfaction.

The results revealed a significant positive relationship between m-banking information quality and customer satisfaction ($\beta=0.115$, $T=2.187$, $p=0.029$). Hence, H_{7d} was supported.

Hypothesis 7(f) was posed as follows:

There is a significant positive association between the service quality of m-banking and customer satisfaction.

The results revealed a significant positive association between m-banking service quality and customer satisfaction ($\beta=0.135$, $T=3.408$, $p=0.001$). Hence, H_{7f} was supported.

Hypothesis 8(a) was posed as follows:

There is a significant positive relationship between the use of m-banking and customer satisfaction.

The results revealed a significant positive relationship between m-banking system use and customer satisfaction ($\beta=0.364$, $T=7.030$, $p=0.00$). Hence, H_{8a} was supported.

Hypothesis 9(a) was posed as follows:

Perceived credibility of m-banking is positively related to customer satisfaction with m-banking.

The results revealed a significant positive relationship between perceived m-banking credibility and satisfaction ($\beta=0.123$, $T=2.538$, $p=0.011$). Hence, H_{9a} was supported.

Hypothesis 10 was posed as follows:

Trust in m-banking is positively related to customer satisfaction.

The results revealed a significant positive relationship between trust in m-banking and satisfaction ($\beta=0.165$, $T=3.145$, $p=0.002$). Hence, H_{10} was supported.

Hypothesis 12(a) was posed as follows:

Satisfaction with m-banking is positively and directly related to customer continuity when transacting through m-banking.

The results revealed a significant positive relationship between satisfaction with m-banking and continued use ($\beta=0.360$, $T=6.259$, $p=0.000$). Hence, H_{12a} was supported.

Hypothesis 12(c) was posed as follows:

Satisfaction with m-banking is positively and directly related to customer loyalty to m-banking.

The results revealed a significant positive relationship between satisfaction with m-banking and customer loyalty ($\beta=0.374$, $T=6.725$, $p=0.000$). Hence, H_{12c} was supported.

Hypothesis 12(d) was posed as follows:

Satisfaction with m-banking is positively and directly related to customer dissemination of positive word of mouth about m-banking.

The results revealed a significant positive relationship between satisfaction with m-banking and WoM ($\beta=0.465$, $T=7.731$, $p=0.000$). Hence, H_{12d} was supported.

Hypothesis 13(a) was posed as follows:

The use of m-banking is positively related to relationship continuity.

The results revealed a significant positive relationship between the use of m-banking and its continued ($\beta=0.394$, $T=7.147$, $p=0.000$). Hence, H_{13a} was supported.

Hypothesis 13(b) was posed as follows:

The use of m-banking is positively related to customer loyalty.

The results revealed a significant positive relationship between use of m-banking and customer loyalty ($\beta=0.318, T=5.442, p=0.000$). Hence, H_{13b} was supported.

Hypothesis 13(e) was posed as follows:

The use of m-banking is positively associated with customer WoM.

The results revealed a significant positive association between the use of m-banking and customer word of mouth ($\beta=0.130, T=2.310, p=0.021$). Hence, H_{13e} was supported.

All results are summarised in

Table 5.15, and the structural model is shown in Figure 5.2.

Table 5.15: Direct relationships

	Hypothesis	β	SE	T	p	95% BCA CI		Result
						LLCI	ULCI	
H ₁	PerfEx ->Use	0.103	0.037	2.753	0.006	0.027	0.172	Supported
H ₂	PerfEx ->Satisf	0.030	0.038	0.773	0.440	-0.036	0.112	Rejected
H _{3a}	Sysq ->Use	-0.003	0.043	0.077	0.939	-0.089	0.081	Rejected
H _{3b}	Inforq ->Use	0.321	0.050	6.398	0.000	0.227	0.422	Supported
H _{3c}	Servq ->Use	0.071	0.037	1.924	0.054	-0.001	0.144	Rejected
H _{4a}	Sysq ->PerfEx	0.171	0.062	2.736	0.006	0.077	0.317	Supported
H _{4b}	Inforq ->PerfEx	0.231	0.064	3.624	0.000	0.139	0.391	Supported
H _{4c}	Servq ->PerfEx	0.102	0.050	2.031	0.042	0.028	0.215	Supported
H ₅	Comp ->Use	0.372	0.044	8.528	0.000	0.287	0.457	Supported
H ₆	SocInf ->Use	0.112	0.036	3.080	0.002	0.042	0.185	Supported
H _{7a}	Sysq ->Satisf	0.147	0.044	3.354	0.001	0.059	0.227	Supported
H _{7d}	Inforq ->Satisf	0.115	0.053	2.187	0.029	0.004	0.205	Supported
H _{7f}	Servq ->Satisf	0.135	0.040	3.408	0.001	0.053	0.199	Supported
H _{8a}	Use ->Satisf	0.364	0.052	7.030	0.000	0.299	0.499	Supported

H_{9a}	Cred ->Satisf	0.058	0.047	1.225	0.220	-0.036	0.151	Rejected
H₁₀	Trust ->Satisf	0.098	0.051	1.913	0.056	0.000	0.195	Rejected
H_{12a}	Satisf ->Cont	0.360	0.057	6.259	0.000	0.246	0.470	Supported
H_{12c}	Satisf ->Loy	0.374	0.056	6.725	0.000	0.265	0.480	Supported
H_{12d}	Satisf ->Wom	0.465	0.060	7.731	0.000	0.343	0.578	Supported
H_{13a}	Use -> Cont	0.394	0.055	7.147	0.000	0.283	0.496	Supported
H_{13b}	Use ->Loy	0.318	0.058	5.442	0.000	0.198	0.426	Supported
H_{13e}	Use ->Wom	0.130	0.056	2.310	0.021	0.022	0.239	Supported

Note: β = beta coefficient, SE= standard error, T= t- statistic, p=probability value.

Relationships are significant at the $p < 0.001$ level, PerfEx: performance expectancy, Use: use of m-banking, Sysq: system quality, Servq: service quality, Inforq: information quality, Comp: compatibility, Cred: credibility, Socinf: social influence, Satisf: satisfaction, Cred: credibility, Cont: continuity, Loy: loyalty, WOM: word of mouth.

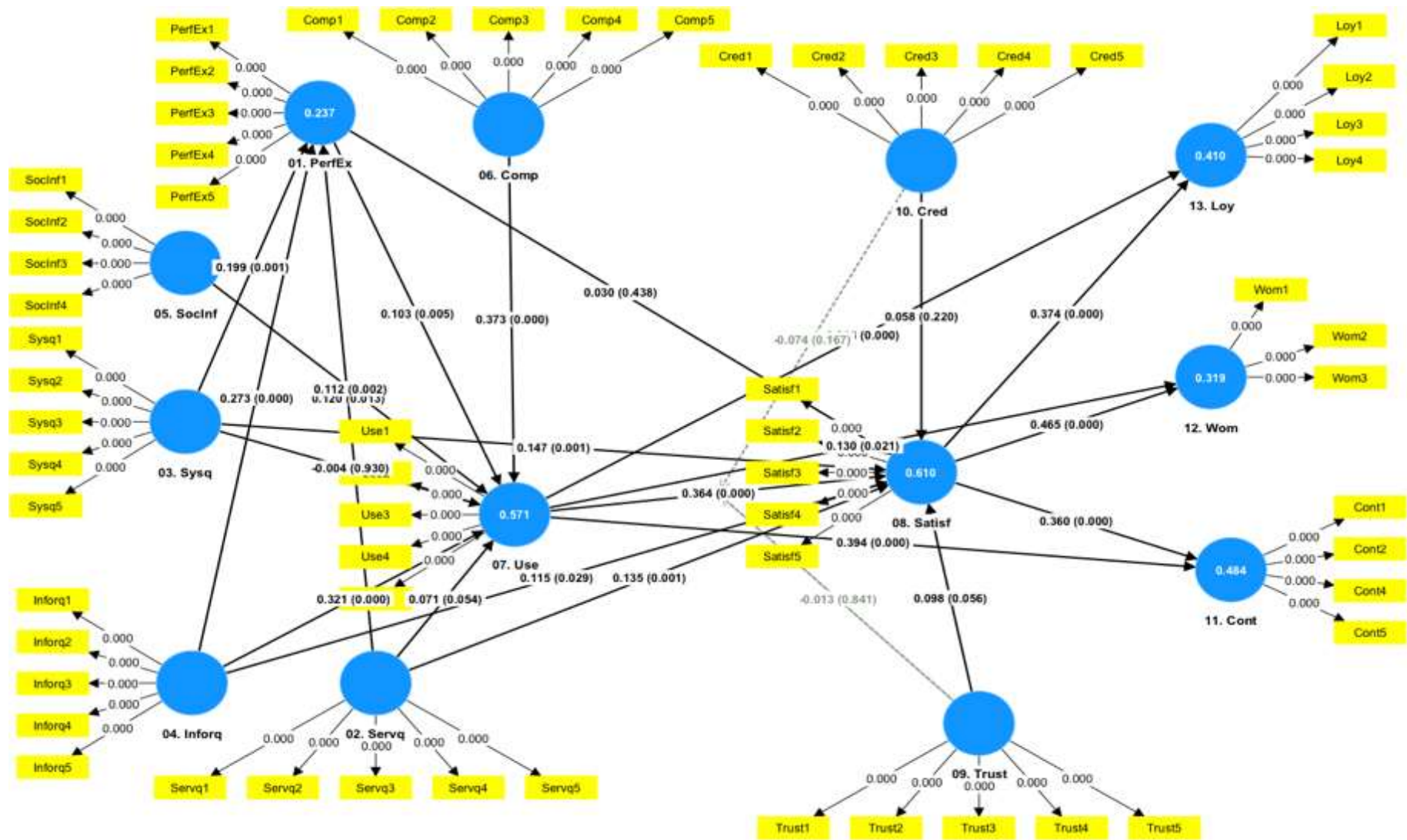


Figure 5.2: PLS structural model

Source: Smart-PLS 4 model output developed for the current study

5.12 ASSESSMENT OF COEFFICIENT OF DETERMINATION (R^2 VALUE)

R-square statistics explain the variance in the endogenous variable that is attributable to the exogenous variable(s). It measures the amount of change in the dependent variable that is brought about by the independent variable(s). The R-square measures the model's explanatory power, depicted by the variance in the endogenous construct(s) (Shmueli & Koppius, 2011). In Smart-PLS, it is also called the in-sample predictive power (Rigdon, 2012). R-square values lie between 0 and 1, with higher values depicting better explanatory power. According to Cohen (1988), 0.26 is substantial, 0.13 is moderate and 0.02 is weak. However, these benchmarks are not absolute; acceptability varies by study context. More recent benchmarks were proposed by Hair et al. (2011); and Hair et al. (2013) for studies in the marketing field: 0.25 (weak), 0.50 (moderate) and 0.75 (substantial). For this study, the R-square values are shown in Table 5.16.

Table 5.16: R- square statistics

ENDOGENOUS VARIABLE	R^2	SE	T	P
Performance Expectancy	0.237	0.051	4.636	0.000
Use	0.571	0.044	13.053	0.000
Satisfaction	0.610	0.040	15.410	0.000
Continuity	0.484	0.048	9.998	0.000
Word of mouth	0.319	0.050	6.427	0.000
Loyalty	0.410	0.043	9.569	0.000

The Table shows that performance expectancy had the weakest explanatory power ($R^2=0.237$). Similarly, word of mouth had a weak explained variance, $R^2=0.319$. The endogenous variable with the highest coefficient of determination attributable to its predictors was satisfaction with $R^2=0.610$, considered moderate according to Hair et al. (2013).

5.13 ASSESSMENT OF EFFECT SIZE (F² VALUE)

Effect size, statistically known as F- square, measures the explanatory contribution of each exogenous variable in a model. This is computed by estimating the change in the endogenous variable's R-square consequent to removing the criterion variable in focus. It attests to the contribution of an exogenous variable to the R² value of an endogenous latent variable (Hair, Babin, et al., 2017). In moderation, F-square refers to the ratio of systematic variance accounted for by a moderating effect relative to unexplained variance in the criterion variable (Aguinis, Beaty, Boik, & Pierce, 2005; Aiken, West, & Reno, 1991). The following formula calculates the magnitude of the effect size:

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}}$$

- $R^2_{included}$ is the endogenous construct's R-square value when the moderator's interaction term is included in the PLS path model.
- $R^2_{excluded}$ is the endogenous construct's R-square value when the moderator's interaction term is excluded in the PLS path model.

Effect size benchmarks have been documented to be largely arbitrary and subjective (Cohen, 1992; Hair et al., 2021; Lance, 2011). They include 0.02 (small), 0.15 (medium) and 0.35 (large) (Cohen, 1988, 2013; Cohen & Borenstein, 1988). More recent benchmarks by Kenny (2018) are: 0.005 (small), 0.01 (medium) and 0.025 (large). This is consistent with Aguinis et al. (2005), who established, in a 30- year review of studies involving moderation, that an average effect size was only 0.009. In this background, the more conservative and stringent cut-offs by Cohen (1988) were adopted for this study.

When an exogenous variable is excluded from the model, F-square also provides a measure of the explanatory impact lost in the endogenous variable's value. So, the model's effect size indicates each exogenous variable's contribution to the endogenous variable's R-square value. The F-square effect size values for this study's operationalised model are shown in Table 5.17. It shows that the F-square effect size values ranged from 0.000 for system quality on use to 0.211 for compatibility on use.

Table 5.17: Effect size coefficients (F-square)

PATH	F²	SE	T	p
PerfEx -> Use	0.018	0.013	1.338	0.181
PerfEx -> Satisf	0.002	0.006	0.290	0.772
Servq -> PerfEx	0.015	0.013	1.094	0.274
Servq -> Use	0.009	0.010	0.858	0.391
Servq -> Satisf	0.032	0.019	1.691	0.091
Sysq -> PerfEx	0.034	0.024	1.428	0.153
Sysq -> Use	0.000	0.004	0.006	0.996
Sysq -> Satisf	0.034	0.022	1.584	0.113
Inforq -> PerfEx	0.059	0.032	1.817	0.069
Inforq -> Use	0.126	0.043	2.958	0.003
Inforq -> Satisf	0.015	0.015	1.019	0.308
SocInf -> Use	0.021	0.015	1.400	0.161
Comp -> Use	0.211	0.059	3.582	0.000
Use -> Satisf	0.142	0.044	3.204	0.001
Use -> Cont	0.150	0.049	3.098	0.002
Use -> Wom	0.013	0.012	1.038	0.299
Use -> Loy	0.086	0.035	2.485	0.013
Satisf -> Cont	0.126	0.046	2.722	0.007
Satisf -> Wom	0.159	0.050	3.182	0.001
Satisf -> Loy	0.119	0.039	3.042	0.002
Trust -> Satisf	0.011	0.012	0.889	0.374
Cred -> Satisf	0.004	0.008	0.497	0.619

Table 5.17 shows that the predictors with statistically significant effect sizes were: information quality (on use) ($F^2 = 0.126$), compatibility (on use) ($F^2 = 0.211$), use (on satisfaction) ($F^2 = 0.142$), use (on continuity) ($F^2 = 0.150$), use (on loyalty) ($F^2 = 0.086$), satisfaction (on continuity) ($F^2 = 0.126$), satisfaction (on word of mouth) ($F^2 = 0.159$) and satisfaction (on loyalty) ($F^2 = 0.119$). The rest had statistically insignificant effect sizes. Accordingly, compatibility (on use), use (on continuity) and satisfaction (on word of mouth) had medium effect sizes on the respective endogenous variables. In contrast, information quality (on use), use (on satisfaction), satisfaction (on continuity) and satisfaction (on loyalty) were considered weak, according to Cohen (1988).

5.14 MODEL PREDICTIVE RELEVANCE (Q² VALUE)

A further step in smart PLS structural model assessment is an examination of the predictive relevance of the model, Q-square. The endogenous latent variables' Q-square values measure of a model's out-of-sample predictive relevance. The Q² values must be greater than zero to indicate model predictive relevance, confirming that the model was properly reconstituted (Hair et al., 2019; Shmueli, Ray, Estrada, & Chatla, 2016). According to Hair et al. (2013), Q-square is benchmarked at 0.02 (weak), 0.15 (moderate) and 0.35 (strong) in terms of degrees of predictive relevance. Unlike the previous Smart-PLS versions' blindfolding technique, Smart-PLS 4's predict algorithm was used to compute the prediction parameters. The Q² values arising from previous blindfolding reuse techniques are not a robust measure and are thus considered redundant as they combine aspects of out-of-sample prediction and in-sample explanatory power (Hair et al., 2019; Shmueli et al., 2016). Hence, the efficacy of the alternative PLS-predict algorithm, which utilises *k*-fold cross-validation to establish if the model outperforms the most naïve linear regression benchmark (a fold is a subset of the total sample and *k* is the number of subsets) (Shmueli et al., 2016; Shmueli et al., 2019). Table 5.18 shows the Q-square values obtained for this study's operationalised model using the PLS-predict algorithm in Smart-PLS 4 (Ringle et al., 2022).

Table 5.18: Q-square statistics

	Q²-predict	RMSE	MAE
PerfEx	0.215	0.896	0.629
Use	0.549	0.677	0.492
Satisf	0.545	0.680	0.526
Cont	0.434	0.758	0.591
Wom	0.312	0.835	0.651
Loy	0.443	0.751	0.588

RMSE: root mean square error, MAE: mean absolute error.

Table 5.18 shows that all Q- square values were positive (greater than zero). Hence confirming the model's predictive relevance. Use, satisfaction, continuity and loyalty are the endogenous variables with strong predictive relevance parameters.

Further predictive relevance was analysed by comparing the PLS root mean square errors and the linear model errors. The prediction algorithm used training and testing (holdout) samples to generate and evaluate predictions from PLS path model estimations using the bootstrapping procedure with 10 000 sub-samples (Shmueli et al., 2016). It computed the differences (errors) between the prediction and the out-of-sample values to determine the model's predictive strength. The generated Root Mean Square Error (PLS_RMSE) and Mean Absolute Error (PLS_MAE) for both the PLS path model and the linear regression model (LM) were analysed and compared. In this study, visual inspection of the error histograms revealed normal distribution. Hence the PLS_RMSE values were used. The analysis assessed the differences between the errors produced by the PLS_RMSE and the errors produced by the linear model, LM_RMSE, using the formula: $differences = PLS_RMSE - LM_RMSE$. Theoretically, if all the differences are negative this implies high model predictive power. If one or two differences are positive, this implies medium predictive power. If most differences are positive, this implies low/no predictive power (Shmueli et al., 2019). These values are shown in Table 5.19.

Table 5.19: Manifest variable prediction summary

	Q² predict	PLS-SEM_RMSE	LM_RMSE	differences
PerfEx1	0.115	0.785	0.810	-0.025
PerfEx2	0.169	0.674	0.692	-0.018
PerfEx3	0.117	0.804	0.839	-0.035
PerfEx4	0.122	0.753	0.768	-0.015
PerfEx5	0.102	0.732	0.765	-0.033
Use1	0.320	0.699	0.730	-0.031
Use2	0.360	0.674	0.696	-0.022
Use3	0.324	0.669	0.692	-0.023
Use4	0.248	1.011	1.056	-0.045
Use5	0.286	0.707	0.746	-0.039
Satisf1	0.317	0.682	0.649	0.033

Satisf2	0.313	0.681	0.699	-0.018
Satisf3	0.264	0.743	0.796	-0.053
Satisf4	0.364	0.652	0.656	-0.004
Satisf5	0.340	0.595	0.605	-0.010
Cont1	0.247	0.771	0.812	-0.041
Cont2	0.257	0.760	0.793	-0.033
Cont4	0.320	0.713	0.741	-0.028
Cont5	0.297	0.691	0.702	-0.011
Loy1	0.309	0.746	0.717	0.029
Loy2	0.258	0.675	0.684	-0.009
Loy3	0.228	0.757	0.782	-0.025
Loy4	0.257	0.746	0.751	-0.005
Wom1	0.241	0.776	0.766	0.010
Wom2	0.228	0.677	0.718	-0.041
Wom3	0.139	0.878	0.906	-0.028

Table 5.19 shows that there are 23 negative differences out of a total of 26 differences. This suggests that the model has medium predictive power, according to Shmueli et al. (2019).

The F-square, R-square and Q-square values for the model are consolidated in Table 5.20. It shows that satisfaction is the endogenous variable with the highest in-sample explained variance and similarly provided the best out-of-sample predictive relevance. It also shows compatibility provided the biggest effect size among the significant predictors.

Table 5.20: Summary of the model's explanatory and predictive parameters

Outcomes	Predictors	F-square	R-square	Q-square
PerfEx	SysQ	0.034	0.237*	0.215
	InforQ	0.059		
	ServQ	0.015		
	SysQ	0.000	0.571*	0.549
	InforQ	0.126*		
	SevQ	0.009		

Use	Socinf	0.021		
	Comp	0.211*		
	PerfEx	0.018		
Satisfaction	PerfEx	0.002	0.610*	0.545
	SysQ	0.034		
	InforQ	0.015		
	ServQ	0.032		
	Cred	0.004		
	Trust	0.011		
	Use	0.142*		
Loyalty	Use	0.086*	0.410*	0.443
	Satisfaction	0.119*		
WOM	Use	0.013	0.319*	0.312
	Satisfaction	0.159*		
Continuity	Use	0.150*	0.484*	0.434
	Satisfaction	0.126*		

* significant at $p < 0.05$

5.15 Importance-Performance Map Analysis (IPMA)

Further analysis of the relative impact of individual predictors on each endogenous variable was explored by carrying out an importance-performance map analysis using Smart-PLS 4. According to Hair, Hult, Ringle, and Sarstedt (2014), IPMA juxtaposes the structural model total effects (importance) with the average latent variable scores (performance) in order to pinpoint key performance areas for future-oriented managerial intervention. Figure 5.3 shows the IPMA depiction for performance expectancy.

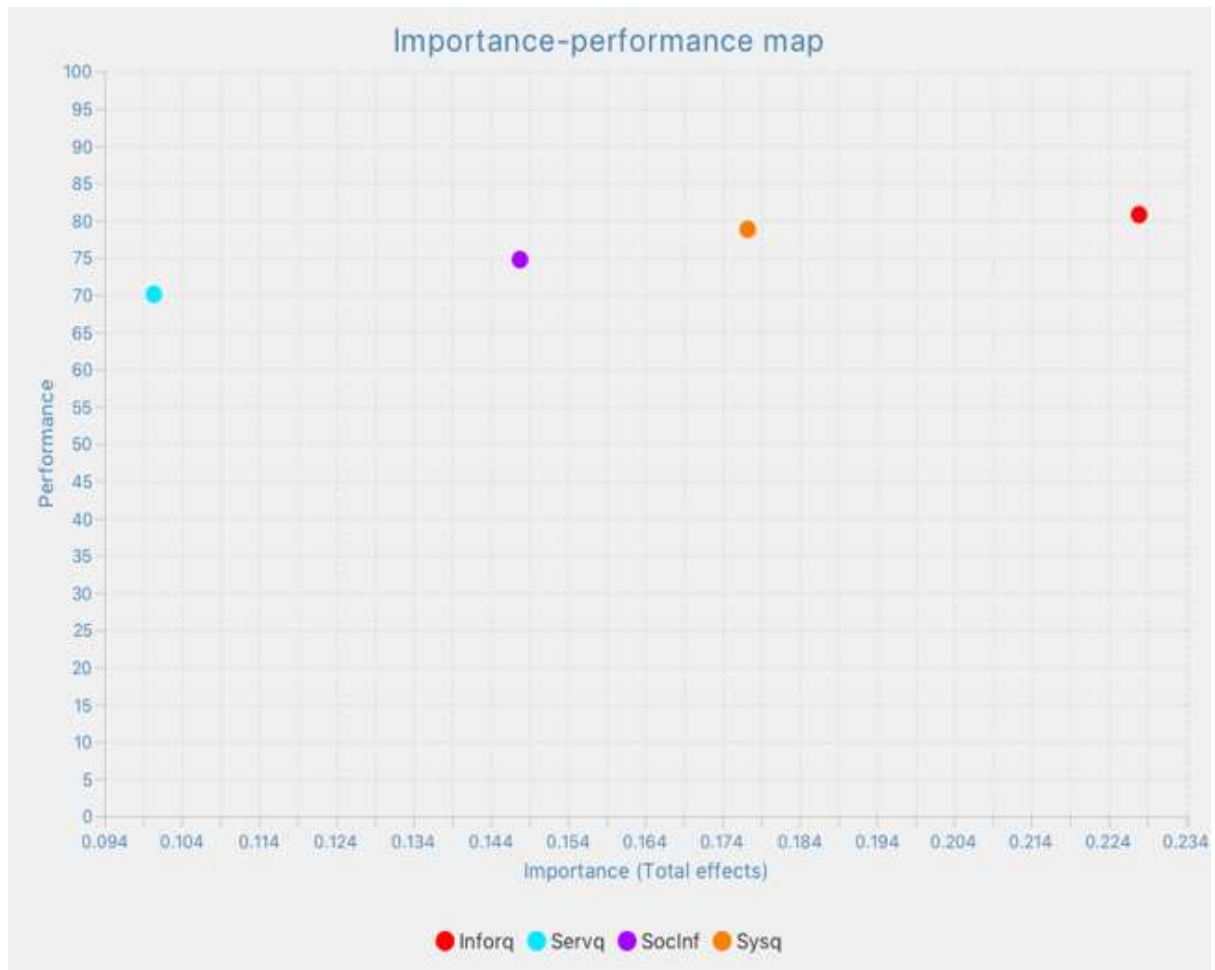


Figure 5.3: Importance-Performance map- Performance expectancy

The map shows that information quality ranks highest in importance and performance among the endogenous variable performance expectancy’s predictors. In contrast, service quality ranks relatively high in terms of performance but is much lower on the importance attribute.

The next figure (Figure 5.4) shows the IPMA grid for the use of m-banking.

