

FACTORS INFLUENCING THE ACCEPTANCE OF DIGITAL BANKING: AN EMPIRICAL STUDY IN SOUTH AFRICA BASED ON THE ENHANCED TECHNOLOGY ACCEPTANCE MODEL

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ABSTRACT

Changing market conditions in the Financial Services Industry accelerated the Digital Transformation of retail banks and expanded the development of innovative and customer centric technologies. As Digital Banking offerings matured and cost pressures increased, changes were made to the operating models of banks and the “digital” concept evolved into more than a channel for accessing services. The author noted the opportunity to expand on the research conducted into mobile and online banking, by considering the factors that would drive acceptance of a fully-fledged Digital Branchless Bank in South Africa. An extended version of the Technology Acceptance Model has been identified as a suitable framework to determine the drivers of technology acceptance and the following significant relationships were identified after collecting data from 252 participants: Compatibility has a significant positive impact on Perceived Usefulness; Perceived Time Risk has a significant negative impact on Attitude; Trust has a significant positive impact on Perceived Usefulness; Perceived Usefulness has a significant positive impact on Attitude; Perceived Usefulness has a significant positive impact on Behavioural Intention; Perceived Ease of Use has a significant positive impact on Trust; Perceived Ease of Use has a significant positive impact on Attitude.

Key words: Digital Banking; Technology Acceptance Model (TAM); Factors; South Africa

INTRODUCTION

Traditional retail banking models with costly full-service branch infrastructure and limited integrated digital channels are transforming to adapt to the digital-era. This evolution has driven increased customer expectations around turnaround times, availability of customer service, a superior customer experience and ongoing competitive pricing. The banking landscape is changing rapidly and innovative models are being tested and deployed as an attempt by Financial Services (FS) companies to remain relevant in the digital era (Cuesta et al. 2015). Digital banking has its roots in the concept of financial inclusion with the aim of solving low banking penetration in the developing world. The availability, decreasing cost of cellular phone technology and the high penetration across the different wealth segments in the populations of these countries led to the development of mobile banking platforms to extend reach and availability of FS. These platforms were originally very basic in nature and leveraged ubiquitous mobile phone agnostic technology such as Unstructured Supplementary Service Data (USSD) (Pavithran et al. 2014). By 2008, these services had passed the initial pilot phases and were increasingly available and popular in markets such as the Philippines, South Africa and Kenya (Donner et al. 2008). The increasingly higher penetration of affordable smartphones has created opportunities for rich mobile banking platforms in developing economies such as India, the Philippines and South Africa (Pavithran et al. 2014). Research conducted on the

South African market has indicated that in 2016, 60% of the adult population had a smartphone and the majority accessed online services via their device (htxt.africa 2016). The success of mobile banking has led to further innovation in the digital space and banks are transforming their internal structures to be focused on digital solutions. Increased competition from innovative disruptors has forced banks to rethink their approach to customer awareness, acquisition and maintenance (Cuesta 2015).

Enhancing digital channels to accelerate customer adoption and increase loyalty have also been driven by FS providers. Customers' utilisation of digital channels reduces the banks' operating costs, distributes customer demand across multiple engagement channels and leads to increased profitability and customer loyalty (Xue et al. 2011). Even though more evolved versions of mobile banking and richer engagement platforms can be found in the developed world, the cost benefit has led to innovative solutions in developing economies to drive financial inclusion and low-cost banking to previously un-/underbanked individuals (Donner et al. 2008). Baxter and Vater (2014) stated that the digitisation of retail banking has been supported by the swift progress in broadband services and affordable smartphones. The transformation to digital has grown more urgent as various disruptors are entering the market with low-cost, digital-only platforms. Skinner (2014) took this argument further and stated that branch-based banking is not dead only because of technology, but what technology enables the customer to do. Providing the customer with suitable technology to maintain control of their finances and the expectation of always available banking services have become the norm, impacting the longevity of the traditional branch-based banking models. Kaufmann et al. (2015) noted that progress in the Information and Communication Technology (ICT) industry has changed the way customers engage with financial institutions. Customers' adaptation to mobile banking is rapidly increasing and driving banks to implement mobile channels at the centre of their distribution network. The recent challenges have been not only to deliver these capabilities, but architect a customer centric eco-system. On this point, Skinner (2014) stated that banks should be "designed for humans, not money". This is exactly where the radical digital innovations find its niche. Investigations by Egan (2015) indicated that banks in the United States of America (USA) are scaling back on physical infrastructure – Bank of America has reduced the number of branches by 10% and the ATM network by 2% during 2013 and 2014. Wonglimpiyarat (2014) found that many banks compete by applying new technologies, such as mobile banking, to enhance the capacity and infrastructure of the banking platform. Improved distribution and access to customers are achieved by entering strategic alliances with other industries to leverage partner delivery channels that ultimately improve customer experience.