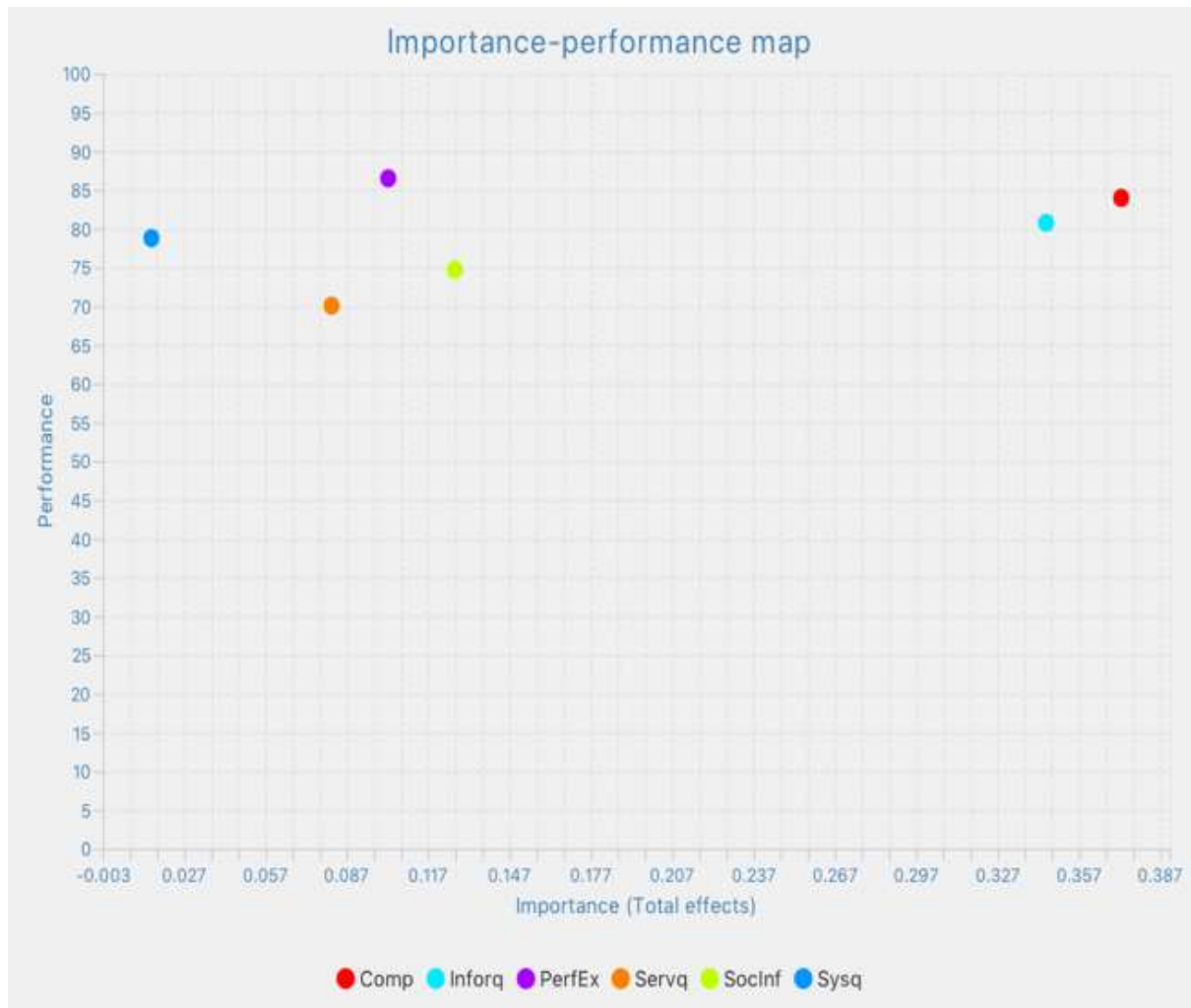


Figure 5.4: Importance-Performance map- Use of m-banking

The map shows that compatibility and system quality rank highly in terms of importance and performance among the predictors of the use of m-banking. The other predictors are clustered close to each other with relatively high performance but low importance.

The next map (Figure 5.5) shows the predictors of satisfaction.

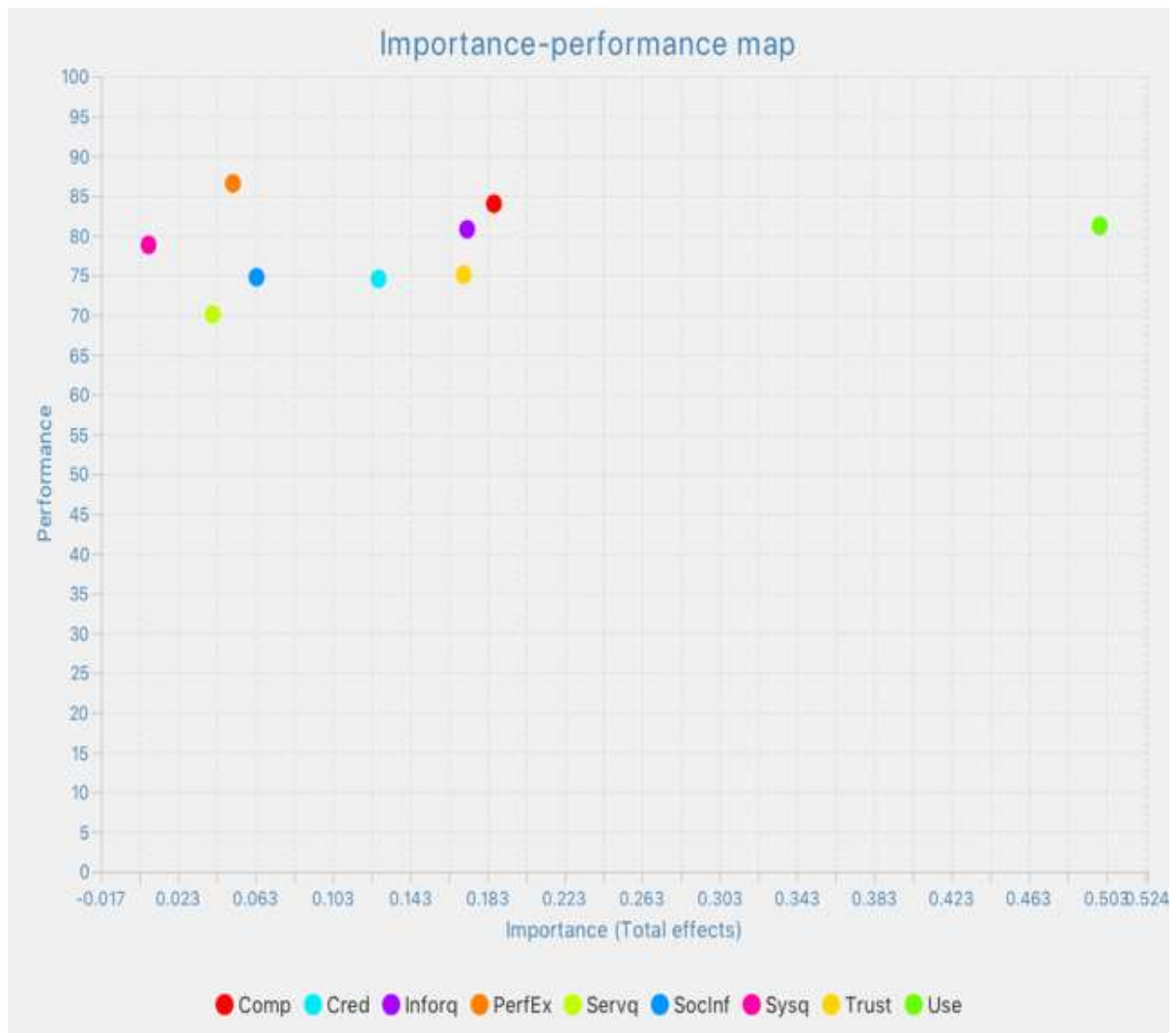


Figure 5.5: Importance-Performance map- Satisfaction

The map shows that the use of m-banking stands out in terms of importance and performance among the predictors of satisfaction with m-banking among the exogenous variables investigated in the study. The other predictors rank similarly high on performance but low on the importance scale.

Next is the importance map for word of mouth about m-banking and its predictors.

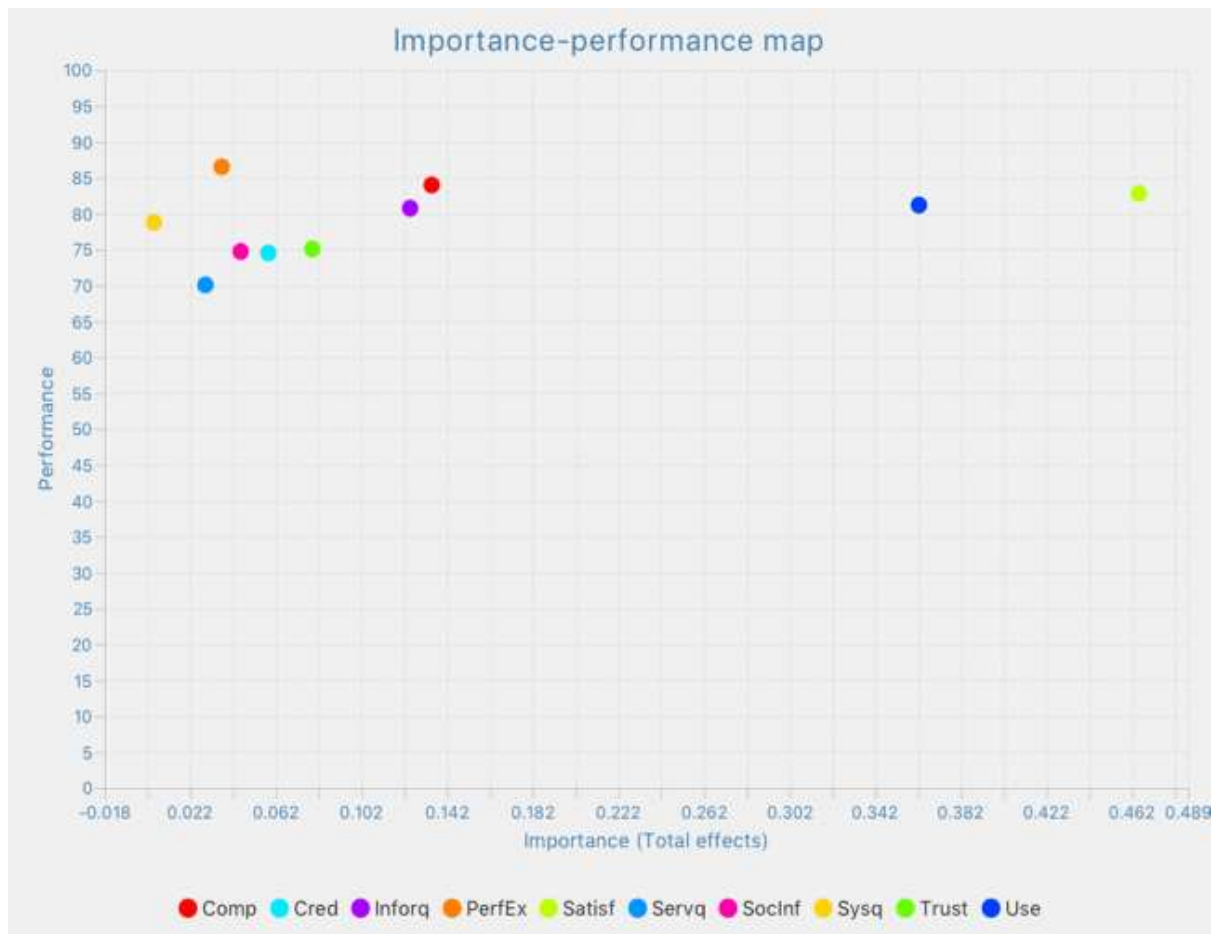


Figure 5.6: Importance-Performance map- WoM

The map (Figure 5.6) shows that trust is the most important variable and also performed best in predicting customer word of mouth about m-banking. The use variable of m-banking also showed a high level of importance, which set it apart from the other predictors that were only high in performance.

The next diagram shows the map for continuity and its predictors

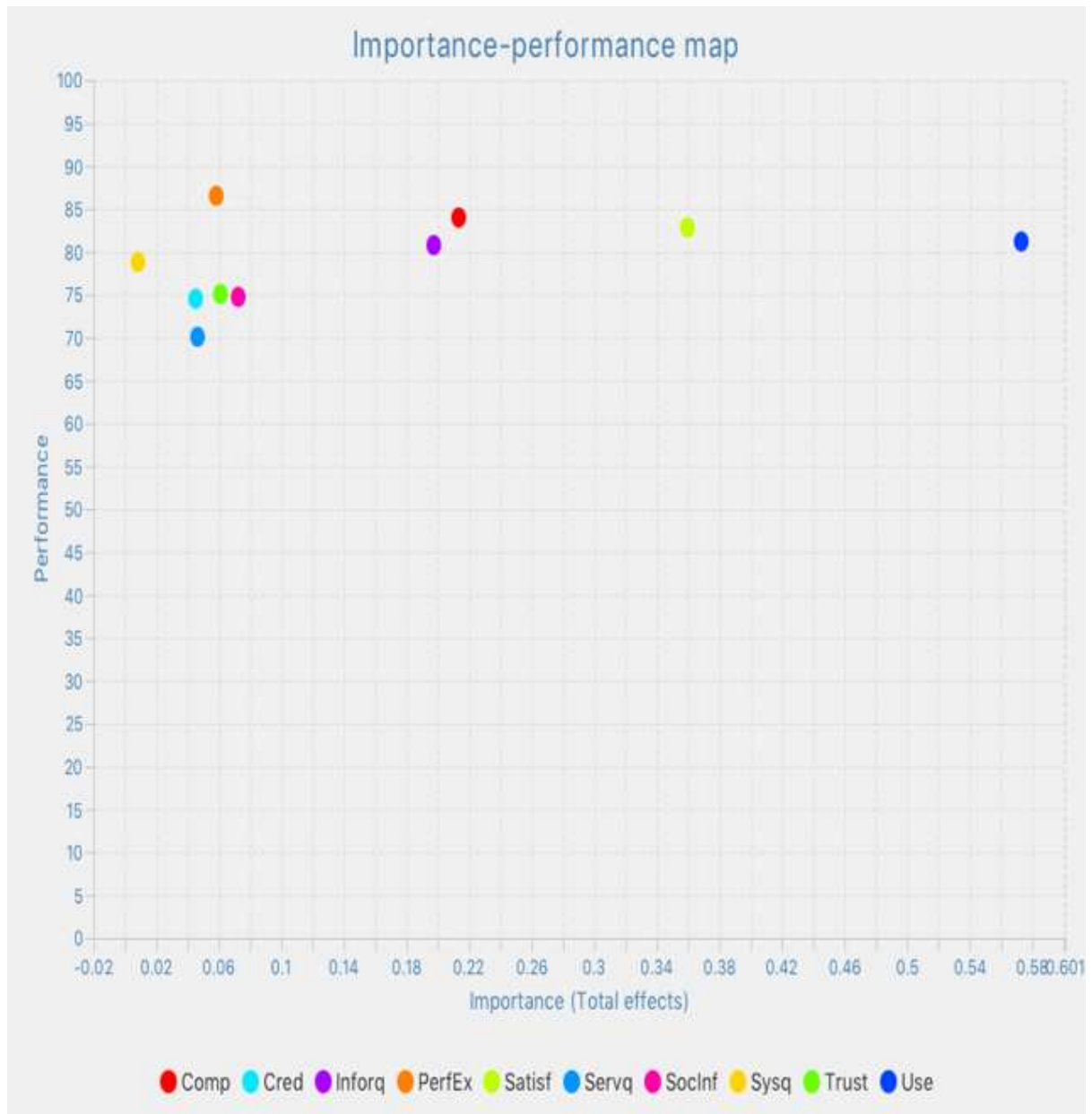


Figure 5.7: Importance-Performance map- Continuity

The map (Figure 5.7) shows that use of m-banking was both important and performed well as a predictor of customer continuity with m-banking. It was followed closely by customer satisfaction on these attributes. The other predictors were far less impactful.

The next map displays the predictors of loyalty in the study model.

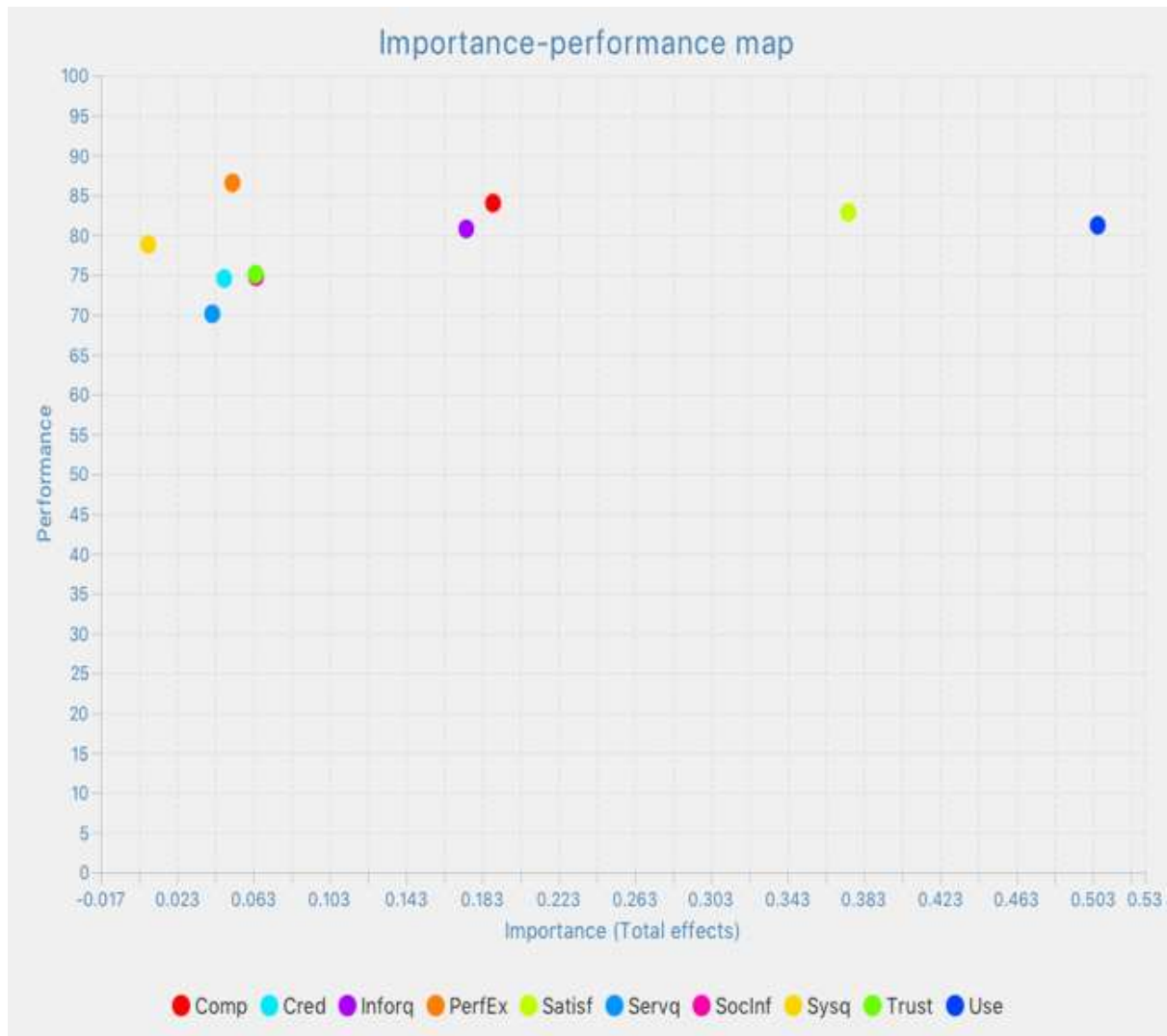


Figure 5.8: Importance-Performance map- Loyalty

The map (Figure 5.8) shows that the use of m-banking and satisfaction are the predictors that mapped highly on both the importance and performance scale, with use as the leading predictor. The other variables registered very low on the importance axis.

In summary, the underlying objective of IPMA is to empower practitioners identify and commit more resources to exogenous variables that have large importance but low performance in contributing to the endogenous variables, and concurrently reduce resources committed to variables that have high performance but low importance (Hair, Hult, et al., 2014; Ringle & Sarstedt, 2016). The preceding maps show that

focusing more on use of m-banking, customer satisfaction, compatibility and information quality would be prudent, and less on service and system quality.

5.16 EMPIRICAL RESULTS OF HYPOTHESES TESTING- MEDIATION AND MODERATION

5.16.1 Mediation analysis

Mediation involves an intervening variable that is a causal result of the independent variable and a causal antecedent of the dependent variable within the same model (Memon, Jun, Ting, & Francis, 2018; Zhao, Lynch, & Chen, 2010). The study implemented a serial mediation proposal as outlined in Figure 5.2 in the previous chapter. Testing the mediation and moderation hypotheses envisaged in the conceptual framework (H7-H12) regarding the use of m-banking, customer satisfaction and behavioural outcomes, was done using the mediated-moderation procedure outlined by Preacher, Rucker, and Hayes (2007). Specifically, the mediation effects proposed in the research model were evaluated using the advanced bootstrapping procedures (Preacher & Hayes, 2008; Zhao, Lynch, et al., 2010), which have more statistical power, and, more importantly, provide for testing significance of specific indirect effects than the traditional Baron and Kenny (1986) causal-step methodology (Aguinis, Edwards, & Bradley, 2017; Hayes, 2009; MacKinnon, Coxé, & Baraldi, 2012).

Adapting Zhao, Lynch, et al. (2010), the direct effect of performance expectancy, social norms, compatibility and quality dimensions on customer satisfaction was compared with a model that introduced system use as a mediator. Similarly, a model that tested the direct effect of m-banking use with behavioural outcomes (continuity, loyalty, word of mouth) was compared with a model that introduced customer satisfaction's proposed mediation effect. The mediation protocol premised on disaggregating the research model into distinct sequential steps and testing the effect of individual mediators is recommended by Zhao, Lynch, et al. (2010). The bootstrapping, bias-corrected confidence interval (95%) procedure with 10000 subsamples was used again to test the direct effects (Hayes, 2013; Preacher & Hayes, 2008; Zhao, Lynch, et al., 2010).

Theoretically, mediation is ascertained when the lower and upper bounds of the 95% confidence interval (CI) do not include zero, meaning that both limits should be negative or positive. The analysis tested for partial and full mediation, as outlined by Preacher and Kelley (2011). Partial mediation occurs when the direct effect between the independent and dependent variable and the indirect effect (via the mediator) are statistically significant. Full mediation arises when the direct effect between the independent and dependent variable is statistically insignificant while the indirect effect through the mediator is statistically significant. If the indirect effect is insignificant, there is no mediation, and the proposed mediation is obsolete. Partial mediation is either positive (complementary) or negative (competitive). Positive partial mediation is called complementary partial mediation, while negative partial mediation is called competitive partial mediation (Zhao, Lynch, et al., 2010). The residual-based index of determining mediation effect size that depends on standard deviation units, δ_x and regression weights, β_n as outlined by Preacher and Kelley (2011), was used to determine the effect size of the mediation of m-banking use on the variance in customer satisfaction. Similarly, the effect size of the variance in behavioural outcomes attributable to customer satisfaction was computed.

5.16.1.1 Simple mediation

Mediation hypothesis H_{8b}, was posited as follows:

Use of m-banking mediates the relationship between the information quality of m-banking and customer satisfaction.

Mediation analysis assessed the proposed mediating role of m-banking use in the relationship between information quality and customer satisfaction. The results are shown in Table 5.21. They show a significant indirect effect of information quality on satisfaction through use ($\beta=0.117$; $T=4.774$; $p<0.05$). The total effect of information quality on satisfaction was significant ($\beta=0.251$; $T=4.848$; $p<0.05$). This significance was persistent when the mediator, use of m-banking, was included in the model ($\beta=0.115$; $T=2.187$; $p<0.05$). In terms of effect size (f -square=0.013), the results show a very small (Chin, 1998), complementary, partial mediating role of use of m-banking on the relationship between information quality and customer satisfaction. Hence, H_{8b} was supported.

Table 5.21: Mediation analysis Results- Use on information quality and satisfaction

Total effects (Inforq ->Satisf)			Direct Effects (Inforq ->Satisf)			Indirect Effect of Inforq on Satisf						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.251	4.848	0.000	0.115	2.187	0.029	H _{8b} : Inforq -> Use -> Satisf	0.117	0.013	4.774	0.000	0.075	0.170

Table 5.22: Mediation analysis Results- Use on system Quality and Satisfaction

Total effects (Sysq ->Satisf)			Direct Effects (Sysq ->Satisf)			Indirect Effect of Sysq on Satisf						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.159	3.454	0.001	0.147	3.353	0.001	H _{7b} : Sysq -> Use -> Satisf	-0.001	0.000	0.088	0.930	-0.034	0.030

Table 5.23: Mediation Results- Use on Service quality and Satisfaction

Total effects (Servq ->Satisf)			Direct Effects (Servq ->Satisf)			Indirect Effect of Servq on Satisf						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.169	4.308	0.000	0.135	3.407	0.001	H _{7g} : Servq -> Use -> Satisf	0.026	0.002	1.834	0.067	0.000	0.056

Mediation hypothesis H_{7b}, was posited as follows:

The use of m-banking mediates the relationship between the system quality of m-banking and customer satisfaction.

Mediation analysis assessed the proposed mediating role of m-banking use in the relationship between system quality and customer satisfaction. The results are shown in Table 5.22. They show an insignificant indirect effect of system quality on satisfaction through use ($\beta=-0.001$; $T=0.088$; $p>0.05$). The total effect of system quality on satisfaction was significant ($\beta=0.159$; $T=3.454$; $p=0.001$). This shows no evidence of mediation of the path by use of m-banking, accentuated by a negligible effect size, ($f\text{-square}=0.000$). Hence, H_{7b} was not supported.

Mediation hypothesis H_{7g}, was posited as follows:

The relationship between the service quality of m-banking and customer satisfaction is mediated by its use.

Mediation analysis assessed the proposed mediating role of m-banking use in the relationship between service quality and customer satisfaction. The results are shown in Table 5.23. They show an insignificant indirect effect of service quality on satisfaction through use ($\beta=0.026$; $T=0.067$; $p>0.05$; $f\text{-square}=0.002$). The total effect of system quality on satisfaction was significant ($\beta=0.169$; $T=4.308$; $p<=0.000$). This shows no evidence of mediation of the path by use of m-banking. Hence H_{7g} was not supported.

Table 5.24: Mediation analysis results- Satisfaction on Use and Continuity

Total effects (Use ->Cont)			Direct Effects (Use ->Cont)			Indirect Effect of Use on Cont						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.524	11.884	0.000	0.394	7.147	0.000	H _{13c} : Use -> Satisf -> Cont	0.131	0.019	4.824	0.000	0.084	0.191

Table 5.25: Mediation analysis results- Satisfaction on Use and Loyalty

Total effects (Use ->WOM)			Direct Effects (Use ->WOM)			Indirect Effect of Use on Loy						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.454	9.321	0.000	0.318	5.441	0.000	H _{13d} : Use -> Satisf -> Loy	0.136	0.020	5.510	0.000	0.094	0.192

Table 5.26: Mediation analysis results- Satisfaction on Use and WOM

Total effects (Use ->WOM)			Direct Effects (Use ->WOM)			Indirect Effect of Use on WOM						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.300	6.093	0.000	0.130	2.310	0.021	H _{13f} : Use -> Satisf -> WOM	0.169	0.037	5.853	0.000	0.116	0.232

Mediation hypothesis H_{13c}, was posited as follows:

The relationship between the use of m-banking and customer disposition to continue using it is mediated by customer satisfaction.

Mediation analysis assessed the proposed mediating role of customer satisfaction with m-banking in the relationship between the use of m-banking and continuity with m-banking. The results are shown in Table 5.24. They show a significant indirect effect of the use of m-banking on continuity through customer satisfaction ($\beta=0.131$; $T=4.824$; $p<0.05$). The total effect of the use of m-banking on continuity was significant ($\beta=0.524$; $T=11.884$; $p<0.05$). This significance was persistent when the mediator, customer satisfaction, was included in the model ($\beta=0.394$; $T=7.147$; $p<0.05$). An effect size, f-square=0.019, considered very small (Chin, 1998), affirms a complementary partial mediating role of customer satisfaction with m-banking on the relationship between the use of m-banking and continuity. Hence, H_{13c} was supported.

Mediation hypothesis H_{13d} was posited as follows:

The relationship between the use of m-banking and customer loyalty is mediated by customer satisfaction.

Mediation analysis assessed the proposed mediating role of customer satisfaction with m-banking in the relationship between the use of m-banking and customer loyalty. The results are shown in Table 5.25. They show a significant indirect effect of use of m-banking on customer loyalty through customer satisfaction ($\beta=0.136$; $T=5.510$; $p<0.05$). The total effect of the use of m-banking on loyalty was significant ($\beta=0.454$; $T=9.321$; $p<0.05$). This significance was persistent when the mediator, customer satisfaction, was included in the model ($\beta=0.318$; $T=5.441$; $p<0.05$). The effect size analysis provided an f-square value which is classified as small (f-square=0.20) (Chin, 1998). This shows a complementary partial mediating role of customer satisfaction with m-banking on the relationship between the use of m-banking and customer loyalty. Hence, H_{13d} was supported.

Mediation hypothesis H_{13f} was posited as follows:

The relationship between the use of m-banking and customer dissemination of positive WoM is mediated by customer satisfaction.

Mediation analysis assessed the proposed mediating role of customer satisfaction with m-banking in the relationship between the use of m-banking and WoM. The results are shown in Table 5.26. They show a significant indirect effect of the use of m-banking on WoM through customer satisfaction ($\beta=0.169$; $T=5.853$; $p<0.05$). The total effect of the use of m-banking on WoM was significant ($\beta=0.300$; $T=6.093$; $p<0.05$). This significance was persistent when the mediator, customer satisfaction, was included in the model ($\beta=0.130$; $T=2.310$; $p<0.05$). The indirect effect had a small effect size ($f\text{-square}=0.037$) (Chin, 1998), although it was bigger than the rest of the proposed mediation paths. This shows a complementary partial mediating role of customer satisfaction with m-banking on the relationship between the use of m-banking and WoM. Hence, H_{13f} was supported.

5.16.1.2 Serial mediation

Serial mediation occurs when at least two latent variables exist between a primary predictor and a criterion variable that may intervene in the direct association between the two. The operationalised model for this study had several proposed serial mediation paths, as shown in Figure 5.2.

Mediation hypothesis H_{7c} was posited as follows:

The relationship between the system quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

Mediation analysis assessed the proposed serial mediation role of performance expectancy and use of m-banking in the relationship between system quality and customer satisfaction with m-banking. The results are shown in Table 5.27. They show a significant indirect effect of system quality on satisfaction through performance expectancy and use of m-banking ($\beta=0.007$; $T=1.973$; $p<0.05$). The total effect of system quality of m-banking on satisfaction was significant ($\beta=0.159$; $T=3.454$; $p<0.05$). This significance was persistent when the mediators, performance expectancy and use were included in the model ($\beta=0.147$; $T=3.353$; $p<0.05$). This confirms a complementary, partial, serial mediating role of performance expectancy and the use

of m-banking, on the relationship between system quality and customer satisfaction. However, the computed effect size was negligible ($f\text{-square}=0.000$), suggesting minimal impact by the posited mediators. Hence, H_{7c} was supported.

Mediation hypothesis H_{7e} was posited as follows:

The relationship between the information quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

Mediation analysis was performed to assess the proposed serial mediation role of performance expectancy and use of m-banking in the relationship between information quality and customer satisfaction with m-banking. The results are shown in Table 5.28. They show a significant indirect effect of information quality on satisfaction through performance expectancy and use of m-banking ($\beta=0.010$; $T=2.088$; $p<0.05$). However, the effect size of the serial mediation was negligible ($f\text{-square}=0.001$) (Chin, 1998). The total effect of information quality of m-banking on satisfaction was significant ($\beta=0.251$; $T=4.848$; $p<0.05$). This significance was persistent when the mediators, performance expectancy and use were included in the model ($\beta=0.115$; $T=2.187$; $p<0.05$). This confirms a complementary, partial, serial mediating role of performance expectancy and the use of m-banking on the relationship between information quality and customer satisfaction. Hence, H_{7e} was supported.

Table 5.27: Mediation analysis results- Performance Expectancy and Use on System Quality and Satisfaction

Total effects (Sysq ->Satisf)			Direct Effects (Sysq ->Satisf)			Indirect Effect of Sysq on Satisf						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.159	3.454	0.001	0.147	3.353	0.001	H _{7c} : Sysq ->PerfEx ->Use -> Satisf	0.007	0.000	1.973	0.049	0.002	0.017

Table 5.28: Mediation analysis results- Performance Expectancy and Use on Information Quality and Satisfaction

Total effects (Inforq ->Satisf)			Direct Effects (Inforq ->Satisf)			Indirect Effect of Inforq on Satisf						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.251	4.848	0.000	0.115	2.187	0.029	H _{7e} : Inforq ->PerfEx ->Use -> Satisf	0.010	0.001	2.088	0.037	0.003	0.023

Table 5.29: Mediation analysis results- Performance Expectancy and Use on Service Quality and Satisfaction

Total effects (Servq ->Satisf)			Direct Effects (Servq ->Satisf)			Indirect Effect of Servq on Satisf						
Coefficient	T-value	p-value	Coefficient	T-value	p-value	Hypothesis	Coefficient	F-square	T-value	p-value	BCa Bootstrap	
											Lower	Upper
0.169	4.308	0.000	0.135	3.407	0.001	H _{7h} : Servq ->PerfEx ->Use -> Satisf	0.004	0.000	1.610	0.107	0.001	0.012

Mediation hypothesis H_{7h} was posited as follows:

The relationship between the service quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

Mediation analysis was performed to assess the proposed serial mediation role of performance expectancy and use of m-banking in the relationship between service quality and customer satisfaction with m-banking. The results are shown in Table 5.29. They show an insignificant indirect effect of service quality on satisfaction through performance expectancy and use of m-banking ($\beta=0.004$; $T=1.610$; $p>0.05$). The total effect of service quality of m-banking on satisfaction was significant ($\beta=0.169$; $T=4.308$; $p<0.05$). Hence, there was no statistical evidence of significant serial mediation provided by performance expectancy and the use of m-banking on the service quality to satisfaction path. This was further supported by the negligible effect size that was computed ($f\text{-square}=0.000$). Hence, H_{7h} was not supported.

A summary of the mediation analysis results is shown in Table 5.30.

Table 5.30: Summary of mediation results analysis

	PATH	B	<i>f</i>²	T	<i>p</i>	Result
H _{8b}	Inforq -> Use -> Satis	0.117	0.013	4.774	0.000	Supported
H _{7b}	Sysq -> Use -> Satisf	-0.001	0.000	0.088	0.930	Not supported
H _{7g}	Servq -> Use -> Satisf	0.026	0.002	1.834	0.067	Not supported
H _{13f}	Use -> Satisf -> WOM	0.169	0.037	5.853	0.000	Supported
H _{13d}	Use -> Satisf -> Loy	0.136	0.020	5.510	0.000	Supported
H _{13c}	Use -> Satisf -> Cont	0.131	0.019	4.824	0.000	Supported
H _{7c}	Sysq -> PerfEx -> Use -> Satisf	0.007	0.000	1.973	0.049	Supported
H _{7e}	Inforq -> PerfEx -> Use -> Satisf	0.010	0.001	2.088	0.037	Supported
H _{7h}	Servq -> PerfEx -> Use -> Satisf	0.004	0.000	1.610	0.107	Not supported

5.16.2 Moderation analysis

Unlike mediation, a moderating variable is not the causal result of the independent variable. A moderating variable contextualises the effect between an independent and a dependent variable by either strengthening the relationship (positively catalysing it) or weakening it, or reversing the expected polarity between a predictor and criterion variable (Hayes, 2013). A moderating variable is typically introduced when literature suggests inconsistency or unexpectedly weak association between a predictor and a criterion variable (Baron & Kenny, 1986).

5.16.2.1 Simple moderation

The two-stage approach to moderation was used in executing the moderation using the PLS algorithm because both the model's proposed predictor and moderation variables were reflective constructs and not formative (Ramayah et al., 2018). Also, the two-stage approach has been established to provide greater statistical power and parameter accuracy (Becker et al., 2023).

Moderation hypothesis H_{9b} was posited as follows:

M-banking perceived credibility moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the relationship.

The study assessed the proposed moderating effect of perceived m-banking credibility on the association between the use of m-banking and customer satisfaction (Cred x Use -> Satisf), The product path coefficient was insignificant ($\beta=-0.074$ $T=1.384$; $p>0.05$). The results are captured in Table 5.31. Thus, confirming that hypothesis H_{9b}, was not supported by the empirical results.

Moderation hypothesis H_{11a} was posited as follows:

Trust in m-banking moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the association.

The study assessed the proposed moderating effect of perceived trust in m-banking on the association between the use of m-banking and customer satisfaction (trust x Use -> Satisf), The path coefficient was insignificant ($\beta=-0.013$; $T=0.201$; $p>0.05$). The

results are shown in Table 5.31. Thus, confirming that hypothesis H_{11a}, was not supported by the empirical results.

Moderation hypothesis H_{11b} was posited as follows:

Trust in m-banking moderates the significant positive relationship between the service quality of m-banking and customer satisfaction, such that the association is strengthened.

The study assessed the proposed moderating effect of perceived trust in m-banking on the relationship between service quality of m-banking and customer satisfaction (trust x servq -> Satisf). The path coefficient (see Table 5.31) reflected a significant negative moderating impact of trust on the relationship between service quality and customer satisfaction ($\beta=-0.110$; $T=3.334$; $p<0.05$). This implies that the relationship between service quality and customer satisfaction is weakened with higher levels of trust, contrary to the expected enhancement. Thus indicating that, though statistically significant, hypothesis H_{11b}, was not supported by the empirical results in terms of directional polarity. The results are captured in Table 5.31.

Table 5.31: Moderation effects of trust and credibility

PATH	β	SE	T	p
Use -> Satisf	0.364	0.052	7.030	0.000
Cred -> Satisf	0.058	0.047	1.225	0.003
Moderation effect: Cred x Use -> Satisf	-0.074	0.012	1.384	-0.008
Moderation effect: Trust x Use -> Satisf	-0.013	0.008	0.201	0.975
Servq -> Satisf	0.126	0.038	3.313	0.001
Trust -> Satisf	0.098	0.050	1.964	0.050
Moderation effect: Trust x Servq -> Satisf	-0.110	0.033	3.334	0.001
Inforq -> Satisf	0.100	0.052	1.931	0.054
Moderation effect: Trust x Inforq -> Satisf	-0.055	0.047	1.165	0.244

Without including the moderating effect (Trust x Servq), the R-square value for satisfaction was 0.601. This shows that a 60.1% change in satisfaction is attributable to service quality, information quality, system quality, trust, compatibility, performance

expectancy and use. Upon inclusion of the interaction effect of trust, the R-square increased to 61.6%, This shows a slight increase of 1.5% in satisfaction's explained variance.

Furthermore, slope analysis was undertaken to substantiate the nature of the moderating effect of trust on the association between service quality and satisfaction. This is shown in Figure 5.9.



Figure 5.9: Moderation effect- trust on service quality and satisfaction path

Figure 5.9 shows that the line has a steeper gradient for trust at one standard deviation below the mean, so at lower levels of trust. This implies that at low levels of trust, the impact of service quality on customer satisfaction with m-banking is much stronger in contrast to high trust levels because the line for high levels of trust is much flatter than the one for lower trust. So, at higher levels of trust, an increase in service quality does not lead to a proportionate increase in customer satisfaction. The slope analysis

results indicate that, for the sampled population, higher levels of trust in m-banking weaken the positive association between service quality and satisfaction.

Further substantive analysis of the significant interaction impact of trust was done by examining the effect size, F-square. The F-square effect size was 0.019. According to Cohen (1988), effect sizes of 0.02, 0.15 and 0.35 represent small, medium and large moderation effect sizes, respectively. So, according to the Cohen (1988) benchmarks, though significant, the impact of the moderator was minimal on the path between service quality and satisfaction. This indicates a small negative moderation effect exerted on the model by introducing trust into the service quality-satisfaction path. So, trust minimally weakens the relationship between service quality and customer satisfaction.

Moderation hypothesis H_{11c} was posited as follows:

Trust in m-banking moderates the significant positive relationship between the information quality of m-banking and customer satisfaction, such that the association is enhanced.

The study assessed the proposed moderating effect of perceived trust in m-banking on the association between information quality of m-banking and customer satisfaction (trust x inforq -> Satisf), The results are captured in Table 5.31. It shows that the path coefficient was insignificant ($\beta=-0.055$; $T=1.165$; $p>0.05$). Thus, confirming that hypothesis H_{11c}, was not supported by the empirical results.

5.16.2.2 Moderated mediation

Moderated mediation, also called conditional mediation, draws on both mediation and moderation as it posits that a moderator significantly changes the strength of a confirmed indirect effect. The value of the Conditional Mediation (CoMe) index, ω , measures the moderating effect on a mediated relationship (Hayes, 2015, 2018). If the CoMe index is significantly different from zero, a conditional mediated effect is confirmed to be small, large or opposite in sign at different levels of the moderator (Hayes, 2015). The CoMe index (ω) is a numerical measure of the linear relationship

between the indirect effect and the putative moderator of the effect (Hayes, 2015). This study investigated moderated mediation using the Process algorithm in Smart-PLS 4. The operationalised model using the Process macro is shown in Figure 5.10.

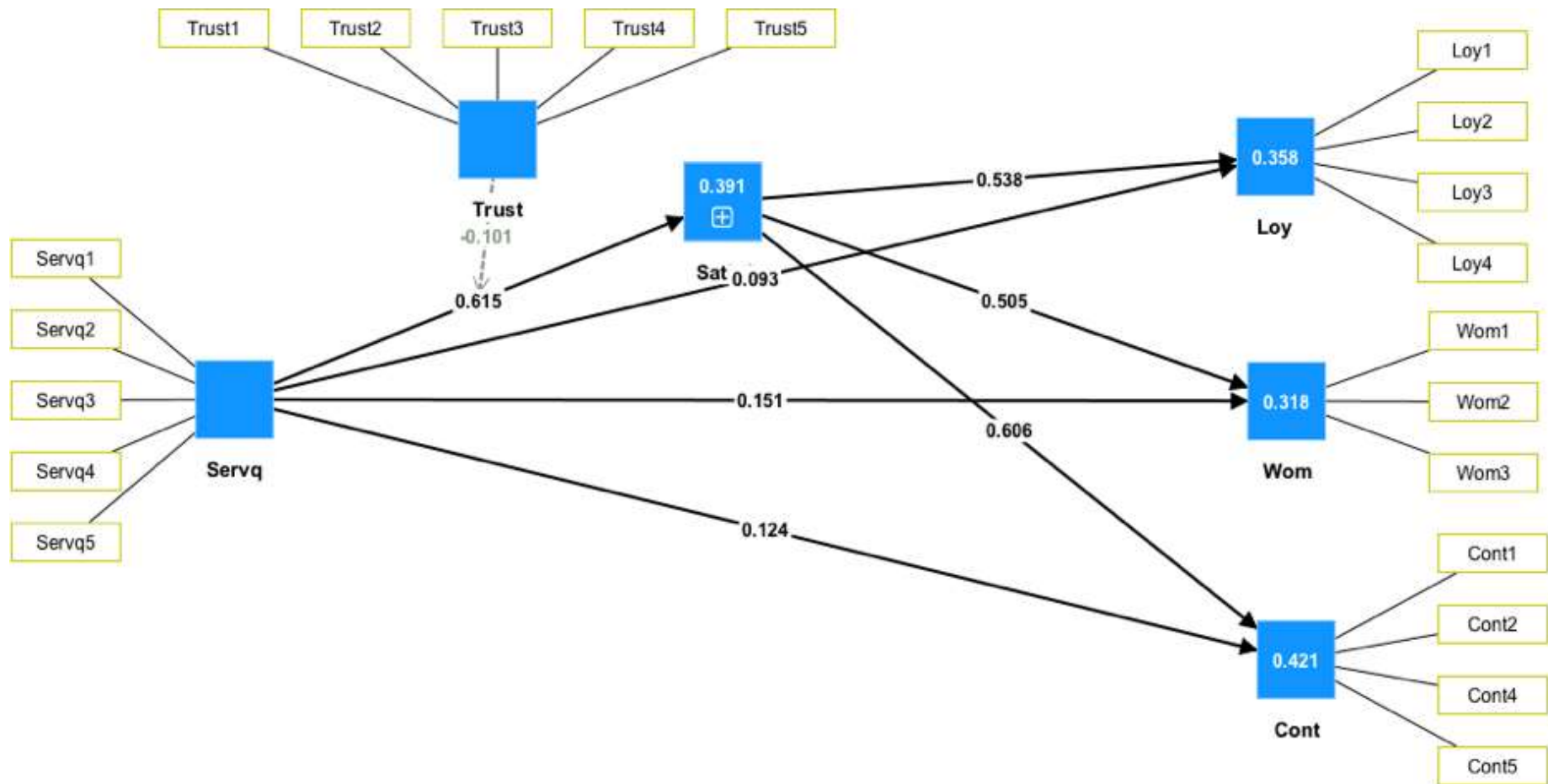


Figure 5.10: Moderated mediation model

Source: Smart-PLS 4 Process output developed for the current study

The moderated mediation hypothesis H_{12b}, was posed as follows:

The significant indirect effect of service quality on continuity with m-banking through satisfaction is moderated by trust such that higher levels of trust have a significant and positive strengthening effect on the relationship.

Results of testing for moderated mediation hypothesised in H_{12b} are shown in Table 5.32.

The moderated mediation hypothesis H_{12e}, was posed as follows:

The indirect effect of service quality on customer loyalty through satisfaction is moderated by trust such that higher levels of trust have significant and positive strengthening effect on the association.

Results of testing for hypothesised moderated mediation H_{12e} are shown in Table 5.33.

Moderated mediation hypothesis H_{12f} was posed as follows:

The significant indirect effect of service quality on customer WoM through satisfaction is moderated by trust such that higher levels of trust have a significant and positive strengthening effect on the association.

Results of testing for moderated mediation hypothesised in H_{12f} are shown in Table 5.34.

Table 5.32: Moderated mediation results (trust*servq->satisfaction-Cont)

Direct relationships

	Path coefficient (β)	T- values	p-value
Servq -> Satisf	0.615	2.891	0.004
Satisf -> cont	0.606	11.191	0.000
Servq -> cont	0.124	3.841	0.000
Trust x Servq -> Satisf	-0.101	2.057	0.040

Moderated Indirect Relationship	Direct effect	Indirect effect	Confidence interval (Low/High)	p-value
Servq -> Satisf -> cont	0.124 (3.841)	0.373 (2.742)	0.121/0.657	0.006

Probing Moderated Indirect Relationships

Low level of trust		0.176	0.102/0.268	0.000
Mean level of trust		0.079	0.031/0.131	0.002
High level of trust		0.128	0.083/0.181	0.000
Index of Moderated Mediation (ω)		-0.061	-0.125/-0.003	0.046

Table 5.33: Moderated mediation results (trust*servq->satisfaction->loyalty)

Direct relationships

	Path coefficient (β)	T- values	P
Servq -> Satisf	0.615	2.891	0.004
Satisf -> Loy	0.538	11.275	0.000
Servq -> Loy	0.093	2.934	0.003
Trust x Servq -> Satisf	-0.101	2.057	0.040

Moderated Indirect Relationship	Direct effect	Indirect effect	95% BCA Confidence intervals (Low/High)	p-value
Servq -> Satisf -> Loy	0.093 (2.934)	0.331 (2.836)	0.114/0.570	0.005

Probing Moderated Indirect Relationships

Low level of trust		0.156	0.094/0.230	0.000
Mean level of trust		0.113	0.077/0.154	0.000
High level of trust		0.07	0.029/0.115	0.001
Index of Moderated Mediation (ω)		-0.054	-0.109/-0.003	0.046

Table 5.34: Moderated mediation results (trust*servq->satisfaction->WOM)

Direct relationships

	Path coefficient (β)	T- values	p
Servq -> Satisf	0.615	2.891	0.004
Satisf -> WOM	0.505	8.213	0.000
Servq -> WOM	0.151	4.05	0.000
Trust x Servq -> Satisf	-0.101	2.057	0.040

Moderated Indirect Relationship	Direct effect	Indirect effect	Confidence interval (Low/High)	p -value
Servq -> Satisf -> WOM	0.151 (4.050)	0.310 (2.754)	0.107/0.542	0.006

Probing Moderated Indirect Relationships

Low level of trust		0.147	0.084/0.220	0.000
Mean level of trust		0.106	0.069/0.150	0.000
High level of trust		0.066	0.028/0.110	0.002
Index of Moderated Mediation (ω)		-0.051	-0.103/-0.004	0.046

The results in Table 5.32 indicate that the index value of trust (ω) for the moderated mediation effect is significant because the CoMe index is statistically different from zero as the bootstrap CI does not include zero [$\omega=-0.061$, $SE=0.031$, 95% CI= -0.125 , -0.003]. The results revealed that at high levels of trust, the indirect effect of service quality on continuity through satisfaction ($\beta=0.079$, $T=3.102$, $p<0.05$) is lower than the indirect effect at low levels of trust ($\beta=0.176$, $T=4.144$, $p<0.05$). This shows that with the increase in trust, the indirect effect of service quality on WOM through satisfaction is dampened. Therefore, the proposed moderated mediation model is empirically confirmed, but the effect is opposite to the postulated one. Hence, hypothesis H_{12b} is not supported.

The results in Table 5.33 indicate that the index value of trust (ω) for moderated mediation effect is significant because the CoMe index is statistically different from zero as $p<0.05$ and the bootstrap CI does not span zero [$\omega=-0.054$, $SE=0.031$, 95% CI = -0.109 , -0.003]. The results revealed that at high levels of trust, the indirect effect of service quality on customer loyalty through satisfaction ($\beta=0.07$, $T=3.253$, $p<0.05$) is less than half of the indirect effect at low levels of trust ($\beta=0.156$, $T=4.456$, $p<0.05$). This shows that with the increase in trust, the indirect effect of service quality on loyalty through satisfaction is dampened. Therefore, the proposed moderated mediation model is similarly confirmed, but providing a negative polarity. Hence, hypothesis H_{12e} is not supported.

The results in Table 5.34 indicate that the index value of trust (ω) for the moderated mediation effect is significant because the CoMe index is statistically different from zero as the bootstrap CI does not include zero [$\omega=-0.051$, $SE=0.026$, 95% CI = -0.103 , -0.004]. The results revealed that at high levels of trust, the indirect effect of service quality on customer WOM through satisfaction ($\beta=0.066$, $T=3.147$, $p<0.05$) is lower than the indirect effect at low levels of trust ($\beta=0.147$, $T=4.188$, $p<0.05$). This shows that with the increase in trust, the indirect effect of service quality on WOM through satisfaction

is reduced. Therefore, while further validating the moderated mediation, the negative polarity disputes the framing of hypothesis H_{12f}.

Table 5.35 shows a consolidation of the moderation analysis results.

Table 5.35: Summary of moderation results analysis

	PATH	Index ω	Path B	SE	T	p	Result
H _{9b}	Cred*Use -> Satisf		0.074	0.053	1.384	0.274	Not Supported
H _{11a}	Trust*Use -> Satisf		0.013	0.065	0.201	0.384	Not supported
H _{11b}	Trust*Servq ->Satisf		0.110	0.033	3.334	0.001	Not supported*
H _{11c}	Trust*Inforq -> Satisf		0.055	0.047	1.165	0.244	Not Supported
H _{12e}	Trust*Servq -> Satisf -> Loy	-0.054	0.331	0.031	2.836	0.005	Not Supported*
H _{12f}	Trust*Servq->satisf->WOM	-0.051	0.310	0.026	2.754	0.006	Not Supported*
H _{12b}	Trust*Servq->satisf->Cont	-0.051	0.373	0.031	2.742	0.006	Not Supported*

*statistically significant, but negative polarity.