There is an opportunity to evaluate the critical success factors for a digital banking offering, not only considering the application of technology in the solution, but the overall design and execution of the operating model. This study focused on methods to evaluate the acceptance of digital banking and what the critical success factors are from a customer perspective to achieve the necessary scale in South Africa for a sustainable business. In the instance of this project, the digital banking eco-system will include the Customer Value Proposition (CVP), the establishment of a digital only banking platform, the technology applied and partnerships created to deliver a comprehensive service offering to customers. The outcome of the research will inform the aspects that will drive adoption in the emerging and middle market of South Africa.

Considering the established nature of the South African banking industry and the magnitude of the incumbents, an increasingly competitive landscape will arise. The time pressure on the journey to digitisation has caused a market stir, but these organisations need to apply tremendous effort to complete the process. As these are established, integrated and complex organisations, the projects are resource intensive and carry numerous risks impacting the stability of the business. Based on the research from Cuesta et al (2015), three successive stages have been identified in digitisation process of banks:

The development of new products and channels in existing banks;

- i. Adaptation of the technological infrastructure; and
- ii. Transformation of the organisation to achieve strategic positioning in the digital environment.

This research considered the South African consumer market and its appetite to accept the offerings of a new digitally-driven bank launched in South Africa. Customers will be incentivised to predominantly engage with the bank via digital self-service channels. Considering the challenges in the market, such as financial literacy and education constraints, staffed physical points of presence will be implemented in a major South African retailer across the geography for high level servicing, customer acquisition and support.

The essential aim of this project was to answer the following research question: *Considering the planned launch of a new digital-only bank in South Africa, in association with a major retailer, what are the key factors that would drive customer and technology acceptance of the platform?*

The author conducted the necessary research into the frameworks and models that would aid in answering this question.

LITERATURE REVIEW

Mobile banking (m-banking) has been one of the recent, more widely applied technological advances in banking. Even though banks have been using ubiquitous and effective channels such as Automated Teller Machines (ATM), Internet Banking and Telephone Banking for traditional banking products, m-banking has proven to have a significant impact on the market (Date et al. 2012). M-banking has been in development in FS since the early 2000s, and many deployments, with varying levels of sophistication, have been seen to date. A key objective of m-banking; being universal, saw the development of original platforms on basic cellular communication technology, such as Short Message Service (SMS) and USSD, but have advanced to smartphone applications (SmartApps) with the increasingly higher penetration of smartphones (currently at 60% in the adult population in South Africa (htxt.africa 2016). The affordability and expanded use of smartphones in developing and developed economies have put financial institutions in the position to offer innovative products and services through enhanced digital channels. According to Karjaluo et al. (2013), the concept of digital banking has increasingly grasped the attention of banks, microfinance institutions, software companies and service providers as deployment of these platforms has indicated an array of key benefits. Considering these benefits in the context of the financial institution, it has been proven to:

- i. Extend client reach: The ability for customers to access banking services remotely;
- ii. Improve customer retention: Convenience of always available and cost-effective banking drives increased customer loyalty;

- iii. Enhance operational efficiencies: Less reliance on physical footprints and the associated staff complement;
- iv. Increase market share: Driven by the convenience of and solutions for financial needs in a real-time process; and
- v. Create more employment opportunities: Downstream and upstream employment creation in sectors such as technology, field services, deployment specialists and network infrastructure development.

Dineshwar and Steven (2013) commented that despite the seemingly obvious benefits of m-banking and the high volume of smartphone and tablet sales, the service is not as commonly adopted as expected. There are use-case specific reasons for this behaviour; however, a key contributor relates to the intention of the original platform and extended strategic imperatives sought.