5.17 PLS-SEM structural model summary

The structural model was established to be statistically of a good fit using the Tenenhaus et al. (2004) GoF index of PLS model fit. The path analysis of the direct effects was based on assessing the p values and confidence intervals, providing empirical support for 17 of the 22 hypotheses. The assessment of the model's explanatory power (R- square) revealed mostly moderate explanatory power and effects size. However, the model's predictive relevance was established to be slightly better than moderate. Further analysis was done by outlining the IPMA, focusing on practical extrapolations. Subsequent to that was the mediation analysis that established support for six of the nine postulated paths. The moderation analysis did not provide empirical support for any of the seven hypothesised interaction effects. However, four of them were statically significant, but all of them had opposite polarities to those that were postulated, thus not supporting the hypotheses as framed.

5.18 CHAPTER SUMMARY

The chapter commenced with an analysis of the quality metrics of the operationalised research model based on the collected data. This involved establishing the reliability and validity of the measurement model. The quality assessment led to a slightly modified measurement model that was taken forward for the rest of the subsequent analysis. Confirmation of the modified measurement model was done by computation of reliability and validity indices for all thirteen model constructs. Thereafter, the structural model analysis tested the hypothesised direct effects, mediation effects and interaction effects. Next is the discussion of the research findings per objective.

CHAPTER 6

DISCUSSION OF RESEARCH FINDINGS

6.1 INTRODUCTION

This chapter presents a summary of the research findings that emanated from the empirical study whose analysis has been outlined in the previous chapter. The discussion commences with a recapitulation of the study. This is followed by a thematic discussion of the research findings per objective by reflecting on each hypothesis. This is done by juxtaposing the findings with related extant studies. Insights and possible implications emanating from the discussion are presented for each objective.

6.2 Recapitulation of the study

The study's main objective was "to examine antecedents, mediators and moderators of consumer behavioural outcomes of mobile banking". Behavioural outcomes were hypothesised to be *Loyalty*, *Word of Mouth* and *Continuity*. Hypothesised antecedents were *Compatibility*, *Social influence*, *Performance expectancy*, *Quality dimensions*, *Use* and *Satisfaction*. *Performance Expectancy*, *Use* and *Satisfaction* were also hypothesised play a mediating role in the model. *Perceived Trust* and *Credibility* were positioned to play a moderating role in the framework. The main objective was pursued by proffering 18 empirically tested hypotheses to address the primary objectives reconstituted in Table 6.1. The Table also shows the respective hypotheses that were the basis of addressing each objective in turn.

Table 6.1: Research objectives and hypotheses

RESEARCH OBJECTIVE	HYPOTHESES
1 <i>To establish the effect of compatibility, performance expectancy and social influence on the use of m-banking by customers in the South African banking context.</i>	H ₁ ; H ₅ ; H ₆
2 <i>To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with the use of m-banking and performance expectancy in the South African banking context.</i>	H _{3a} ; H _{3b} ; H _{3c} H _{4a} ; H _{4b} ; H _{4c}
3 <i>To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with satisfaction with m-banking and performance expectancy, trust and credibility with satisfaction with m-banking.</i>	H ₂ ; H _{7a} ; H _{7d} ; H _{7f} ; H _{9a} ; H ₁₀
4 <i>To test and evaluate associations of the use of m-banking with customer satisfaction and the behavioural outcomes of m-banking.</i>	H _{8a} ; H _{13a} ; H _{13b} ; H _{13e}
5 <i>To test and evaluate associations of customer satisfaction from m-banking with the behavioural outcomes of m-banking.</i>	H _{12a} ; H _{12c} ; H _{12d}
6 <i>To examine the proposed mediation effect of use of m-banking in the relationship between the quality dimensions and customer satisfaction, and the mediation effect of</i>	H _{8b} ; H _{7b} ; H _{7g} H _{13f} ; H _{13d} ; H _{13c}

customer satisfaction in the relationship between the use of m-banking and behavioural outcomes.

7 *To examine a proposed serial mediation effect of performance expectancy and use of m-banking on the associations between the quality dimensions and customer satisfaction with m-banking.* H_{7c}; H_{7e}; H_{7h}

8 *To examine and empirically test proposed moderation effects of perceived credibility and perceived trust on the association between the use of m-banking and customer satisfaction, as well as the moderation effect of perceived trust on associations between service quality and customer satisfaction as well as information quality and customer satisfaction.* H_{9b}; H_{11a}; H_{11b}; H_{11c}

9 *To examine and empirically test proposed moderated mediation by trust on the association between service quality and the behavioural outcomes of m-banking use (WOM, loyalty, continuity).* H_{12e}; H_{12f}; H_{12b}

6.3 DISCUSSION OF RESEARCH FINDINGS PER RESEARCH OBJECTIVE

6.3.1 Research objective 1

To establish the effect of compatibility, performance expectancy and social influence on the use of m-banking by customers in the South African banking context.

The first research objective focused on establishing the relationships between compatibility, performance expectancy and social influence (as antecedents), with the use of m-banking (as an outcome). As depicted in Table 6.1, this research objective was addressed by hypotheses 1, 5 and 6.

The first three findings outline the relationships between compatibility (Comp), performance expectancy (PerfEx) and social influence (SocInf) with the use of m-banking measured at the individual level. A pictorial depiction of the hypothesised relationships, extracted from the structural model presented in Chapter 5 of this thesis is shown in Figure 6.1.

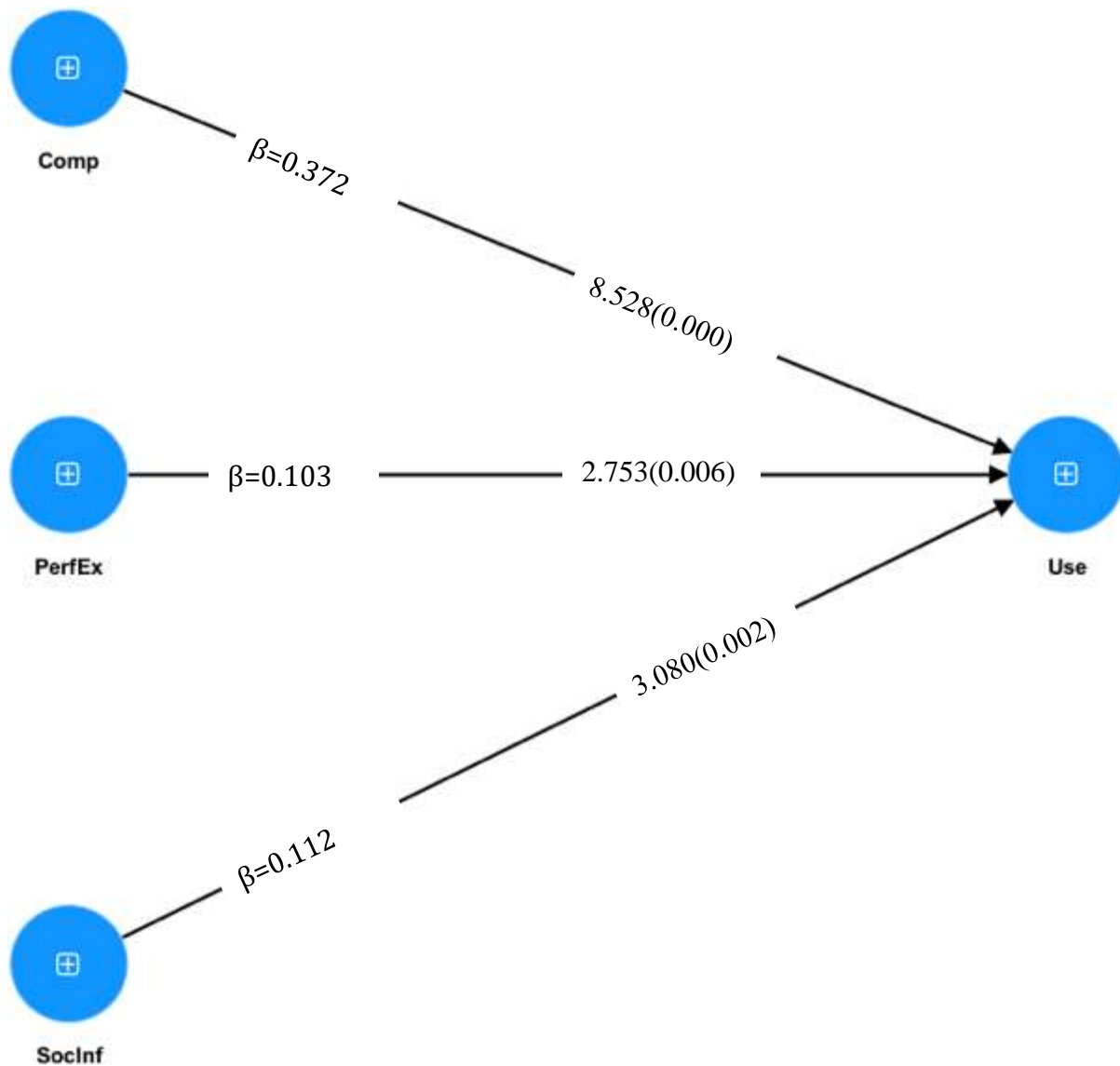


Figure 6.1: Compatibility, Performance Expectancy and Social influence to Use path diagram

Hypothesis 1: There is a significant positive relationship between performance expectancy and the use of m-banking.

The findings show that, a positive relationship exists for the sampled population elements between performance expectancy and use of m-banking : $\beta=0.103$; $T=2.753$; $p=0.006$. This provides empirical support for hypothesis 1 since the path coefficient is statistically significant. So, a unit standard deviation change in the use of m-banking can be accounted for by 10.3% change due to performance expectancy. It is numerically small in proportion, but may be practically significant as it provides the

median weight of impact among the three postulated predictors in the sub-model. The finding of a positive association between performance expectancy and use resonates with findings by Mohapatra et al. (2020) who also established such a positive association in an empirical study on m-banking in India. In that study context, the path coefficient of PE on use was more impactful, at 59.9%, much higher than parity.

Further corroboration is evident in the findings by Gupta and Arora (2020) who found that performance expectancy positively impacts the use of mobile payment systems through behavioral intention. In a more socio-economically and culturally relatable sample demographic, Thusi and Maduku (2020) invoked the UTAUT2 theory in a study of South African millennials and established that PE had a significant and positive relationship with the use (intention) of m-banking. Their finding reflected a slightly higher PE path coefficient of 27.3%. However, other related studies that made use of the UTAUT theory on m-banking did not find a similarly significant positive relationship between the two latent variables (e.g. Kwateng, Atiemo, & Appiah, 2018; Purwanto & Loisa, 2020; Samartha et al., 2022). When this study's finding is juxtaposed with the one by Thusi and Maduku (2020) that was undertaken in a South African context, the implication is that, even at the post-adoption level of the m-banking terrain, customer decision-making is still influenced by their view of the functional utility of the m-banking platform. As expected, the comparatively smaller path coefficient suggests that other factors are involved in the interplay and decision schema about the use of m-banking. This means that as per this finding, at the post-adoption level of m-banking, decisions customers make are impacted by their performance expectancy but to a limited extent, probably because they routinely expect it to function optimally.

Hypothesis 5: There is a significant positive relationship between the compatibility of m-banking and its use.

The findings show that, for the sampled population elements, a positive relationship exists between compatibility and use of m-banking as was hypothesised: $\beta=0.372$; $T=8.528$; $p=0.000$. The statistically significant path coefficient provides empirical support for the hypothesis. This is the most impactful path coefficient in the sub-model as it indicates that 37.2% of a unit standard deviation change in the use of m-banking can be attributed to compatibility's predictive weight. This positive relationship

resonates with related findings on mobile banking adoption in South Africa by Venter de Villiers et al. (2020) who found a significant positive relationship between compatibility and intention to use m-banking. The path coefficient in their study was slightly lower (0.34).

Similarly, McGovern et al. (2019) found a positive association between compatibility and adoption of m-banking, with a comparatively lower path coefficient of 0.16 in their model. However, other previous studies found compatibility to have a very strong positive impact on the adoption and use of m-banking, similar to this study's finding (e.g. Hanafizadeh et al., 2014; Mohammadi, 2015; Muzurura & Chigora, 2019; Wessels & Drennan, 2010). The findings of this study further reinforce this association. Notably, there is a paucity of recent studies on m-banking that have invoked compatibility as one of the predictor constructs compared to the other latent variables in the submodel. This study provides empirical evidence of the positive association between compatibility and the use of m-banking in the South African context, thus partly validating the IDT theory.

Hypothesis 6: There is a significant positive relationship between social influence about m-banking and its use.

The findings show that a positive relationship exists between social influence and the use of m-banking as was hypothesised: $\beta=0.112$; $T=3.080$; $p=0.002$. This resonates with findings by Assensoh-Kodua and Msosa (2020), who found that social norms had a positive influence on the use of m-banking by South African consumers even though the social influence impact coefficient in their study was much smaller at $\beta=0.038$. Studying the adoption and use of Fin-Tech services in South Africa, Slazus and Bick (2022) established a significant positive influence attributable to social influence. On a much broader global level, other related studies on m-banking also found a positive and statistically significant relationship between social influence and the use of m-banking (e.g. Baabdullah et al., 2019; Muzurura & Chigora, 2019; Samartha et al., 2022; Yu, 2012). However, this finding is in contrast to findings by Gupta and Arora (2020) as well as Baptista and Oliveira (2015) who, in both cases, found that there was no statistically significant association between social influence and the intention to adopt and use mobile banking systems.

To sum up, the empirical findings indicate that compatibility, social influence and performance expectancy (in that order) all have statistically significant positive effects on customers' decision schema on the use of m-banking within the South African context. Notably, compatibility has a path coefficient greater than the combined effect of social influence and performance expectancy. This probably suggests that customers value highly how m-banking resonates with their broader digital lifestyles. Pitched at a post-adoption level, the result makes logical sense as it shows that on-going compatibility of the m-banking features with the customer's digital lifestyle has greater prominence for customers compared to social norms and performance expectancy. These two variables would probably play a more impactful role in a study that is pitched the adoption-level of the pyramid indicated in chapter one of the thesis. Hence, objective 1 of the study was met as the findings confirmed the antecedence of compatibility, social influence and performance expectancy to the use of m-banking.

6.3.2 Research objective 2

To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with the use of m-banking and performance expectancy in the South African banking context.

The second research objective focused on establishing the relationships between the quality dimensions (service quality, information quality and system quality) (as antecedents), with performance expectancy, and with the use of m-banking (as outcomes).

Six findings describe the relationship between the quality dimensions, performance expectancy and the use of m-banking. A pictorial depiction of the hypothesised relationships, extracted from the structural model presented in Chapter 5 of this thesis is shown in Figure 6.2.

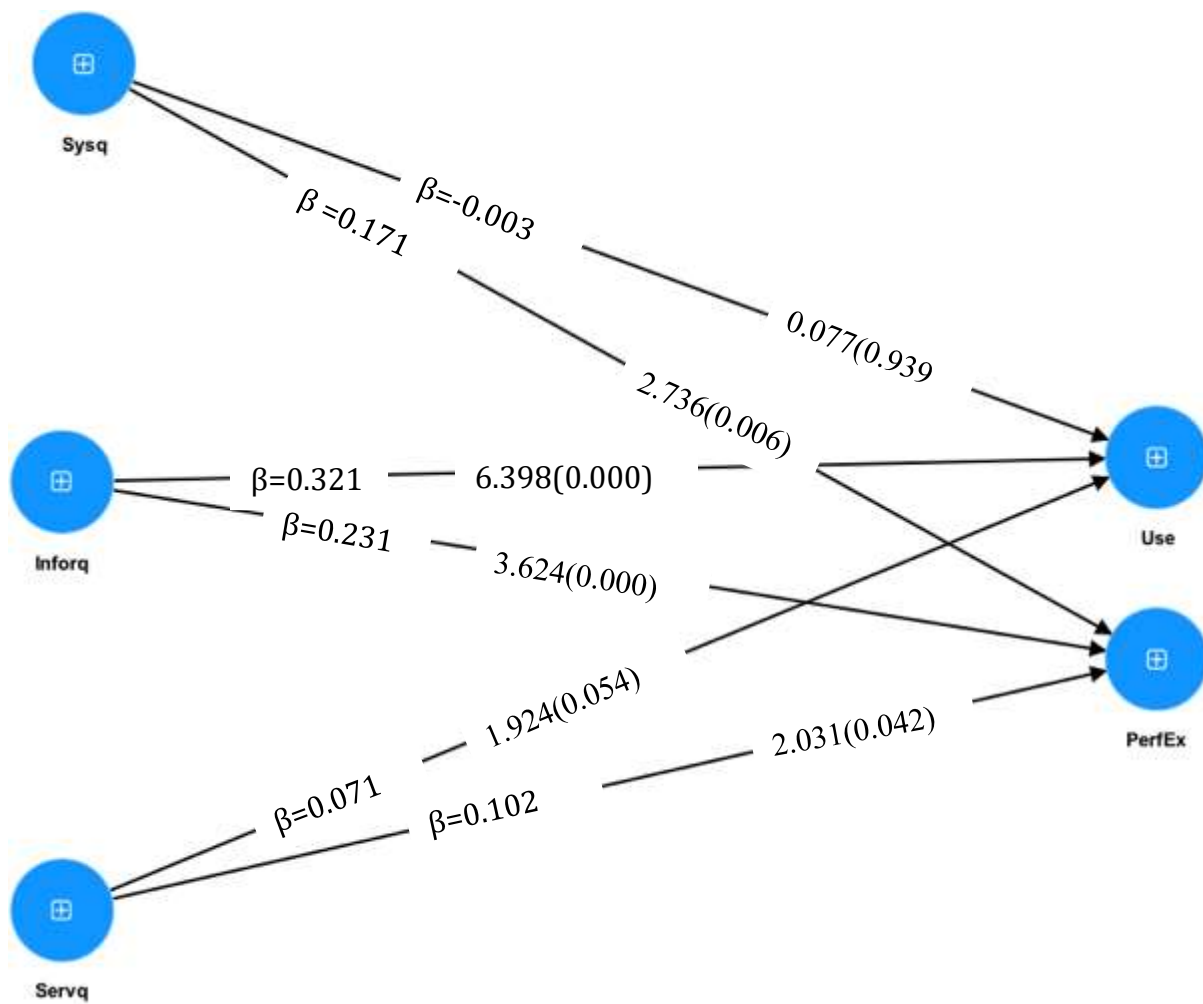


Figure 6.2: System quality, information quality and service quality to use and performance expectancy path diagram

Hypothesis 3a: There is a significant positive relationship between the system quality of m-banking and its use.

As depicted in the extract from the structural model shown in Figure 6.2, the empirical findings show that there is an insignificant negative association between system

quality and use of m-banking: $\beta=-0.003$, $T=0.077$, $p=0.939$, thus no empirical support for hypothesis 3a contrary to the proffered postulation. This finding diverges sharply from a recent finding within a Malaysian m-banking context by Tarawneh et al. (2021) in which the system design interface was the most impactful antecedent to the use of the platform. In the context of this South African-domiciled study, this may suggest experiential stasis in which bank customers use m-banking as a utility, its quality being inconsequential for various reasons. What can be extrapolated from this finding could be that for customers who routinely use m-banking, the quality of the system is taken for granted and the differentiation potential that it has at the novel pre-adoption stages is diminished.

Hypothesis 3b: There is a significant positive relationship between the quality of the information available on m-banking, and its use.

The structural model extract shows that there is a significant positive relationship between information quality and the use of m-banking since the T value is greater than 1.96 and the p -value is less than 0.05 (two-tailed, 95% significance): $\beta=0.321$, $T=6.398$, $p=0.000$. This is the most impactful path coefficient in the sub-model, signifying that, with the other predictors in the sub-model held constant, a unit standard deviation change in m-banking use can be attributed to a 32.1% change related to the information quality. This significant positive relationship is consistent with previous findings by other researchers who made use of the DMISS model or its adaptation and found a significant positive relationship between information quality and use or intention to use an information system (Bahaddad, 2017; Gharaibeh & Gharaibeh, 2020; Rana & Dwivedi, 2018). Specifically, Sharma and Sharma (2019) established a significant positive association between the information quality of a m-banking, and customers' disposition to use it with a comparable path coefficient of 0.270. This finding makes logical sense at a post-adoption level of the m-banking value-chain as customers who routinely use m-banking probably attach a greater premium to the accuracy and robustness of the informative details about their bank account profile, account balances, transaction history, etc than the other variables at play.

Hypothesis 3c: There is a significant positive relationship between the service quality of m-banking and the use of m-banking.

The structural model extract shows that there is a statistically insignificant relationship between service quality and use of m-banking emanating from analysing the data obtained from the sampled population cohort as the T value is smaller than 1.96 and the p -value is greater than 0.05: $\beta=0.071$, $T=1.924$, $p=0.054$. Hence, there is no empirical support for hypothesis 3c. This resonates with a similar statistically insignificant association between system quality and the use of m-banking established under hypothesis 3a. This finding goes against the grain as it is contrary to studies like Kamboj et al. (2022), Chen (2012), Singu and Chakraborty (2022) and Zhou et al. (2021) who all advanced a service-dominant logic by establishing that service quality of m-banking plays an essential role either in the adoption and/or use of the platform. The rationale that can be deduced from this finding is that, similar to the diminished role of system quality highlighted earlier, customers are mostly comfortable navigating the m-banking self-service channel and trouble-shoot occasional glitches on their own, probably interacting with chatbots that banks provide on their platforms.

Hypothesis 4a: There is a significant positive relationship between m-banking system quality and performance expectancy.

As depicted in the extract from the structural model shown in Figure 6.2, the empirical findings show a significant positive association between system quality and performance expectancy of m-banking: $\beta=0.171$, $T=2.736$, $p=0.006$, thus supporting hypothesis 4a. This implies that a unit standard deviation change in performance expectancy can be attributed to a 17.1% change associated with the system quality of the m-banking platform. Though statistically significant, this is classified as a practically small effect as the beta value is below 0.20 as per Cohen (1988) typology of effect sizes. The finding of a significant positive effect of system quality on performance expectancy is consistent with previous results by Windasari and Mousa (2021), who found a positive association between performance expectancy and the

use of m-banking. Similarly, Thusi and Maduku (2020) established a positive association between performance expectancy and intention to use m-banking among South African millennials. Their study produced a path coefficient of 0.273, much higher than this study's 0.171. The common theme that brings this study's findings and the cited previous studies together is that they all indicate that when customers perceive the quality of m-banking to be high, they expect resilient performance.

Hypothesis 4b: There is a significant positive relationship between m-banking information quality and performance expectancy.

As depicted in the extract from the structural model shown in Figure 6.2, the empirical findings show that there is a significant positive association between information quality and performance expectancy of m-banking: $\beta=0.231$, $T=3.624$, $p=0.000$, providing support for hypothesis 4b. This finding confirms previous findings that established a positive association between information quality and performance expectancy (e.g. Chen et al., 2012; Zhou, 2013). The empirical finding suggests that, with other predictors in the sub-model held constant, a standard deviation change in performance expectancy can be attributed to the 23.1% effect related to the information quality of m-banking. This is the most impactful path coefficient in the sub-model's performance expectancy antecedents. At a practical level, since m-banking relates to customers' financial transactions, they probably attach most value to the accuracy and relevancy of the information about their accounts and transactions they access via m-banking compared to the other quality sub-dimensions that precede performance expectancy. As indicated earlier in relation to the use of m-banking, this finding brings to the forefront the key role played by information quality in self-service channels.

Hypothesis 4c: There is a significant positive relationship between m-banking service quality and performance expectancy.

As depicted in the extract from the structural model shown in Figure 6.2, the empirical findings show that there is a significant positive association between service quality and performance expectancy of m-banking: $\beta=0.102$, $T=2.031$, $p=0.042$, providing support for hypothesis 4c. This suggests that a unit standard deviation change in performance expectancy can be attributed to the 10.2% effect associated with service quality perceptions by customers. Though significant, this is the smallest path coefficient for the predictors of performance expectancy depicted in the sub-model. The finding resonates with the findings by Rahi, Mansour, Alghizzawi, and Alnaser (2019) who established a higher positive path coefficient of 0.290 between service quality and performance expectancy in a study on the adoption of internet banking. A notable take-away from this finding is that, despite a small effect size, it is contrary to the insignificant role of service quality on the use of m-banking, discussed previously. This suggests that customers expect levels of service quality to be reliable indicators of the anticipated utility of an information system.

Four of the six postulated hypotheses that encompass the second objective were supported by the empirical results. Hence, the objective was largely attained. The cumulative effect of these findings is that they show that information quality is the validated antecedent to the use of m-banking. The insignificant effects of system quality and service quality on the use of m-banking are counter-intuitive, but they can similarly be explained according to the profile of the respondents. At a post-adoption level, customers attach greater prominence to the robustness of their m-banking information since they predominantly use it on their own, requiring little service personnel intervention. Furthermore, they are well-versed on how to troubleshoot any system glitches that arise, due to accumulated experience. In contrast, system quality, service quality and information quality all play a significant role in antecedence to performance expectancy. This suggests that customers analyse the overall quality of the mobile banking channel when they evaluate how new features will perform if they put them to use. Comparing the two endogenous variables in this sub-model shows that other variables are most likely influential in the use of m-banking, in contrast to performance expectancy.

6.3.3 Research objective 3

To test and evaluate associations of the quality dimensions (system quality, information quality, service quality) with satisfaction with m-banking and performance expectancy, trust and credibility with satisfaction with m-banking.

The third research objective focused on establishing the relationships between performance expectancy, perceived credibility, perceived trust and the quality dimensions (system quality, information quality and service quality) (as antecedents), with satisfaction with m-banking (as the outcome).

Six findings describe the relationship between performance expectancy, trust, credibility, and the quality dimensions with satisfaction from m-banking. A pictorial depiction of the hypothesised relationships, extracted from the structural model presented in Chapter 5 of this thesis is shown in Figure 6.3.

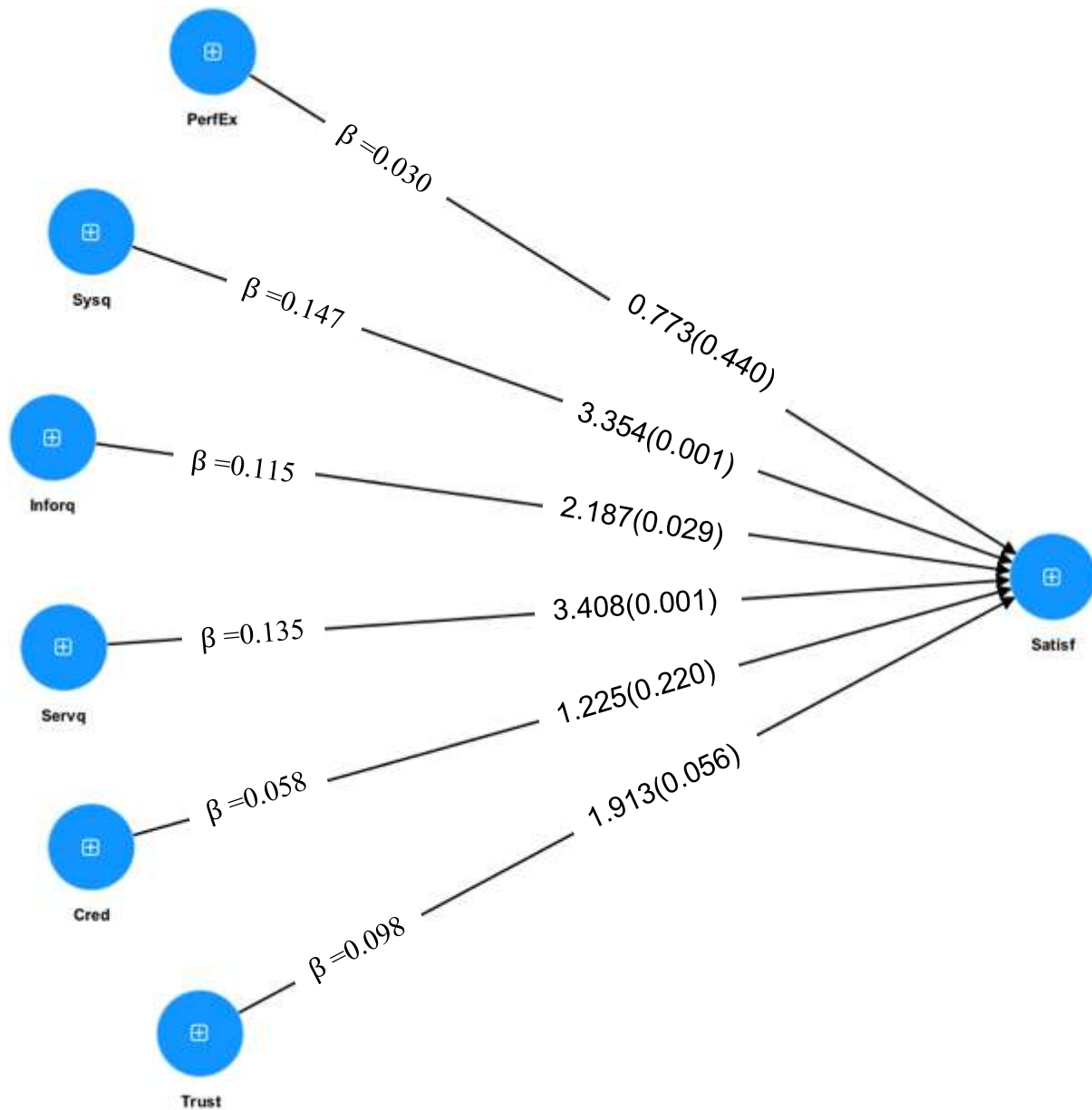


Figure 6.3: System quality, information quality, service quality, credibility and trust to satisfaction path diagram

Hypothesis 2: There is a significant positive relationship between m-banking performance expectancy and customer satisfaction.

As depicted in the extract from the structural model shown in Figure 6.3, the empirical findings show that there is a statistically insignificant association between performance expectancy and customer satisfaction from m-banking: $\beta=0.030$, $T=0.773$, $p=0.440$, thus providing no support for hypothesis 2. This is in contrast with findings by

Albashrawi and Motiwalla (2020) who established a significant positive association between performance expectancy and satisfaction with m-banking. As day-to-day users of m-banking, this finding probably reflects that the results captured respondents' lived experiences in which their satisfaction was contingent on other variables.

Hypothesis 7a: There is a significant positive relationship between system quality of m-banking and customer satisfaction.

As depicted in the extract from the structural model shown in Figure 6.3, the empirical findings show that there is a significant positive association between system quality of m-banking and satisfaction from m-banking: $\beta=0.147$, $T=3.354$, $p=0.001$, providing support for hypothesis 7a. This suggests that 14.7% of a unit standard deviation change in customer satisfaction can be attributed to perceptions about the system quality of the m-banking channel. This is in tandem with previous studies that similarly found a significant positive association between system quality and customer satisfaction. Investigating the use of m-banking using an adapted DMISS model, Baabdullah et al. (2019) established a positive association between system quality and customer satisfaction, mediated by use of m-banking. Also, similarly adapting the DMISS model, Uddin, Ghosh, and Isaac (2019) empirically confirmed a significant positive relationship between system quality and customer satisfaction. While system quality was not impactful among postulated predictors of the use of m-banking, the results show that it plays a significant role in terms of customer satisfaction. Fluctuations in the quality of the m-banking channel is likely to influence levels of customer satisfaction unlike its use because its use at the post-adoption level is likely routine. In contrast, satisfaction is described as a dynamic, affective post-consumption state that depicts the level of equilibrium on the pre-use and post-use continuum (Cenfetelli et al., 2008; Oliver, 2010).

Hypothesis 7d: There is a significant positive relationship between m-banking information quality and customer satisfaction.

The empirical findings show that there is a significant positive association between information quality of m-banking and satisfaction from m-banking: $\beta=0.115$, $T=2.187$, $p=0.029$, thus showing empirical support for hypothesis 7d. This indicates that among the postulated predictors in the sub-model, 11.5% of a unit standard deviation change in customer satisfaction can be accounted for by customers' perceptions of the information quality of the platform. This confirms similar findings about a positive association between information quality and customer satisfaction from m-banking established by Albashrawi and Motiwalla (2020) even though in that study a much higher path coefficient of 31.2% was established. As previously established, the results show that information quality plays an outsized role in the antecedence to the criterion variables in the research model.

Hypothesis 7f: There is a significant positive association between the service quality of m-banking and customer satisfaction.

The empirical findings show a significant positive association between the service quality of m-banking and customer satisfaction from m-banking: $\beta=0.135$, $T=3.408$, $p=0.001$, thus showing empirical support for hypothesis 7f. This suggests a 13.5% contribution to a standard deviation change in customer satisfaction attributable to service quality per this sub-model. This finding is not unique as Mahamad and Ramayah (2010) and Khan et al. (2021) previously established a positive association between service quality and customer satisfaction with banking services. Similarly, Wiharso et al. (2022) established a positive association between the overall quality of m-banking and customer satisfaction. Contextually, Tumewah and Kurniawan (2020) empirically established that m-banking service quality directly influences the levels of customer satisfaction. This finding shows that customer support for m-banking users is pertinent as it determines levels of customer satisfaction and needs to be prioritised by the service providers, even if it may predominantly be through self-service chatbots and various artificial intelligence systems.

Hypothesis 9a: Perceived credibility of m-banking is positively related to customer satisfaction with m-banking.

The empirical results show that the relationship between perceived credibility of m-banking and customer satisfaction is not statistically significant: $\beta=0.058$, $T=1.225$, $p=0.220$. Hence there is no empirical support for hypothesis 9a. This finding is contrary to previous studies on m-banking that found a positive association between the perceived credibility of m-banking and customer satisfaction (e.g. Kumar et al., 2012; Luarn & Lin, 2005; Masrek et al., 2018; Vuong et al., 2020). The difference could be attributed to the focus on m-banking adoption that most of these studies were pitched at, whereas this study was premised on post-adoption attitudes. At the post-adoption stage, the majority of customers probably view m-banking as mostly credible.

Hypothesis 10: Trust in m-banking is positively related to customer satisfaction.

The empirical results show no empirical support for this hypothesis: $\beta=0.098$, $T=1.913$, $p=0.056$. Hence, there is no confirmation of hypothesis 10 within the context of this study. This finding is contrary to the norm that has been established in a number of previous studies that found perceived trust to impact customer satisfaction significantly (e.g. Altay & Yaprakli, 2024; Damabi et al., 2018; Geebren et al., 2021; Masrek et al., 2018; Susanto et al., 2016). The rationale behind this finding could be that at the post-adoption level of the m-banking value chain, customers have experienced higher levels of m-banking system failures that have led to financial loss such that the established direct association at pre-adoption stage between trust and customer satisfaction does not hold.

In terms of the study's third objective, the summative effect of the preceding findings shows that three of the six hypotheses that encompass it were confirmed by the empirical results. Accordingly, the objective was partly achieved. A prominent finding is that the significant hypotheses are those that proffered that the quality sub-dimensions (system, information, service) have a direct influence on customer satisfaction. This makes logical sense as the quality of m-banking will influence the depth, breadth and frequency of its use, which will affect the levels of satisfaction on an ongoing basis. Furthermore, the empirical results show that the levels of satisfaction are predominantly influenced by system quality, service quality and information quality, respectively. An interesting finding, subject for further investigation in future studies, is the insignificant role of performance expectancy, credibility and

trust, on the levels of customer satisfaction with m-banking. Although unexpected, this finding further isolates variables that have previously been established to play significant roles in the adoption of emerging technologies, whereas this study was framed at the post-adoption level. Furthermore, regular users of m-banking probably are at a stage where the credibility and trustworthiness of m-banking hardly feature in their decision schema.

6.3.4 Research objective 4

To test and evaluate associations of the use of m-banking with customer satisfaction and the behavioural outcomes of m-banking.

The fourth research objective focused on establishing the relationships between the use of m-banking (as an antecedent) and customer satisfaction as well as the behavioural outcomes emanating thereof (customer loyalty, word of mouth, continuity) (as outcomes).

Four findings describe the relationship between the use of m-banking and satisfaction as well as with behavioural outcomes. A pictorial depiction of the hypothesised relationships, extracted from the structural model presented in Chapter 5 of this thesis is shown in Figure 6.4.

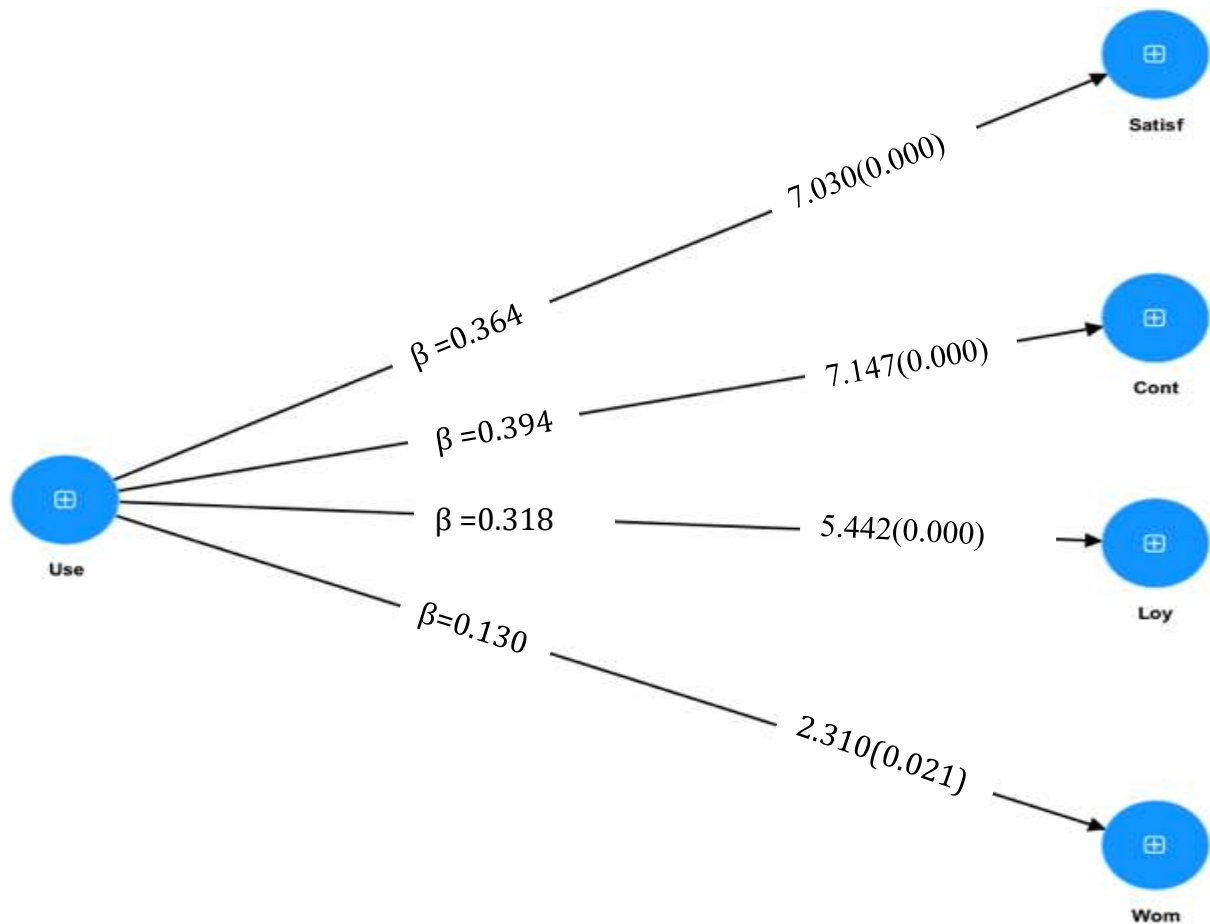


Figure 6.4: Use to satisfaction, continuity, loyalty and WoM path diagram

Hypothesis 8a: There is a significant positive relationship between the use of m-banking and customer satisfaction.

The empirical findings show that there is a significant positive association between the use of m-banking and customer satisfaction from m-banking: $\beta=0.364$, $T=7.030$, $p=0.000$, thus showing empirical support for hypothesis 8a. This suggests a 36.4% contribution to a unit standard deviation change in customer satisfaction. This provides supportive empirical evidence resonating with Thakur (2014), who similarly established a positive and significant association between the use of m-banking and customer satisfaction, although with a smaller path coefficient, $\beta=0.231$. A higher path coefficient between the use of mobile apps and customer satisfaction was previously

established by Humbani and Wiese (2019) in a contextually similar South African context. Integrating this study's finding about the relationship between use and customer satisfaction into the extant body of knowledge affirms that increased use of an information system positively contributes to customer satisfaction.

Hypothesis 13a: The use of m-banking is positively related to relationship continuity.

As depicted in the sub-model (Figure 6.4) extracted from the PLS structural model, there is a statistically significant positive association between the use of m-banking and the willingness of customers to continue using it going forward. This is shown by a statistically significant path coefficient, $\beta=0.394$. The path coefficient suggests that a unit standard deviation change in continuity preference can be accounted for by a 39.4% impact attributable to the use of m-banking. This association between use and continuity inclination can be comparatively juxtaposed with extant studies that also affirmed a positive association between the use of an information system and customer willingness to continue using it (e.g. Ganguli & Roy, 2011; Oponng et al., 2014). What can be deduced from this finding is that, at the post-adoption level, customers who are ardent users of m-banking are more inclined to continue using it to access more features and options, and be early adopters of new applications that may be rolled out with system updates.

Hypothesis 13b: The use of m-banking is positively related to customer loyalty.

The empirical findings show a significant positive association between the use of m-banking and customer loyalty to m-banking: $\beta=0.318$, $T=5.442$, $p=0.000$, thus showing empirical support for hypothesis 13b. In the context of the sampled population, this suggests a 31.8% contribution to a unit standard deviation change in the customer loyalty accountable to the use of m-banking. This finding is not unique as previous studies similarly found this type of positive association (e.g. Baabdullah et al., 2019; Ganguli & Roy, 2011; Oponng et al., 2014). In particular, Baabdullah et al. (2019) undertook their study within an m-banking context and established a statistically

significant and positive path coefficient between the use of m-banking and customer loyalty ($\beta=0.12$). In contrast, this study established a path coefficient that is almost three times stronger than this one, suggesting that the use of m-banking spurs higher levels of customer loyalty in a likely cyclical process.

Hypothesis 13e: The use of m-banking is positively associated with customer WoM.

The empirical findings show that there is a significant positive association between the use of m-banking and customer dissemination of positive WOM about m-banking: $\beta=0.130$, $T=2.310$, $p=0.021$, thus showing empirical support for hypothesis 13e. This indicates that 13.0% of a standard deviation change in the WOM dissemination can be attributed to the effect of the use of m-banking. In a related South African context, Slazus and Bick (2022) established that there was a positive association between the use of m-banking and customers' engagement in positive word-of-mouth in their study context. The finding of higher levels of use influencing dissemination of positive WOM about m-banking is likely attributable to customers communicating their preference to predominantly transact (settling bills, making purchases, transfers, stock purchases, etc) via m-banking. A by-product of this organic dissemination of positive WOM is that these loyal customers are optimally positioned to be m-banking brand ambassadors and influencers.

Consolidation of these findings with respect to objective 4 shows that all four hypotheses encompassing this theme were established to be statistically significant. Hence, the objective was achieved as the results clarified quantitatively that the use of m-banking is an antecedent to continuity, satisfaction, loyalty and WoM (in that order). It makes logical sense that levels of use of m-banking directly influence customers' levels of satisfaction and the behavioural outcomes that arise. Higher levels of use, and possible reliance on m-banking, may lead to a feedback loop that perpetuates it.

6.3.5 Research objective 5

To test and evaluate associations of satisfaction from m-banking with the behavioural outcomes of m-banking.

The fifth research objective focused on establishing the relationships between customer satisfaction from m-banking (as an antecedent) and the behavioural outcomes emanating thereof (customer loyalty, word of mouth, continuity) (as outcomes).

Three findings describe the relationship between customer satisfaction with m-banking and the behavioural outcomes. A pictorial depiction of the tested hypothesised relationships, extracted from the structural model presented in Chapter 5 of this thesis is shown in Figure 6.5.

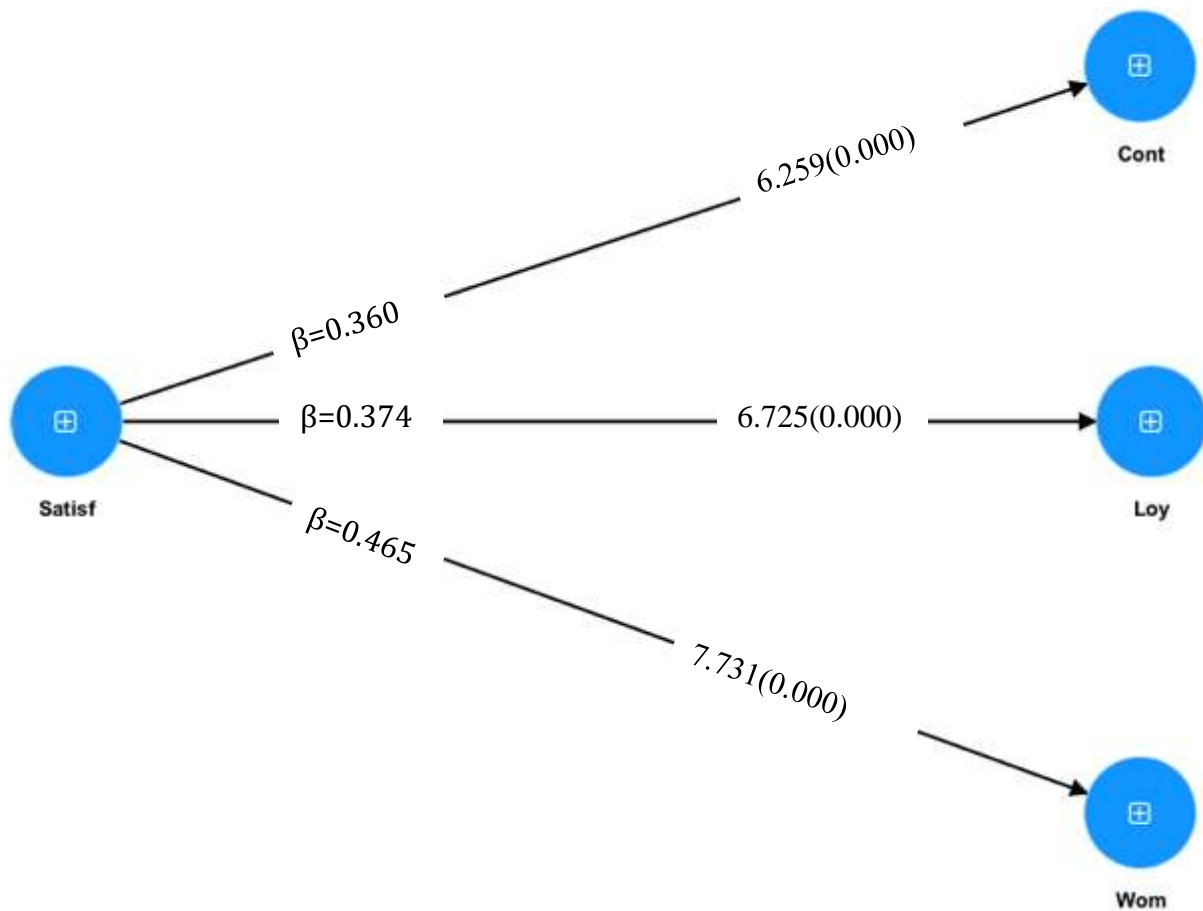


Figure 6.5: Satisfaction to continuity, loyalty and WoM path diagram

Hypothesis 12a: Satisfaction with m-banking is positively and directly related to customer continuity when transacting through m-banking.

The empirical findings show that there is a significant positive association between customer satisfaction from m-banking and the willingness to continue using m-banking: $\beta=0.360$, $T=6.259$, $p=0.000$, thus showing empirical support for hypothesis 12a. The beta value indicates that within the sub-model, 36% of a unit standard deviation change in continuity can be attributed to the effect of customer satisfaction with m-banking. This compares well with the findings by Zhao and Bacao (2020) who established a path coefficient of $\beta=0.341$ for the association between satisfaction with

mobile commerce service and continuity intention. In a m-banking context, Susanto et al. (2016) established a path coefficient $\beta=0.322$ for the association between customer satisfaction from smartphone banking and the intention to continue using it. Similarly, Yuan et al. (2016), as well as Rabaa'i and AlMaati (2021), empirically confirmed a significant positive association between customer satisfaction from m-banking and continuance intention. Other extant studies also empirically confirmed significant positive relationships between satisfaction and continuity intention with an information system (e.g. Boakye et al., 2012; Chong, 2013b; Humbani & Wiese, 2019; Kumar et al., 2012). Pitched at the post-adoption level, the inclination to continue using m-banking for satisfied customers is quite logical. It suggests that higher levels of satisfaction mitigate against potential switching behaviour as customers develop a greater affinity to m-banking as it fulfils their banking needs more conveniently than traditional access channels.

Hypothesis 12c: Satisfaction with m-banking is positively and directly related to customer loyalty to m-banking.

The empirical findings show that there is a significant positive association between customer satisfaction from m-banking and customer loyalty to the m-banking channel: $\beta=0.374$, $T=8.725$, $p=0.000$, thus providing empirical support for hypothesis 12c. The 0.374 beta coefficient indicates that within the sub-model, using a percentile illustration, 37.4% variance in a standard deviation change in customer loyalty can be related to the effect of customer satisfaction. This path coefficient is much smaller than the 0.54 realised in an m-banking study by Kumalasari, Permanasari, Karismariyanti, and Munandar (2022), as well as the 0.615 established by Sampaio et al. (2017). The marked path coefficient dichotomy may be contextual: suggesting that the sampled profile for this study may value other untested exogenous drivers of customer loyalty compared to the other two cited studies. However, the key implication is that, similar to the finding on continuity, high levels of customer satisfaction with m-banking culminate in likelihood of customer loyalty, agreeing with findings on similar m-banking studies by Tumewah and Kurniawan (2020).

Hypothesis 12d: Satisfaction with m-banking is positively and directly related to customer dissemination of positive word of mouth about m-banking.

The empirical findings show that there is a significant positive association between customer satisfaction from m-banking with WOM about the m-banking channel: $\beta=0.465$, $T=7.731$, $p=0.000$, thus providing empirical support for hypothesis 12d. This implies that as per this sub-model, 46.5% of the unit standard deviation change in WOM can be statistically linked to the effect of customer satisfaction. Notably, this is the highest path coefficient among the three behavioural outcomes in the sub-model. It suggests that between loyalty, continuity and WoM, the more likely customer disposition emanating from their satisfactory experiences with m-banking is positive WOM. Practically, the magnitude of the metric suggests that approximately half of the likely customer disposition to post-service disposition to WoM can be attributed to other factors. A comparative path weighting between customer satisfaction and word of mouth ($\beta=0.59$) was established by Maxham III and Netemeyer (2002) in a study on satisfaction with recovery from service delivery failures.

Similarly, Hennig-Thurau et al. (2002) also established a comparable path coefficient between customer satisfaction and likelihood of WoM arising subsequently ($\beta=0.44$). However, some extant studies have established much stronger path coefficients between customer satisfaction from using an information system and subsequent word-of-mouth arising: Olorunniwo et al. (2006) ($\beta=0.991$); Sampaio et al. (2017) ($\beta=0.833$). Similar to the findings about the other behavioural outcomes (continuity and loyalty), this finding confirms the significant antecedence of satisfaction to customer dissemination of positive WoM.

The findings confirm that objective five of the study was accomplished as it was empirically established that customer satisfaction leads to the postulated behavioural outcomes, with WoM being the most prominent outcome subdimension, followed by loyalty, and, lastly, continuity. In the context of this study's overall objective that was outlined in chapter one of the thesis, this is a key finding, as it confirms validation of the behavioural outcomes subdimensions: word-of-mouth, loyalty and continuity. Hierarchically, the prominence of word-of-mouth shows that customers are likely to

influence others in entrenching the use of m-banking going forward, if their word-of-mouth is positive.

6.3.6 Research objective 6

To examine the proposed mediation effect of use of m-banking in the relationship between the quality dimensions and customer satisfaction, and the mediation effect of customer satisfaction in the relationship between the use of m-banking and behavioural outcomes.

The sixth research objective focused on testing the proposed mediation effects of the use of m-banking (as a mediator) as well as customer satisfaction (as a mediator) in the relationships between the quality dimensions (as predictors) and customer satisfaction (as the criterion) as well as between customer satisfaction (as a predictor) and the behavioural outcomes (as the criterion).

Six findings describe the mediating effect of both the use of m-banking and customer satisfaction with m-banking. A pictorial depiction of the tested hypothesised mediating relationships, extracted from the structural model presented in Chapter 5 of this thesis, is shown in

Figure 6.6: Mediation path diagram due to use and satisfaction

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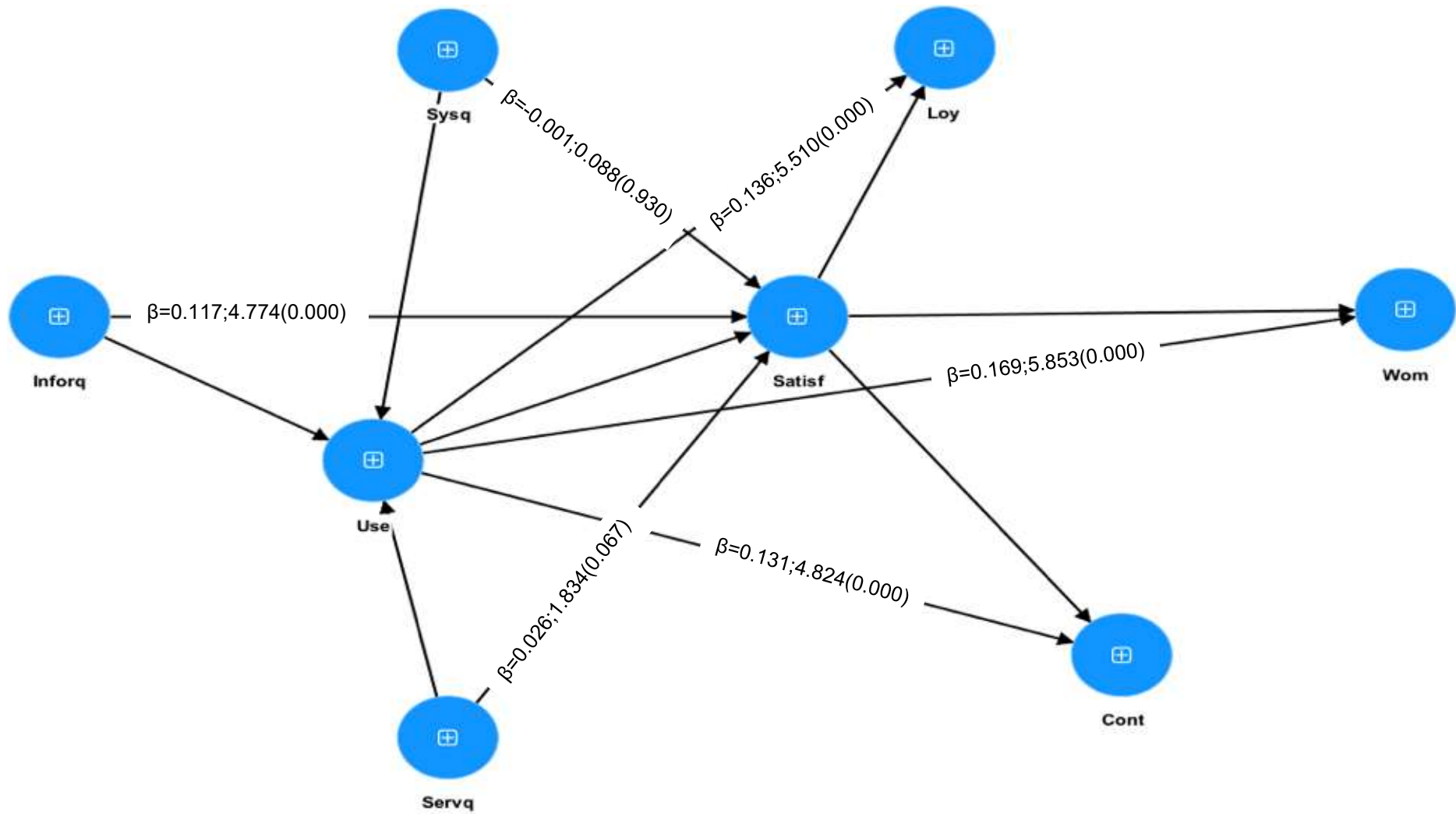


Figure 6.6: Mediation path diagram due to use and satisfaction

Hypothesis 7b: The use of m-banking mediates the relationship between the system quality of m-banking and customer satisfaction.

Hypothesis 7g: The relationship between the service quality of m-banking and customer satisfaction is mediated by its use.

Hypothesis 8b: Use of m-banking mediates the relationship between the information quality of m-banking and customer satisfaction.

As captured in the sub-model in Figure 6.6, the mediation analysis showed that the three indirect effects of system quality and service quality on customer satisfaction through the use of m-banking were both statistically insignificant as the p values are both greater than 0.05 and both confidence intervals span zero. Hence no empirical support for hypotheses 7b and 7g. In contrast, the indirect effect of information quality on customer satisfaction through use was statistically significant and positive (boot $\beta=0.117$), with a 95% confidence interval excluding zero (CI: 0.075;0.170). This provides empirical support for hypothesis 8b even though the effect size is relatively small. The practical implication of this finding suggests that as the level of use of m-banking fluctuates, there is a direct implication on how customers view their level of satisfaction from the quality of the information about their banking transactions, profile and options accessible through the channel. This means that the levels of customer satisfaction with the information quality fluctuates in the direction of the levels of use of the channel by the customer. It is notable that, while the hypothesised indirect effects between system quality and customer satisfaction, as well as service quality and customer satisfaction, were empirically not supported, the direct effects between system quality and satisfaction, as well as between service quality and satisfaction were found to be positive and statistically significant as discussed previously (H_{7a}; H_{7c}).

Hypothesis 13c: The relationship between the use of m-banking and customer disposition to continue using it is mediated by customer satisfaction.

Hypothesis 13d: The relationship between the use of m-banking and customer loyalty is mediated by customer satisfaction.

Hypothesis 13f: The relationship between the use of m-banking and customer dissemination of positive WoM is mediated by customer satisfaction.

As depicted in the sub-model in Figure 6.6, all three hypothesised indirect relationships, H_{13c}, H_{13d}, and H_{13f} were supported by the empirical results. Satisfaction mediated the relationship between use of m-banking and positive WoM (boot $\beta=0.169$), 95% confidence interval: [0.116;0.232]. Similarly, satisfaction mediated the relationship between the use of m-banking and customer loyalty (boot $b = 0.136$), with a 95% confidence interval: [0.094;0.192]. Satisfaction also mediated the relationship between the use of m-banking and customer continuity to use m-banking (boot $\beta=0.131$), 95% confidence interval: [0.084;0.191]. Even if the mediation effect sizes are classified as small, according to effect sizes typology (Cohen, 1988, 2013), this finding reveals the centrality of customer satisfaction in the behavioural outcomes of using m-banking. This is in contrast to the proposed mediation effect of use between the quality dimensions and customer satisfaction in which only the information quality and satisfaction path was empirically supported.

In terms of objective 6, the findings show that customer satisfaction was the more prominent mediator as some of the effects of m-banking use that led to each of the three behavioural outcomes passed through it. In contrast, system use only interceded the effects of information quality on customer satisfaction, but had negligible effects with respect to service quality as well as system quality. This clarification met the stipulation of objective 6. The implication of the insignificant mediation due to m-banking use between service quality and system quality to customer satisfaction further reinforces that, at the post-adoption level, fluctuations on the levels of use, leading to varying satisfaction levels, is more reliant on the information quality that customers experience. The significant serial mediation path linking information quality, performance expectancy, use and customer satisfaction is relevant for practitioners, as well as the theory of m-banking. Practically, it shows that managers need to

address information quality, performance expectancy, and levels of use of m-banking when they introduce new features on their m-banking portals. However, the extremely small effect sizes of all the mediated paths show that further exploration is necessary to test and embed the mediation theory validated in this study.

6.3.7 Research objective 7

To examine a proposed serial mediation effect of performance expectancy and use of m-banking on the associations between the quality dimensions and customer satisfaction with m-banking.

The seventh research objective focused on testing the proposed serial mediation effect of performance expectancy and use (as mediators) in the paths between the quality dimensions (as predictors) and the behavioural outcomes (as the criterion).

Three findings describe the serial mediation effect of performance expectancy and the use of m-banking (in that order) on the quality dimensions and behavioural outcomes value chain. A pictorial depiction of the tested hypothesised serial mediation relationships, extracted from the structural model presented in Chapter 5 of this thesis, is shown in Figure 6.7.

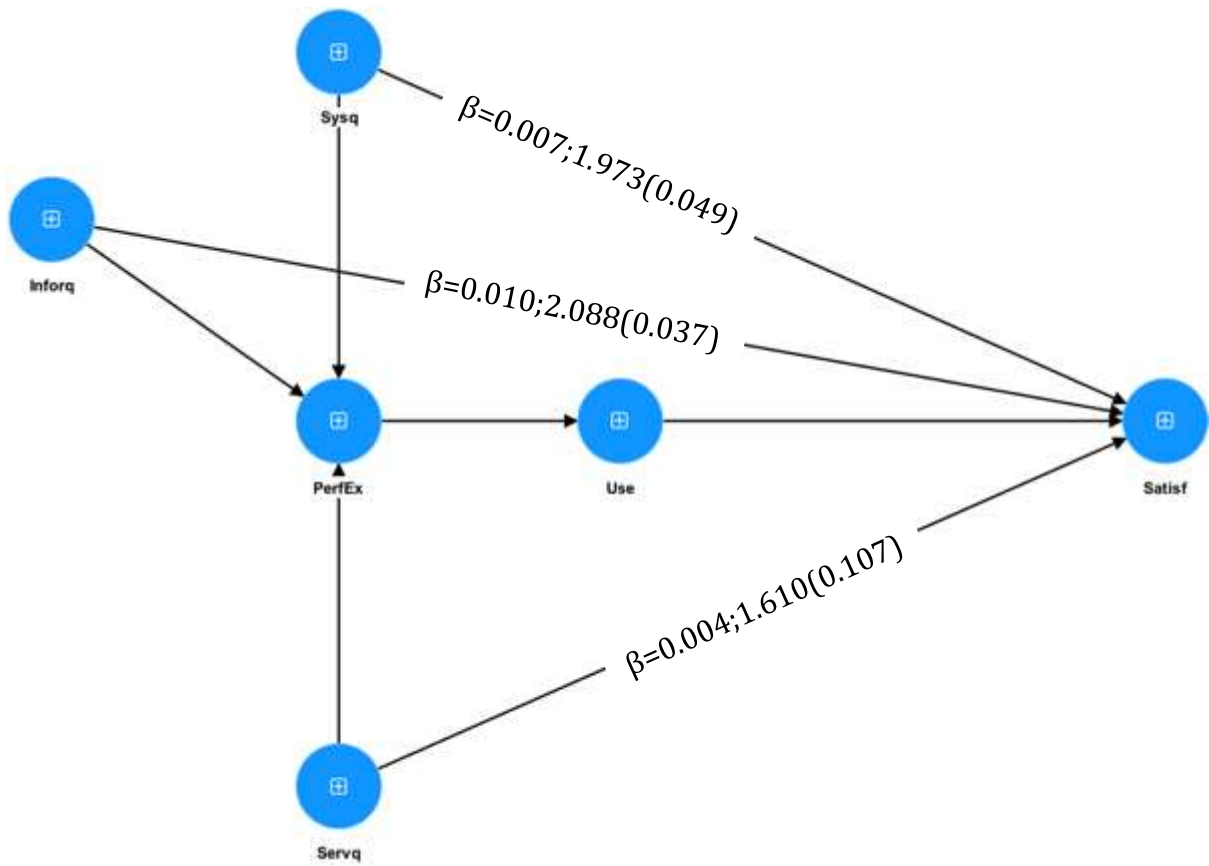


Figure 6.7: Serial mediation path diagram due to performance expectancy and use

Hypothesis 7c: The relationship between the system quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

Hypothesis 7e: The relationship between the information quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

Hypothesis 7h: The relationship between the service quality of m-banking and customer satisfaction is mediated, serially, by performance expectancy and system use.

As captured in the sub-model in Figure 6.7, the mediation analysis showed that the two indirect effects of system quality and information quality on customer satisfaction through performance expectancy and use of m-banking were both statistically significant as the p values are both smaller than zero and the 95% confidence intervals do not span zero: boot $\beta=0.007$, CI [0.002;0.017] for the system quality-satisfaction path, and boot $\beta=0.010$, CI [0.003;0.023] for the information quality-satisfaction path. This provided empirical support for hypotheses 7c and 7e. However, the analysis showed that the indirect effect of service quality on satisfaction through performance expectancy and use was not statistically significant, as the p -value was greater than 0.05. Thus, no empirical support for hypothesis 7h. Though statistically significant, the effect sizes of the two supported paths are very small and suggest the bigger relevance of the non-mediated direct effects. The two supported serial mediations bring into relevance variables whose direct paths were empirically not supported: system quality-use, performance expectancy-satisfaction, information quality-performance expectancy, information quality-use, use-satisfaction and information quality-satisfaction. Similarly, the unsupported serial mediation does not mitigate the subset of direct paths that were empirically supported as previously discussed: service quality-performance expectancy; performance expectancy-use; use-satisfaction and service quality-satisfaction.

The assessment illuminates the practical significance on customer satisfaction of service quality, compared to system quality and information quality, whose effect is

significantly transmitted through the other variables. Hence, objective eight was met as the results clarified, in terms of the postulated serial mediation, that performance expectancy and m-banking use, transmit some of the effects of the quality dimensions that lead to customer satisfaction, but minimally so. The partial serial mediation due to performance expectancy and use of m-banking is subject for further investigation in related fields to establish if higher effect sizes can be attained.

6.3.8 Research objective 8

To examine and empirically test proposed moderation effects of perceived credibility and perceived trust on the association between the use of m-banking and customer satisfaction, as well as the moderation effect of perceived trust on associations between service quality and customer satisfaction as well as information quality and customer satisfaction.

The eighth research objective focused on testing the proposed moderation effects of perceived credibility and perceived trust (as moderators) on the associations between information quality, service quality, and use (as antecedents) with customer satisfaction from m-banking (as the criterion).

Four findings describe the interaction effects of perceived credibility and perceived trust on the specified paths, as shown in Figure 6.8.

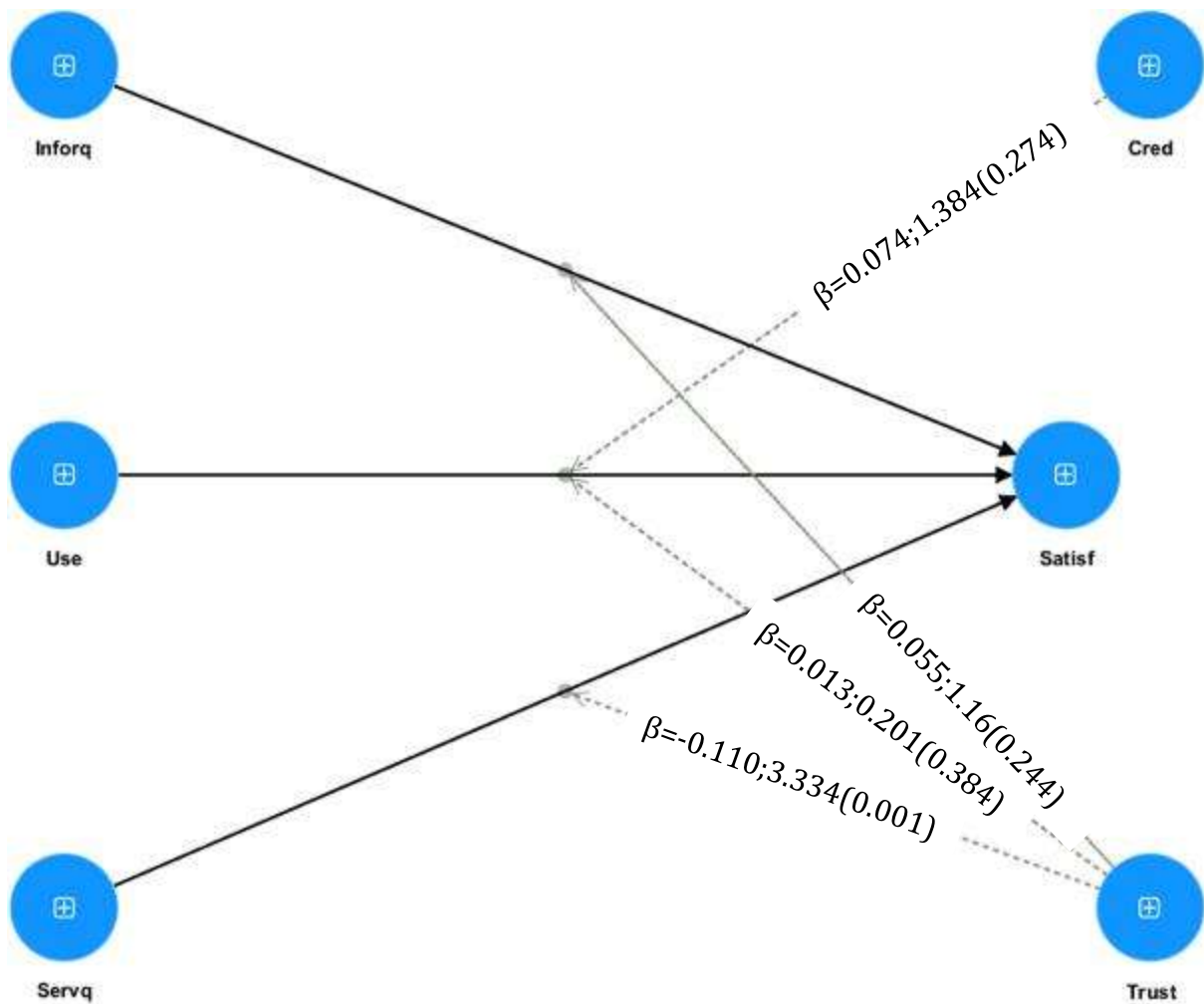


Figure 6.8: Moderation effects of trust and credibility

Hypothesis 9b: M-banking perceived credibility moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the relationship.

Hypothesis 11a: Trust in m-banking moderates the significant positive relationship between using m-banking and customer satisfaction, strengthening the association.

Hypothesis 11b: Trust in m-banking moderates the significant positive relationship between the service quality of m-banking and customer satisfaction, such that the association is strengthened.

Hypothesis 11c: Trust in m-banking moderates the significant positive relationship between the information quality of m-banking and customer satisfaction, such that the association is enhanced.

The moderation analysis captured in the sub-model in Figure 6.8 shows that all four proposed interaction effects due to perceived credibility and perceived trust of m-banking were not empirically supported. This was also confirmed by the slope analysis, which showed that the proposed interaction effect of perceived credibility did not strengthen the significant association between information quality and customer satisfaction, as there was not much difference in the slope of the line either at positive or negative unit standard deviation when compared to the slope at mean standard deviation. Hence, hypothesis 9b was not supported. Similarly, the interaction effect of perceived trust on information quality as well as on the use of m-banking produced slopes that did not show much deviation at plus/minus one standard deviation compared to the slope at mean standard deviation. Hence, hypotheses 11a and 11c were not supported.

In contrast, the interaction effect of trust on the path between service quality and satisfaction was statistically significant, but it had unexpected negative polarity. The slope analysis similarly confirmed this significant negative interaction effect. This implies that, counterintuitively, in contrast to the reviewed literature, at higher levels of trust, the stated relationship between service quality and customer satisfaction was suppressed. Despite the statistical significance of the finding, the dampening of the relationship due to higher levels of trust imply that hypothesis 11b was not empirically supported. However, the significance of this finding for theory and practice stands out. The implication could be that higher levels of trust may suppress the effect of service quality on customer satisfaction because customers have developed a level of complacency and see no competitive advantage arising from better service quality. The finding suggests that studies that are framed at the post-adoption level within the information systems field should consider that trust may be a negative moderator on

antecedents of customer satisfaction, and conceptualise it accordingly. Practitioners may need to evaluate higher levels of trust from a perspective of potential diminishing returns. In terms of objective eight, the findings indicate that the objective was partially achieved because they clarified that perceived trust provided a significant interaction effect on the service quality-customer satisfaction path, while perceived credibility was not substantiated as a moderator.

6.3.9 Research objective 9

To examine and empirically test proposed moderated mediation by trust on the association between service quality and the behavioural outcomes of m-banking use (WOM, loyalty, continuity).

The ninth research objective focused on testing the proposed moderated mediation effects of perceived trust (as moderator) on the associations between service quality (as the antecedent), and the behavioural outcomes (loyalty, WOM and continuity) through customer satisfaction (as the mediator).

Three findings describe the interaction effects of perceived trust on the specified mediated paths as shown in Figure 6.9.

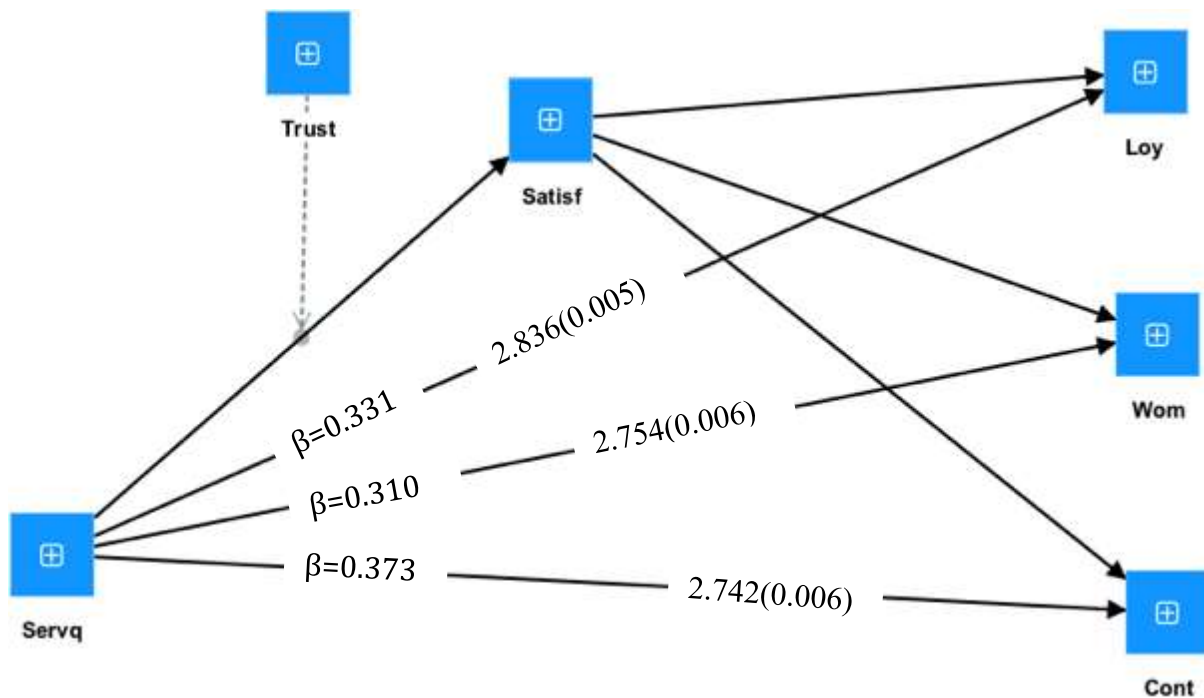


Figure 6.9: Moderated mediation due to perceived trust

Hypothesis 12e: The indirect effect of service quality on customer loyalty through satisfaction is moderated by trust such that higher levels of trust have significant and negative suppressing effect on the association.

Hypothesis 12f: The significant indirect effect of service quality on customer WoM through satisfaction is moderated by trust such that higher levels of trust have a significant and negative suppressing effect on the association.

Hypothesis 12b: The significant indirect effect of service quality on continuity with m-banking through satisfaction is moderated by trust such that higher levels of trust have a significant and negative suppressing effect on the relationship.

As depicted in Figure 6.9, the moderated mediated effect of trust on the indirect effect of service quality on customer loyalty through satisfaction was statistically significant with a CoMe index, $\omega = -0.054$ [CI: -0.109; -0.003]. The analysis revealed a bootstrap

$\beta=0.156$ at low levels of trust, and bootstrap $\beta=0.07$ at high levels of trust. Thus, trust dampened the indirect effect of service quality on loyalty, through satisfaction, contrary to the framing of hypothesis 12e, hence not supporting it. The moderated mediated effect of trust on the indirect effect of service quality on WOM through satisfaction was statistically significant, with a CoMe index, $\omega=-0.051$ [CI: -0.103; -0.004]. A bootstrap $\beta=0.066$ was established at high trust levels, and bootstrap $\beta=0.147$ at low levels of trust. This established a dampening effect of trust on the indirect effect of trust on WOM through satisfaction, thus not supporting the framing of hypothesis 12f. The moderated mediated effect of trust on the indirect effect of service quality on continuity through satisfaction also provided a statistically significant CoMe index, $\omega=-0.051$ [CI: -0.125; -0.003]. A bootstrap $\beta=0.079$ was established for high levels of trust, and a bootstrap $\beta=0.176$ for low levels of trust. This similarly confirmed a dampening effect of trust on the indirect association between service quality and continuity through satisfaction, thus contradicting the proposed polarity postulated in hypothesis 12b. Hence the hypothesis was not empirically supported. In terms of the stated objective 9, the empirical findings confirmed the postulated moderated mediation, notwithstanding that the moderation was opposite to how the hypotheses were framed. The results clarified that perceived trust provided significant interaction effects that suppressed the indirect effects that were identified.

6.4 OVERALL PURPOSE OF THE STUDY: ANTECEDENTS, MEDIATORS AND MODERATORS OF CONSUMER BEHAVIOURAL OUTCOMES OF M-BANKING USE

6.4.1 Antecedents of m-banking:

The study aimed to establish the total effects between the quality dimensions, social influence, compatibility, system use and customer satisfaction with the behavioural outcomes.

Table 6.2 captures the results of the total effects analysis.

Table 6.2: Summary of total effects analysis

PATH	β	T	p	Bias corrected CI	
				LLCI	ULCI
				2.50%	97.50%
Comp -> Cont	0.214	6.863	0.000	0.156	0.279
Comp -> Loy	0.188	5.916	0.000	0.130	0.254
Comp -> Satisf	0.186	6.420	0.000	0.134	0.249
Comp -> Use	0.373	8.537	0.000	0.287	0.457
Comp -> Wom	0.135	5.462	0.000	0.091	0.189
Cred -> Cont	0.045	2.252	0.024	0.010	0.089
Cred -> Loy	0.047	2.317	0.021	0.010	0.090
Cred -> Satisf	0.126	2.535	0.011	0.025	0.221
Cred -> Wom	0.059	2.376	0.018	0.014	0.111
Inforq -> Cont	0.198	6.328	0.000	0.140	0.261
Inforq -> Loy	0.174	6.473	0.000	0.125	0.230
Inforq -> PerfEx	0.228	3.547	0.000	0.097	0.345
Inforq -> Satisf	0.172	5.812	0.000	0.119	0.234
Inforq -> Use	0.345	6.995	0.000	0.250	0.443
Inforq -> Wom	0.125	5.594	0.000	0.085	0.174
PerfEx -> Cont	0.059	2.732	0.006	0.015	0.101
PerfEx -> Loy	0.052	2.681	0.007	0.014	0.090
PerfEx -> Satisf	0.051	2.629	0.009	0.014	0.090
PerfEx -> Use	0.102	2.740	0.006	0.026	0.174
PerfEx -> Wom	0.037	2.641	0.008	0.010	0.066
Satisf -> Cont	0.360	6.259	0.000	0.246	0.470
Satisf -> Loy	0.374	6.727	0.000	0.263	0.482
Satisf -> Wom	0.466	7.740	0.000	0.344	0.579
Servq -> Cont	0.047	2.172	0.030	0.005	0.089
Servq -> Loy	0.041	2.150	0.032	0.004	0.080
Servq -> PerfEx	0.101	1.990	0.047	0.003	0.200
Servq -> Satisf	0.041	2.124	0.034	0.004	0.079
Servq -> Use	0.081	2.217	0.027	0.008	0.152
Servq -> Wom	0.029	2.062	0.039	0.003	0.060
SocInf -> Cont	0.073	3.350	0.001	0.033	0.118
SocInf -> Loy	0.064	3.380	0.001	0.030	0.104

SocInf -> PerfEx	0.148	2.848	0.004	0.045	0.250
SocInf -> Satisf	0.063	3.338	0.001	0.029	0.104
SocInf -> Use	0.127	3.608	0.000	0.060	0.199
SocInf -> Wom	0.046	3.086	0.002	0.020	0.078
Sysq -> PerfEx	0.178	2.811	0.005	0.052	0.300
Sysq -> Satisf	0.007	0.348	0.728	-0.033	0.050
Sysq -> Use	0.015	0.350	0.727	-0.069	0.097
Trust -> Cont	0.061	2.796	0.005	0.024	0.111
Trust -> Loy	0.064	2.646	0.008	0.024	0.119
Trust -> Satisf	0.170	3.111	0.002	0.064	0.280
Trust -> Wom	0.079	2.677	0.007	0.029	0.146
Use -> Cont	0.573	14.396	0.000	0.492	0.645
Use -> Loy	0.505	11.610	0.000	0.412	0.585
Use -> Satisf	0.500	10.420	0.000	0.404	0.589
Use -> Wom	0.363	7.934	0.000	0.271	0.451

As outlined in the preceding Table, the total effects for all the hypothesised paths were statistically significant, except two: Sysq -> Satisf and Sysq -> Use. However, Sysq -> PerfEx was statistically significant, thus ascertaining the validity of system quality's relevance and contribution to the overall model. Otherwise, it would have been rendered obsolete. Hence, social influence, compatibility, system quality, service quality, information quality, performance expectancy, system use, satisfaction, perceived trust and perceived credibility were empirically ascertained to be direct and/or indirect antecedents of the behavioural outcomes of m-banking use (WOM, continuity, loyalty). The Table shows that the strongest total effects relate system use to satisfaction and system use to the behavioural outcomes: Use -> Cont (0.573); Use -> Loy (0.505); Use -> Satisf (0.500); Use -> WoM (0.363). This finding validates the pivotal role played by system use and satisfaction in the model as drivers of the behavioural outcomes. Concurrently, the finding strongly ascertains the relevance and theoretical validity of the behavioural outcomes postulated in the research model.

6.4.2 Mediators of m-banking:

This section describes the mediation effects between the primary exogenous variables (quality dimensions, social influence, and compatibility) and the behavioural outcomes.

Table 6.3 shows the mediation paths that were empirically supported.

Table 6.3: Mediation results analysis- summary

PATH	β	<i>P</i>	Bias corrected CI	
			LLCI	ULCI
			2.50%	2.50%
Inforq -> Use -> Satisf	0.117	0.000	0.075	0.170
Use -> Satisf -> WOM	0.169	0.000	0.116	0.232
Use -> Satisf -> Loy	0.136	0.000	0.094	0.192
Use -> Satisf -> Cont	0.131	0.000	0.084	0.191
Sysq -> PerfEx -> Use -> Satisf	0.007	0.049	0.002	0.017
Inforq -> PerfEx -> Use -> Satisf	0.010	0.037	0.003	0.023

Table 6.3 shows that four simple mediation paths and two serially mediated paths were statistically significant with CIs not spanning zero and thus empirically supported. This provided model evidence for the mediation role of system use, satisfaction and performance expectancy. Even though the magnitudes of all four mediation weights are relatively small ($\beta < 0.25$), the practical significance is that customers who use m-banking develop favourable behavioural dispositions if they are satisfied with their experience as the results show that satisfaction is a pivotal mediator. The two serial mediation paths have very small effect sizes, terminate with customer satisfaction, and have performance expectancy and use as the sequential mediators. The implication could be that performance expectancy from m-banking drives customers to use m-banking and this has a positive impact on the levels of customer satisfaction. A striking outcome of the analysis is that service quality and social influence do not feature in either form of mediation, suggesting that m-banking customers place less value on the two in terms of antecedence to satisfaction and behavioural outcomes.

6.4.3 Moderators of m-banking:

This section describes the moderation effects between the primary exogenous variables (quality dimensions, social influence, and compatibility) and the behavioural outcomes.

Table 6.4 shows the moderated paths that were empirically supported.

Table 6.4: Moderation results analysis- summary

PATH	Index	Path	SE	T	p
	ω	β			
Trust*Servq ->Satisf		0.110	0.033	3.334	0.001
Trust*Servq -> Satisf -> Loy	-0.054	0.331	0.031	2.836	0.005
Trust*Servq->satisf->WOM	-0.051	0.310	0.026	2.754	0.006
Trust*Servq->satisf->Cont	-0.051	0.373	0.031	2.742	0.006

Of the two proposed moderators, only perceived trust was empirically established to have a statistically significant interaction effect, even though it suppressed the relationships, contrary to the hypothesised strengthening effect. The perceived credibility of m-banking had no significant effect according to the validated model. The implication could be that m-banking customers predominantly view m-banking as well-established, and credible, so they attach little credence to any possible impact its fluctuation may have on their views about it. This is unlike the findings by Masrek et al. (2018) who established that perceived credibility had a strong association with customer satisfaction from m-banking. In contrast, in this study, perceived trust was established as inducing a statistically significant effect on the relationship between service quality and satisfaction. It shows that fluctuations in levels of trust impact the strength of the relationship between service quality and satisfaction. Notably, the moderation effect was contrary to how the hypotheses were framed because it suppressed the indirect relationships, thus not supporting the hypotheses.

This finding about perceived trust stands out as many extant studies have validated the role of trust as an antecedent to satisfaction and not as a moderator (e.g. Damabi

et al., 2018; Geebren et al., 2021; Slazus & Bick, 2022; Zhao & Bacao, 2020). The three moderated mediation paths due to perceived trust were validated in the model as all three were statically significant and had CoMe indices that were distinct from zero. However, they all had negative CoMe indices, implying a dampening effect of trust on the paths, contrary to the anticipated strengthening effects that were postulated. The practical relevance of this finding is that high levels of trust tend to suppress the association between service quality and each behavioural outcome through satisfaction. The model relevance of these findings is that they confirm and validate perceived trust as a moderator of the paths that ultimately lead to behavioural outcomes. This finding is ideal for investigation in future studies on m-banking and related fields as it suggests that, at the post-adoption level, higher levels of trust may lead to scepticism and ambivalence, contrary to how extant studies pitched at the adoption levels have validated its impact.

6.5 CHAPTER SUMMARY

The chapter commenced with a recapitulation of the study, outlining each study objective in tandem with the associated hypotheses. It discussed the findings per study hypotheses and illuminated the implications for each research objective. Findings were juxtaposed with relevant extant studies and the broader implications and insights were extrapolated. Next is the final chapter of the thesis, which concludes the research narrative. This closure is marked by specifying the contributions the study makes to theory and practice at the level of antecedents, mediators, moderators and behavioural outcomes of m-banking. Finally, the chapter outlines limitations inherent in the study's implementation, from conceptualisation to execution of the adopted blueprint. Lastly, recommendations for future studies and m-banking practitioners are outlined.

CHAPTER 7

CONCLUSIONS, IMPLICATIONS, CONTRIBUTIONS, RECOMMENDATIONS AND LIMITATIONS

7.1 INTRODUCTION

This chapter presents thematically framed conclusions from the discussion on research findings outlined in the preceding chapter. First, concluding discussions are framed at the level of antecedents, mediators, moderators and behavioural outcomes on the m-banking value chain. Second, the implications arising from the themed conclusions follow subsequently. Third, the chapter outlines the study's main contributions to the body of knowledge on m-banking and recommendations for m-banking industry practitioners.

7.2 CONCLUSIONS

The research objective-themed findings outlined in the previous chapter motivate the following conclusions regarding the overall purpose of the study as outlined in Chapter One of this thesis:

- Regarding antecedents to the behavioural outcomes, customer satisfaction and system use, both adapted from the DMISS model, empirical results confirmed them primary antecedents. The quality dimensions (system quality, information quality and service quality) from DMISS, social influence and performance expectancy (from the UTAUT) and compatibility (from IDT) were established to be antecedents to the stated primary outcomes. Hence their effects on the behavioural outcomes were mediated.
- Regarding mediation, performance expectancy (from the UTAUT), system use and satisfaction (from the DMISS) were empirically established to be mediators in the model.
- On moderation, there was no empirical evidence supporting the perceived credibility's role as a moderator. Empirical evidence was established for the interaction effect of perceived trust on the relationships between service quality, customer satisfaction and the behavioural outcomes, even though it was contrary to the hypothetical framing.

- Regarding the hypothesised behavioural outcomes (WOM, loyalty and continuity), empirical findings validated their theoretical relevance and practical significance. This was quantified by the R-square values and model predictive relevance (Q-square).
- Regarding the overall model, since the four subsets stipulated in the overall study purpose (antecedents, mediators, moderators and behavioural outcomes) were established, and empirically validated, the validity of the theoretical model proposed at the onset of the study was confirmed.

7.3 IMPLICATIONS

The implications of the findings outlined in the previous chapter are discussed below:

- *Regarding the relationship between the quality dimensions (as antecedents) and customer satisfaction (as a consequence) through either performance expectancy or system use (as mediators)*- consumer perceptions of satisfaction from m-banking, either directly consequent to the quality dimensions or through performance expectancy or system use, is vastly influenced by the quality of the information available on the m-banking channel, with service quality and system quality almost negligible in the customer's decision schema. Despite a medium-sized effect size, the findings revealed the stand-out dominance of information quality compared to the other two dimensions. Understanding this finding is important for m-banking practitioners because it suggests that their integrated marketing communication should place a premium on ensuring the information accessed on m-banking is specific, timely, accurate and has similar detail compared to visiting a bank branch.
- *Regarding the modelled relationships between performance expectancy, social influence and compatibility (as antecedents) with the use of m-banking (as a consequence), and hence contribution to the operationalised model*- empirically, compatibility of m-banking with consumer lifestyle and trends is the most impactful antecedent with a medium effect size. Hence it would be imperative to have a marketing and communication strategy on m-banking that prioritises compatibility of the service. Notably, performance expectancy is the least impactful, suggesting that for a typical consumer, performance is taken

for granted to a certain degree (hence not that elastic) thus not fluctuating in a manner that would impact the use of the service.

- *Regarding the theorised mediation sequence*, - serial mediation is extremely weak, and thus, focus is placed on simple mediation paths, which also have small effect sizes. The supported simple mediation paths show that, satisfaction is the stronger mediator compared to system use. Thus, it is imperative to recognise that behavioural outcomes are driven by quality dimensions, compatibility, performance expectancy, social influence, and system use, through customer satisfaction. This means that m-banking marketing strategies should focus on delivering customer satisfaction by optimising the customer experience with m-banking. Optimisation of the customer experience requires measures that address each primary driver: the quality dimensions, performance expectancy, social influence and compatibility. Optimisation of the customer experience will likely result in stronger direct and indirect effects on behavioural outcomes through customer satisfaction.
- *Regarding the theorised interaction effects*- trust's unexpected suppressive moderation effect on service quality, in contrast to perceived credibility, is important for the practitioner's strategic marketing tool-kit. Customers most probably consider m-banking to be well-established and thus credible. Investing resources into enhancing its perceived credibility may result in diminishing returns. The dampening effect of trust is concomitant with the inelastic effect of credibility because it suggests that as levels of trust in m-banking are elevated, the association between service quality and customer satisfaction as well as with each of the behavioural outcomes, is attenuated. This is evident in the validated simple moderation effect and the moderated mediation process model. This means that at high levels of trust, higher service quality neither translates to better customer satisfaction nor elevation in favourable behavioural outcomes. This finding suggests that investing in enhancing customer trust in m-banking should probably be done by addressing the information quality of m-banking and less on service quality. Even though counter-intuitive, this makes practical sense. Since m-banking is predominantly self-service (except on once-off service failure episodes) it makes sense for

customers to place a premium on the information quality available on m-banking rather than on service quality that may not be routinely pertinent.

- *Regarding the theorised behavioural outcomes-* all three were empirically validated as having moderate metrics: continuity had the highest in-sample explanatory power and it was at parity with customer loyalty in terms of the out-of-sample predictive relevance. Recapitulating this finding with the minimal effect of social influence among the primary antecedents ties in with the lower predictive relevance of word-of-mouth. The implication is that more traction for practitioners in terms of customer retention and value contribution lies in focusing on continuity disposition and customer loyalty. As social influence was established to be less impactful, WoM was similarly shown to be the least consequential behavioural outcome.

7.4 STUDY CONTRIBUTIONS

According to Wu and Du (2012), IS studies on consumer behaviour should focus on system usage and not just behavioural intention, which has been the overwhelming norm as scholars have explicitly or implicitly assumed that behavioural intention can be accepted as a surrogate for system use. In light of this background, this study purposely departed from this routine by conceptualising and operationalising a research model that put system use and customer satisfaction at the centre of the investigation. A review of most IS studies by Wu and Du (2012) showed that scholars have positioned behavioural intention (BI) as the ultimate dependent variable instead of system use emanating from the untested assumption of surrogacy of BI for system use. This trend continues more than a decade later as extant studies predominantly continue to focus on BI as the dependent variable (e.g. Bhuvana & Vasantha, 2019; Ho et al., 2020; Kumar et al., 2020; Mohapatra et al., 2020; Motiwalla et al., 2019; S. Singh & Srivastava, 2020). Wu and Du (2012) state that informed and beneficial research on consumer behaviour should be operationalised on theoretical frameworks beyond BI and incorporate system use as one of the endogenous variables, if not the ultimate dependent variable. In fact, instead of surrogacy, Istijanto and Handoko (2022) established that behavioural intention is an antecedent of actual system use. This study operationalised the finding by Wu and Du (2012) by not just incorporating

system use into the study model, but also investigating the behavioural outcomes of system use. This is a notable departure from the documented theoretical trend in studies focusing on m-banking in the IS sub-field.

7.4.1 Theoretical Contributions regarding Antecedents of the Behavioural Outcomes

In conceptualising antecedents to m-banking use and customer satisfaction, this study moved away from the predominant focus by m-banking scholars on adoption and/or behavioural intention (e.g. Agyei et al., 2020; Gharaibeh & Gharaibeh, 2020; Mohapatra et al., 2020; Owusu et al., 2021; Saji & Paul, 2018). By empirically validating the operationalised antecedents in an m-banking context, this study showed that the same theoretical constructs, exhaustively established as pre-cursors to adoption or intent, can equally confirm the use of m-banking and customer satisfaction. This contribution is pertinent because it shifts the theoretical discourse on m-banking up the pyramidal value chain as m-banking use becomes embedded in the consumer behavioural schema.

Next, by integrating two constructs from the UTAUT (social influence and performance expectancy) and one construct from the IDT (compatibility) into the DMISS predictors of system use, this study empirically demonstrated the outsized influence of the perceived compatibility of m-banking to its use. The findings also showed the dominant influence of system use among the antecedents to customer satisfaction, at near parity with compatibility's influence on system use. Reconciling these two findings shows the veracity of bringing together the IDT and DMISS theory constructs together. The literature review did not reveal any study in a m-banking context that brought such a dual interplay to the fore. Quite pertinent in the review is to indicate that the study showed the highly diminished influence of system quality and service quality as antecedents to system use. The essence of this contribution is that, when focusing on m-banking at the post-adoption phase, this finding shows that theoretical conceptualisation should not put much cognisance on system quality and service quality as customers probably take these for granted. This does not undermine the need to put similar emphasis on all validated pre-adoption constructs (including

system quality and service quality) for studies that are pitched at the m-banking adoption level of the value-chain.

This study contributes to the m-banking body of knowledge by empirically validating WoM, loyalty and continuity as behavioural outcomes of m-banking adoption and use, the primary antecedents of which are system use and customer satisfaction. It further shows that customer satisfaction influences behavioural outcomes more than system use. A review of extant literature did not show studies that spoke to the behavioural outcomes of m-banking adoption and use, let alone establish and quantify hierarchically, the drivers of these outcomes as explored in this study.

7.4.2 Theoretical contribution regarding mediators of the behavioural outcomes

This study empirically demonstrated the mediation roles of system use, satisfaction and performance expectancy. It further established that the most impactful mediation was provided by satisfaction between system use and behavioural outcomes. Many studies on m-banking have established some form of mediation framework (e.g. Damabi et al., 2018; Geebren et al., 2021; Motiwalla et al., 2019; Zhou et al., 2021) but a review of extant literature has not identified mediation that positioned behavioural outcomes as the ultimate consequent. Furthermore, this study contributes by validation of a serial mediation framework in an m-banking context, relating system quality and information quality (as predictors) with customer satisfaction (as the consequent), mediated by performance expectancy and system use (in that order). The validation of this type of serial mediation is not evident in the reviewed m-banking extant literature.

7.4.3 Theoretical contribution regarding moderators of behavioural outcomes

While previous studies have exhaustively investigated the antecedents of the adoption and use of m-banking (Aldammagh, Abdeljawad, & Obaid, 2021; Baptista & Oliveira, 2015; Boonsiritomachai & Pitchayadejanant, 2019) , the potential moderating effects of perceived credibility and trust on both its use and customer satisfaction has been largely unexplored, often with inconsistent findings. This study contributes by

establishing that, from a post-adoption m-banking study perspective, the consumer behaviour landscape prioritises perceived trust of the channel over its credibility. This is because trust was established to be the consequential moderator between the two, with respondents probably at a stage where they consider the credibility of m-banking to be a *fait-accomplis*. Having isolated perceived trust as the validated moderator, further analysis showed that the interaction was suppressive, instead of additive, as initially conceptualised on the basis of reviewed literature. Although unexpected, the results made logical sense because the framing of the hypotheses was premised on previous studies which are predominantly pitched at the adoption level of the m-banking value-chain. The results made sense when viewed from a post-adoption lens, that introduced previously unexplored behavioural outcomes. An emergent contribution is that, from a m-banking post-adoption perspective, higher levels of trusting m-banking undermine efforts made to improve the quality of the service provided to customers by banking consultants. This is a contrarian contribution as it goes against the grain of a positive association between elevation in service delivery and customer trust in an information system. However, this makes behavioural sense if viewed from a post-adoption milieu.

7.4.4 Theoretical contribution regarding the behavioural outcomes

Empirical extrapolation into investigating the behavioural outcomes of use and customer satisfaction has been occasionally recommended (Asnakew, 2020; Foroughi et al., 2019; Yuan et al., 2016) but largely not taken up. A few recent studies have investigated one of the three behavioural outcomes, not all three within the same study, as was done in this study (e.g. Nguyen et al., 2020; Tumewah & Kurniawan, 2020). This study makes a more impactful theoretical contribution by an empirically-backed proposition of outcome dimensions: WoM, continuity and loyalty. The empirical results established the constructs' veracity and significance in the m-banking context for the sampled population. As highlighted previously, extant studies on m-banking have focused on adoption, behavioural intention or system use and have not delved beyond that. By establishing behavioural outcomes, this study has moved the scholarly discourse on m-banking beyond adoption on the product engagement and experience curve.

7.4.5 Conclusion

This study has made a theoretical contribution by establishing and validating the antecedents, mediators and moderators of the m-banking value chain, with the behavioural outcomes at the apex of the pyramid. In the process, the study has established the relative weight and significance of each antecedent, mediator and moderator by looking at the effect sizes. At the level of primary antecedents, the study established the key roles of information quality and compatibility among the pool of exogenous variables. Similarly, the study showed the important role of customer satisfaction in the validated mediation paths. It also indicated that continuity was the more likely positive outcome from satisfied customers.

7.5 MANAGERIAL RECOMMENDATIONS

7.5.1 Recommendations at an antecedence level

The research findings have provided ample empirical evidence indicating that, within the South African context, m-banking is no longer a novel value-addition service for a niche market in the banking industry. It is accepted and utilised by mainstream bank customers. Hence, bank practitioners must keep promoting its adoption by new customers but dedicate more resources to strategies that address optimisation of continued use and favourable behavioural outcomes in the long run.

The study's findings suggest that focusing on the constructs that precede behavioural outcomes, m-banking practitioners should tailor a marketing mix strategy that prioritises information quality on the channel and compatibility of the m-banking channel with clients' routine use of their mobile devices. The results of the importance-performance map analysis provide further supporting evidence. Practically, this means ensuring that customer profiles have accurate information, and that account and transaction details are always accurate, and up to date. There should be no real-time lag between updating customers' information on the banking system accessible in the branches and the system accessed via mobile devices. Furthermore, it would be imperative to ensure that information about the various banking options and features is accessible on the m-banking portal as in the branch.

To optimise compatibility, the findings suggest that m-banking marketing practitioners should track what their customers routinely do on their mobile devices, e.g. on social media apps like Facebook, WhatsApp, Instagram and X. This can be done by the use of embedded cookies on the m-banking apps, subject to customers' informed consent. Practitioners need to reflect that, in this thesis, the sampled respondents answered mostly 'strongly agree' to survey statements like, "Using my mobile device to conduct mobile banking is quite similar to other activities I do on my mobile on a regular basis". Similarly, respondents strongly agreed with the statement: "The technology skills I already know are relevant for mobile banking". Compatibility implies seamless resonance between the navigation customers are familiar with on other mobile-device accessed platforms. Regarding technology skills, it could be beneficial if practitioners set up the m-banking navigation steps to be easily accessible with minimum complexity, without compromising security safeguards. A litmus test could be that if the customer can operate the cell phone for communication purposes, they should be able to access m-banking without much cognitive distress. Further analysis of the IPMA results shows that it would be prudent for banks to commit fewer resources to service quality and system quality of m-banking as these variables are viewed as less important by the customers. Such resources could be beneficially diverted to addressing information quality, compatibility and customer satisfaction.

7.5.2 Recommendations at a mediation level

The empirical results showed serial mediation between system quality, information quality and customer satisfaction, through performance expectancy and system use (in that order). However, the effect size in both cases was very weak. A moderate effect size was detected for the simple mediation between system use and behavioural outcomes through customer satisfaction. This mediation has practical relevance and practitioners would benefit by considering it in their m-banking marketing strategies. Since complementary partial mediation was established, practitioners could prioritise customer satisfaction in their m-banking package. This would entail a robust m-banking application interface that provides error-free account and transaction information for customers around the clock.

Optimal levels of customer satisfaction can be maintained using an integrated m-banking customer support system that uses service personnel and artificial intelligence

(chatbots). That way, the likelihood of service failure is mitigated around the clock, guaranteeing the availability of m-banking at any time and regardless of location. This is important because this 24-hour access is the channel's key differentiator and competitive advantage. The need to rigorously safeguard customer satisfaction as a validated partial and complimentary mediator is because some of the positive effect of system use on the behavioural outcomes (WoM, loyalty, continuity) are transmitted through customer satisfaction. So, optimising customer satisfaction would most likely boost the transmitted effect to behavioural outcomes.

7.5.3 Recommendations at a level of moderators

The insignificant interaction effect of perceived credibility suggests that, at a post-adoption level, customers consider it as equally authentic as the traditional brick-and-mortar access to banking services in the banking halls. The inelasticity of perceived credibility on influencing customer satisfaction was further reinforced by the insignificance of the proposed direct path between perceived credibility and satisfaction. So, banking practitioners are unlikely to produce much return on investment by investing resources in promoting its authenticity in the eyes of the banking public. The implication is that, when customers reach the post-adoption stage of m-banking, they are beyond equivocating about its credibility. Practically, this suggests that a tailored marketing strategy is pivotal when promoting m-banking. Messages packaged for the post-adoption customer segment need to focus on the robustness of the platform in terms of real-time account information updates, accuracy of the data, and adaptability.

In contrast, the proposed interaction effects of perceived trust were more nuanced and insightful. Nuanced because, similar to perceived credibility, the direct path between trust and satisfaction was established to be insignificant, but the interaction effect was established to be statistically significant in both the simple moderation, and the moderated mediation. Insightful because, while statistically significant, the proposed hypotheses were not supported since the interaction proved to be suppressive, instead of being additive, as was postulated. For practitioners, the finding suggested that, at the post-adoption level, fluctuations in perceptions of trust do not shift in tandem with customers' views of m-banking. Higher levels of trust do not bolster the relationships

between customer satisfaction and its antecedents, such as information quality, use, service quality, etc. Instead, it weakens them. Similarly, lower levels of trust strengthens these relationships. For practitioners, it would be counter-productive to implement measures that would undermine trust in their own flagship product. However, investing a lot of resources to boost levels of trust that are presumably already high at the post-adoption level may not be financially prudent.

At the post-adoption level, practitioners may be best-served by allocating resources in order to maintain the levels of trust at an equilibrium point, and not boost them. The explanation of the unexpected effect could be that, at the post-adoption level, customers may view bank-orchestrated campaigns aimed at boosting levels of trust with scepticism and suspicion because m-banking is largely a self-service channel for them. In order to maintain steady levels of trust, banks can implement security measures that minimise the risk of customers losing money through hacking and cyber-fraud. It is imperative that, without making m-banking access overly cumbersome, banks must implement security features as robust as the traditional mechanisms used to protect assets in the brick-and-mortar banking halls. To enhance security, banks can introduce biometric access into their m-banking apps e.g. voice, facial and iris recognition. Biometric access may prove to be less susceptible to hacking when compared with alphanumeric passwords. However, as trust in m-banking becomes embedded in the customer psyche, practitioners may need to utilise chatbots to address service quality issues to keep costs at a minimum. This is because the empirical results showed that high levels of trust dampen the association between service quality and customer satisfaction. This suggests that from a cost perspective, achieving acceptable service quality should be done at minimum cost as it is unlikely to translate to higher levels of customer satisfaction. Lastly, the findings leave an empirical gap regarding potential moderators that were not tested in this study. Examples that have been established in previous studies, though pitched at the pre-adoption level are gender, age, education level, financial literacy level and income levels.

7.5.4 Recommendations at a level of behavioural outcomes

To promote the continued use of m-banking, practitioners can incorporate chatbots to help customers navigate the m-banking portal around the clock. The foremost contribution to practice on this aspect is empirical validation that WoM, loyalty and continuity, are behavioural outcomes of m-banking use and customer satisfaction. Based on this, it would be imperative to tailor m-banking operational strategies to deliver desirable behavioural outcomes i.e. positive WoM, customer loyalty and its continued use. The statistical analysis established that loyalty had the strongest out-of-sample predictive relevance (Q-square) among the three behavioural outcomes. The practical implication is that banks may benefit by ensuring customers stay loyal to their brand. They can implement measures that raise switching costs and disincentivise bank-hopping. An example would be the design of tariff structures that charge the least fees for mobile transactions in general, especially those conducted in-house, but a lot higher across banks. This is contrary to outdated, legacy, bank-tariff structures that have historically focused on a customer's net-worth. Practitioners can use infomercials featuring testimonials by customers who disseminate positive word of mouth about their m-banking experiences and their loyalty to m-banking going forward. These can be aired in banking halls and the broadcast media. Such infomercials can also be aired via social media platforms like Facebook, X and Instagram. Like Oertzen and Odekerken-Schröder (2019), this study asserts that banks would benefit by incentivising current loyal customers to disseminate favourable WoM about m-banking. Furthermore, a review of m-banking success should move away from focusing on adoption and use of m-banking to metrics that measure behavioural outcomes as established in this thesis (word of mouth, loyalty, continuity, etc.).

7.5.5 Conclusion

The recommendations to practice span all four aspects of the outlined m-banking value chain from primary antecedents, mediators, moderators and behavioural outcomes. It showed that practitioners need to pay more strategic attention to compatibility, information quality, perceived trust, and the three behavioural outcome dimensions. Overall, while implementing strategies that drive the adoption and use of m-banking is still paramount, there is a need to segue the marketing strategies on m-

banking to the realm of post-adoption as the empirical findings revealed that is where many customers are.

7.6 LIMITATIONS OF THE RESEARCH FINDINGS

This study's contribution to the body of knowledge on m-banking is subject to some constraints that need to be highlighted as they potentially influence the findings and conclusions reached in this study. These limitations span the research design, the operationalised sampling techniques, the sample size, self-reported system-use data, and the survey method.

- *Research design*- quantitative descriptive research methods provide robust statistical measures about the polarity and magnitude of the association between variables. However, they do not provide cause-and-effect metrics, which are more relevant for practitioners. No causal extrapolations should be drawn from the research findings and conclusions outlined in this thesis regarding the use and behavioural outcomes of m-banking use. Related to this methodological constraint, the deeper, nuanced meaning and underlying drivers behind the observed quantifiable measures are undetermined by this study's once-off, cross-sectional research technique (Rahman, 2020). In this case, the method provides big-picture behavioural descriptors of the status quo regarding customer trends and disposition about m-banking. Implementing a cross-sectional research design to investigate m-banking consumer behaviour is not ideal, since it continuously undergoes change as more powerful and potent mobile devices get into the market each year (Alkhowaiter, 2020). This evolution may be better captured through a longitudinal study.
- *Sampling technique*- the non-probability sampling technique implemented in this study likely affected the sample's representativeness. The implementation of probability sampling techniques ideally obtains a representative sample. The spin-off from non-probability sampling techniques is the inability to generalise findings to the broader target population.

- *Sample size-* due to budget constraints associated with the hand-delivered questionnaire method, a sample size of 453 was settled upon. This was above the calculated threshold of 384 as per the sample size calculator. However, considering the size of the estimated banked population in the identified provinces, a much bigger sample size could have been better and probably produced more representative results, albeit based on a non-probabilistic sample.
- *Subjective actual system-use data-* self-reported (subjective) responses to questionnaire items dealing with the use of m-banking compared to machine-generated data (objective) from a bank's logging system is also a notable limitation. Self-reported survey responses have been established to sometimes not resemble actual consumer behaviour when compared to electronically logged data (Albashrawi & Motiwalla, 2017a).
- *The survey method-* A major disadvantage of hand-delivered questionnaires, used in this study, is the potential lack of representativeness among respondents who may not be accessible at the time field workers reach a survey area. This lack of access may eventually result in a biased sample.

7.7 RECOMMENDATIONS FOR FUTURE STUDIES

Recommendations for future related studies are indicated below.

- As antecedents to the use of m-banking, service quality and system quality were validated in previous studies on m-banking (e.g. Albashrawi & Motiwalla, 2020; Baabdullah et al., 2019; Jaafreh, 2017). However, in this study, the antecedence of system quality on system use was negligible while that of service quality was weak. At post-adoption level of m-banking, this study's findings deserve further exploration in future studies. Similarly, the stand-out role of information quality established in this study requires reinforcement from future studies in the m-banking context. The explanation in this study context was that, at the post-adoption level, the veracity and robustness of the information accessed through m-banking plays a prominent role in customer attitudes and dispositions since it is a self-service channel. This assertion needs further empirical interrogation in future studies. Furthermore, the validated

strong association between compatibility and system use, at near-parity with the information quality-system use association, prompts a question that was not tested in this study: what is the nature and strength of the association between compatibility and customer satisfaction within a m-banking context? This is a subject for future studies on m-banking.

- At the mediation level, the evaluation of performance expectancy, system use, and customer satisfaction as mediators revealed that all three tested serial mediation effects were supported in this study, but the effect sizes were small. It is imperative for future studies to empirically test these serial mediations and further probe the effect sizes. More importantly, under the theme of mediation, a number of paths that are evident in the operationalised structural model were not probed in detail in this study. Examples include the mediating role of performance expectancy between the quality dimensions and use of m-banking. Similarly, the potential serial mediation role of performance expectancy and use interceding between the quality dimensions and each of the behavioural outcomes (WOM, loyalty, continuity). Another unexplored serial mediation path involves use of m-banking and customer satisfaction interceding the relationship between social influence and the behavioural outcome sub-dimensions.
- The divergence between perceived credibility and perceived trust in which perceived trust was established to be the significant moderator provides an avenue for future studies. Future studies in a m-banking context, pitched at the post-adoption level should test for confirmation that perceived credibility is not a significant moderator of associations between the quality dimensions and customer satisfaction. Also subject to future interrogation is the possible interaction effect of perceived trust on system quality and information quality, not established in this study. More importantly, the unexpected dampening effect of perceived trust (as postulated on reviewed literature), even if it was explained, is ideal for further interrogation and validation in studies similarly pitched at the post-adoption level.
- The veracity of the validated m-banking behavioural outcomes (WOM, loyalty, continuity) is subject to future studies on m-banking pitched at the post-adoption level, because, as motivated in this study's literature review section, this has not been explored in much depth in extant studies. Validation in this study

provides a springboard for future studies to explore these behavioural outcomes further, and test other possible outcomes within the m-banking context.

- Studies pitched at the adoption level of the m-banking value-chain have previously established some effects of demographic factors like age, gender and employment status on the uptake of m-banking (e.g. Singh & Sinha, 2016; Veríssimo, 2016). Future studies may invoke other contextually-relevant constructs, e.g., from UTAUT2 (Venkatesh et al., 2012), like price value, age, gender, digital literacy and hedonic motivation. However, studies that have investigated the impact of demographic factors on the uptake of new technology in the banking sector have not been conclusive and often produced inconsistent findings on the role of these demographic factors (e.g. Cruz et al., 2010; Howcroft, Hamilton, & Hewer, 2002; Karjaluoto, Mattila, & Pento, 2002; Mattila, Karjaluoto, & Pento, 2003; Oumlil & Williams, 2000). Although descriptive statistics related to gender, age, employment status, income and education were reported, the thrust of this study was pitched at the post-adoption domain of the m-banking terrain, and, as such, probing the likely moderating or mediating effects of demographic factors was not considered objectively pertinent for this study. It was decided that focusing on the behavioural and attitudinal factors driving consumer behaviour and attitudes would provide sufficient empirical evidence to answer all the research questions posed at the onset of the study. It would be advisable for future studies to investigate the mediation or moderation role (or both) of some of these demographic factors on the inter-play that has been validated between the variables in this study model in a study pitched at the post-adoption level.
- The literature review strategy that was implemented in this study was based on a thematic-geographical paradigm. It revealed differences emanating from both the themes and geography. This dichotomy is a subject for future studies to undertake comparative empirical studies using the model that was validated in this study.

7.8 CHAPTER SUMMARY

The purpose of this chapter was to provide concluding remarks that spun-off from the research findings per the objective outlined in chapter six of the thesis. Conclusions were outlined per the research theme captured in the conceptual model shown in chapter one of the thesis: antecedence, mediation, moderation and behavioural outcomes. The thematic conclusions outlined in this chapter show that the study objectives were achieved. These conclusions were followed by an outline of the study's contributions to the body of knowledge on m-banking and recommendations for m-banking practitioners. This was followed by a discussion focusing on the limitations that impacted the research findings regarding the research design, sampling technique, sample size, data collection and survey techniques. Lastly, recommendations for future research were presented from this study's findings.

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APPENDIX A: Survey tool

Examining antecedents, moderators and outcomes of customer satisfaction with mobile banking use

Research Conducted by:

Mr F. Khoza (569728)

Dear Participant,

You are invited to participate in an academic research study conducted by Fhatani Khoza (contact: 0782226148), a doctoral student from the Wits Business School at the Witwatersrand University in Johannesburg.

The purpose of the study is to examine the factors that precede, mediate and moderate customer satisfaction with mobile banking, as well as the behavioural outcomes.

Please note the following:

- This is an anonymous questionnaire; therefore, your name will not appear on the questionnaire. The answers you provide will be treated as strictly confidential as you cannot be identified in person based on the answers you give.
- Your participation in this study is very important. However, this is a voluntary questionnaire, you may choose not to participate. You may also stop participating at any time, when answering this questionnaire, without any consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible. This should not take more than **15 minutes** of your time.
- The results of the study will be used solely for academic purposes and may be published in an academic journal. If requested, you may be provided with a summary of the findings.
- Please contact my supervisor, Dr. F, Saruchera: fanny.saruchera@wits.ac.za if you have any questions or comments regarding the study.

Please tick the box below to indicate that:

- You have read and understand the information provided above.

- You give your consent to participate in the study on a voluntary basis.

SURVEY INSTRUMENT

INSTRUCTIONS TO RESPONDENTS:

- *On a scale of 1 to 5, please indicate the degree to which you agree or disagree with each of the following statements regarding your experience/attitude/view about mobile banking. (1='Strongly disagree'; 5='Strongly agree'). Except for Yes/No questions.*
- *Where the pronoun "I" is used, this refers to you as a respondent.*
- *Definition: The survey defines mobile banking as all bank transactions done using cell phones, smart phones, iPADS, smart watches and similar mobile devices. It EXCLUDES laptops and desktops.*

Section 1: Screening Section


Please answer the questions below by ticking/clicking the appropriate box/icon next to each question.

1.1	Are you 18 years or older?	YES	NO
1.2	Do you own a bank account?	YES	NO

If you have answered no to any of these questions, please do not continue with the questionnaire. Thank you for your support. It is much appreciated.


Section 2: Performance experience/expectancy of mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree				Strongly Agree	
		1	2	3	4	5	
2.1	Using mobile banking improves/would improve my performance in conducting daily banking transactions.	1	2	3	4	5	
2.2	Using mobile banking makes it easier/would make it easier for me to conduct banking transactions.	1	2	3	4	5	
2.3	I find/would find mobile banking useful in conducting my banking transactions.	1	2	3	4	5	
2.4	I can manage my money through mobile banking without visiting the bank, anytime, anywhere.	1	2	3	4	5	
2.5	Mobile banking helps me accomplish tasks more quickly.	1	2	3	4	5	

Section 3: Social influence about mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree				Strongly Agree	
		1	2	3	4	5	
3.1	People who are important to me think that I should use mobile banking	1	2	3	4	5	
3.2	People who influence my behaviour think that I should use mobile banking	1	2	3	4	5	
3.3	People whose opinions that I value prefer that I use mobile banking	1	2	3	4	5	
3.4	I can manage my money through mobile banking without visiting the bank, anytime, anywhere.	1	2	3	4	5	

3.5	My friends, family and colleagues do most of their transactions using mobile banking.	1	2	3	4	5
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Section 4: System quality of mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree		→			Strongly Agree	
		1	2	3	4	5		
4.1	Mobile banking is easy to navigate.	1	2	3	4	5		
4.2	Mobile banking allows me to easily find the information I am looking for.	1	2	3	4	5		
4.3	Mobile banking loads up information I need on my device very quickly.	1	2	3	4	5		
4.4	Mobile banking is error-free most of the time I use my device.	1	2	3	4	5		
4.5	Mobile banking offers full functionality on my device.	1	2	3	4	5		


Section 5: Information quality of mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree				Strongly Agree	
		1	2	3	4	5	
5.1	The information provided by mobile banking is relevant.	1	2	3	4	5	
5.2	The information provided by mobile banking is accurate.	1	2	3	4	5	
5.3	The information provided by mobile banking is reliable.	1	2	3	4	5	
5.4	The information provided by mobile banking is complete.	1	2	3	4	5	
5.5	The information provided by mobile banking is up-to-date.	1	2	3	4	5	

Section 6: Service quality of mobile banking


Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree				Strongly Agree	
		1	2	3	4	5	
6.1	The responsible service personnel are always eager to help whenever I need support with the mobile banking.	1	2	3	4	5	
6.2	The responsible service personnel provide personal attention when I experience problems with the mobile banking.	1	2	3	4	5	

6.3	The responsible service personnel provide services related to the mobile banking at the promised time.	1	2	3	4	5
6.4	The responsible service personnel have sufficient knowledge to answer my questions regarding the mobile banking.	1	2	3	4	5
6.5	I am able to access a service agent quickly when I need assistance on mobile banking.	1	2	3	4	5


Section 7: Use of mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree					Strongly Agree	
		1	2	3	4	5		
7.1	I use mobile banking.	1	2	3	4	5		
7.2	I use mobile banking to manage my accounts.	1	2	3	4	5		
7.3	I use mobile banking to make transfers, pay bills and by goods and services.	1	2	3	4	5		
7.4	I subscribe to financial products and/or services that are accessible via mobile banking.	1	2	3	4	5		
7.5	Assuming that you have access to mobile banking services, rate your likelihood of using it.	1	2	3	4	5		


Section 8: Satisfaction from mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree				Strongly Agree	
		1	2	3	4	5	
8.1	I am satisfied that mobile banking meets my knowledge or information processing needs.	1	2	3	4	5	
8.2	I am satisfied with mobile banking efficiency.	1	2	3	4	5	
8.3	I am satisfied with mobile banking effectiveness.	1	2	3	4	5	
8.4	I am satisfied with the quality of mobile banking.	1	2	3	4	5	
8.5	Overall, I am satisfied with mobile banking.	1	2	3	4	5	

Section 9: Credibility of mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree				Strongly Agree	
		1	2	3	4	5	
9.1	Using mobile banking would not divulge my personal information.	1	2	3	4	5	
9.2	I consider/would consider mobile banking secure for conducting my banking transactions.	1	2	3	4	5	
9.3	I would find mobile banking secure in requiring and receiving other information, e.g. bank statements.	1	2	3	4	5	
9.4	I see no risk of me losing my money through mobile banking use.	1	2	3	4	5	
9.5	Overall, I consider mobile banking to be a credible and authentic transaction platform.	1	2	3	4	5	

Section 10: Trust in mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree		→			Strongly Agree	
		1	2	3	4	5		
10.1	Mobile banking seems trustworthy.	1	2	3	4	5		
102	Mobile banking is very reliable in safeguarding my assets.	1	2	3	4	5		
10.3	I believe my bank has my best interests on the mobile banking platform	1	2	3	4	5		
10.4	I consider conducting transactions on mobile banking to be safe and low risk	1	2	3	4	5		
10.5	Overall, I trust the mobile banking platform.	1	2	3	4	5		

Section 11: Compatibility of mobile banking


Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree		→			Strongly Agree	
		1	2	3	4	5		
11.1	I believe that using mobile banking fits/will fit my lifestyle.	1	2	3	4	5		
11.2	I believe that using mobile banking is/will be suitable for me.	1	2	3	4	5		

11.3	I believe that my mobile phone is compatible with mobile banking technology.	1	2	3	4	5
11.4	Using my mobile device to conduct mobile banking is quite similar to other activities I do on my mobile on a regular basis.	1	2	3	4	5
11.5	The technology skills I already know are relevant for mobile banking.	1	2	3	4	5

Section 12: Loyalty towards mobile banking


Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree				Strongly Agree
12.1	I will use mobile banking for other available services and products I need from my bank.	1	2	3	4	5
12.2	I am glad to use mobile banking than go into the bank branch.	1	2	3	4	5
12.3	I would expend extra effort to continue using mobile banking.	1	2	3	4	5
12.4	I am committed to making repeated use of mobile banking going forward.	1	2	3	4	5
12.5	I would continue using mobile banking, even at a higher access cost.	1	2	3	4	5
12.6	If my bank offered incentives for using other access options (e.g. visiting a branch), I would switch from mobile banking. (reverse coded)	1	2	3	4	5

12.7	As long as I remain a bank customer, I do not foresee myself stopping using mobile banking. (reverse coded)	1	2	3	4	5
12.8	Overall, I consider myself a loyal mobile banking customer.	1	2	3	4	5

Section 13: Word of mouth regarding mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree  Strongly Agree				
		1	2	3	4	5
13.1	I would recommend mobile banking to my family, friends and anyone who may seek my advice.	1	2	3	4	5
13.2	I say positive things about mobile banking to other people.	1	2	3	4	5
12.3	Have you recommended mobile banking to other people? Yes/No	1	2	3	4	5
13.4	I am likely to make negative comments about mobile banking to my friends and family. (reverse coded).	1	2	3	4	5
13.5	Overall, I say positive things about mobile banking.	1	2	3	4	5

Section 14: Continuity with mobile banking

Regarding your experience with mobile banking, or expectation of mobile banking, please indicate, by ticking the number that represents the extent to which you agree or disagree with each of the following statements on a scale of 1 to 5, where 1 = strongly disagree, and 5 = strongly agree.

Statements		Strongly Disagree		→			Strongly Agree	
		1	2	3	4	5		
14.1	I intend to continue using mobile banking going forward.	1	2	3	4	5		
14.2	I feel a commitment to continue using mobile banking.	1	2	3	4	5		
14.3	I would continue to use mobile banking even if it becomes more expensive to access.	1	2	3	4	5		
14.4	I would still continue to be a customer of the mobile banking.	1	2	3	4	5		
14.5	Overall, I intend to continue using mobile banking for most of my transactions	1	2	3	4	5		

Section 15: Demographic Section

Please type out your answer in the block provided.

15.1 What year were you born in?

Please answer the questions below by ticking the appropriate block.

15.2 Please indicate the gender you identify to.

Male	1
Female	2
Non-binary	3

Prefer not to answer	4
----------------------	---

15.3 Please indicate which income category you fall under, based on your gross **monthly** income before tax and any deductions.

R15 000 or less	1
R15 001 – R25 000	2
R25 001 – R35 000	3
R35 001 – R45 000	4
R45 001 – R55 999	5
R56 000 or more	6
Prefer not to answer	7

African/Black	1
Asian	2
Coloured	3
Indian	4
Caucasian/White	5
Other	6
Prefer not to answer	7

15.6 Please indicate your employment status

Unemployed	1
Half Day	2

15.5 Please indicate your education level

Secondary/High school	1
Certificate/Vocational	2
Diploma	3
Degree	4
Postgraduate degree	5
Prefer not to answer	6

Secondary/High school	1
Certificate/Vocational	2
Diploma	3
Degree	4
Postgraduate degree	5
Prefer not to answer	6

Temporary position	3
Contract basis	4
Full time employee	5
Self-employed	6
Prefer not to answer	7

***** END*****

Thank you for your participation. It is much appreciated.

APPENDIX B: Measurement scales

SECTION	CONSTRUCT	MEASUREMENT SCALE DERIVED FROM
1	<i>SCREENING</i>	<i>N/A</i>
2	Performance expectancy	Luarn & Lin, 2005; Baabdullah, Alalwan & Rana, 2019
3	Social influence	Baabdullah, Alalwan & Rana, 2019
4	System quality	Urbach et al, 2010; Tam & Oliveira, 2017
5	Information quality	Urbach et al, 2010
6	Service quality	Urbach et al, 2010
7	Use	Zhou et al, 2010; Koenig-Lewis et al, 2010
8	Satisfaction	Wu & Wang, 2006
9	Credibility	Luarn & Lin, 2005
10	Trust	Oliveira, 2014; Zhou, 2013
11	Compatibility	Koenig-Lewis et al., 2010
12	Loyalty	Petzer & De Meyer, 2011; Price & Arnould 1999; Ganesh, Arnold & Reynolds, 2000
13	Word of Mouth	Price & Arnould, 1999
14	Continuity	Cronin, Brady & Hult, 2000
15	<i>DEMOGRAPHIC</i>	<i>N/A</i>

APPENDIX C: Ethics clearance certificate



Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Khoza

CLEARANCE CERTIFICATE

PROTOCOL NUMBER: H23/01/09

PROJECT TITLE

Examining antecedents, mediators and moderators of consumer behavioural outcomes of mobile banking

INVESTIGATOR(S)

Mr F Khoza

SCHOOL/DEPARTMENT

Wits Business School/

DATE CONSIDERED

27 January 2023

DECISION OF THE COMMITTEE

Approved
Risk Level: Minimal

EXPIRY DATE

16 February 2026

DATE 17 February 2023

CHAIRPERSON



(Professor J Watermeyer)

cc: Supervisor : Prof F Saruchera

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **A SIGNED COPY** returned to the Secretary electronically. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. I/we agree to completion of a regular progress report. For Minimal and Low Risk studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.



Signature

20, 02, 2023.

Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX D: Consent form

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG



PROJECT TITLE: Examining antecedents, mediators and moderators of consumer behavioural outcomes of mobile banking

NAME OF RESEARCHER: Fhatani Khoza

I, _____ agree to participate in this research project.

I agree to the following: (please circle your response)

The research study was explained to me. I understand that this study seeks my views and attitudes regarding mobile banking.	Yes	No
I understand that I can volunteer to take part in the study	Yes	No
I understand that I can withdraw from completing the questionnaire at any time if I so wish.	Yes	No
I agree that my participation will remain anonymous (my name or other identifying data will not be used by the researcher in their research report	Yes	No
I understand that the information I provide will be used for academic purposes only.	Yes	No
I agree that other researchers may use the information I provide in my questionnaire (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	Yes	No

_____ (signature of participant)

_____ (name of participant)

_____ (date)

_____ (signature of researcher)

Fhatani Khoza (researcher's name)

_____ (date)

APPENDIX E: Editing memorandum

EDITING CONFIRMATION

To whom it may concern:

This memo serves to confirm that the manuscript/research project detailed below has been language-edited and/or proof-read.

Regards,

-SM001-

SM (Cert. Lang. Ed.)
Language Editor

Manuscript Title:

EXAMINING ANTECEDENTS, MEDIATORS AND MODERATORS OF CONSUMER
BEHAVIOURAL OUTCOMES OF MOBILE BANKING

Author:

FHATANI KHOZA

Issued on:

25/02/2024

Disclaimer:

The editors/proofreaders make(s) no claim as to the accuracy of the manuscript contents nor the objectives of the author. While all possible efforts have been made to ensure the text as edited is readable and grammatically correct, the author(s) have the option to accept or reject suggestions and trackable changes made to the document before submission.

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