The adoption of digital banking

Considering the focus on Financial Technology (FinTech), financial inclusion and transformation of banking models, many case studies have been completed on m-banking and its adoption. Moser (2013) stated that in 2012, m-banking adoption was still low, even in established markets. This is contrary to the optimistic forecasts made in historical research, anticipating the impact of the technology on the future of banking. Moser (2013) also raised the question, whether m-banking is a fashionable rather than an industrialised concept. After an investigation into the slower than anticipated adoption of m-banking, Moser (2013:172) summarised the market as follows: "Mobile Banking is likely to experience a broad adoption over the next years – however, external factors might lead to fashionable phases with peaks in attention and expectations". The research concluded that after the thorough analysis of more than 13 years of academic and investigative literature, a positive incline is visible in the overall adoption cycle. Even though the lifecycle shows some fashionable aspects during the adoption cycle, m-banking is expected to see an overall increased adoption rate. These findings are an important consideration in this project, as the customer research needs to recognise the long-term adoption drivers, rather than the initial early adopters hype. With the introduction of a comprehensive digital model in the South African banking landscape, it is necessary to analyse the precursors to the solution being the adoption to digital channels. Campbell and Frei (2010) found that early customer adoption of digital channels is impacted, when:

- i. The channels serve as a substitution for more expensive channels; and
- ii. Services are augmented in traditional full-service channels (call centres and branches) in ways, where the customer sees value and transformation in the organisational strategy.

Models used in establishing technology acceptance

In 2015, a literature review on m-banking adoption by Shaikh and Karjaluo (2015) considered 55 academic publications from January 2005 – March 2015. In this literature review, the authors discovered the application of 12 models, namely: Technology Acceptance Model (TAM), Extended Technology Acceptance Model (TAM+), Innovation Diffusion Theory (IDT) / Diffusion of Innovation Theory (DOI), Elaboration Likelihood Model (ELM), Self Service Technology Attitude (SST A) /

Intention to Use Model (IUM), Task Technology Fit (TTF), Theory of Planned Behaviour (TPB), Unified Theory of Acceptance and Use of Technology (UTAUT), Ubiquitous Computing Framework (UCF), Benefit Cost Framework (BCF), Rausch Measurement Model (RMM) and the Self-developed Model (SDM).

The information obtained in the analysis was reduced to identify the models utilised most frequently. As indicated in **Error! Reference source not found.**, TAM+ accounted for 15 occurrences (27%), SDM also accounted for 15 occurrences (27%), TAM accounted for 6 occurrences (11%) and UTUAT accounted for 5 occurrences (9%). From this analysis, the TAM+ and SDM models have been applied to developing economies most frequently. The applications have been differentiated between Developed and Developing Economies to determine suitability to the South African market.

Table 1: Models with the highest frequency of application (summarised)

Model	Developing Economy (DE)	Developed Economy (D)	Conceptual	Total
TAM+	13	1	1	15
SDM	12	2	1	15
TAM	5	1	0	6
UTAUT	3	2	0	5

As the potential models have been identified, the next step was to identify the factors tested in these models, and where strong association to Attitude (A) and Behavioural Intention (BI) could be established. **Error! Reference source not found.** indicates the factors most frequently tested in similar research projects.

Table 2: Factors tested in technology acceptance research

Factor	TAM+ DE	TAM+ D	SDM DE	SDM D	Influence on A	Influence on BI	Total Occurrences
Perceived Usefulness (PU)	11	2	1	1	0.342	0.380	15
Perceived Ease of Use (PEU)	7		1		0.246	0.278	8
Credibility	6				n/a*	0.254	6
Attitude towards use	3	2	1		-	0.372	6
Social influence / subjective norm	2	1	2		n/a*	0.244	5
Trust	2		2		n/a*	0.338	4
Perceived risk	3	1			n/a*	-0.148	4
Compatibility (lifestyle, device)	1	2	1		0.231	0.446	4
Security	1	1	1	1	-	-	4
Cost	2	1			n/a*	0.182	3
Self-efficacy	2				n/a*	0.229	2
Relative advantage	1		1		0.381	n/a*	2

The Development of the Technology Acceptance Model

From **Error! Reference source not found.**, it was identified that TAM+ was the most frequently applied model in DE and therefore selected for application in South Africa. To adequately assess the TAM+ model, the research started with the investigation to TAM. The integration of technology into users' personal and professional lives and the drivers of the decision to accept or reject a solution, has led to various theoretical developments. Fred Davis introduced the TAM 28 years ago, and it has subsequently become the benchmark model (Granić & Marangunić 2013). Singh and Padhi (2015:109) stated that TAM is an important theoretical framework that finds relevance in the context of Information and Communications Technology (ICT) adoption in the financial (specifically microfinance) sector. The ultimate goal in applying the TAM theory is to extract the determinants of technology adoption by analysing the end-user behaviour (Davis et al. 1989) as indicated in **Error! Reference source not found.**

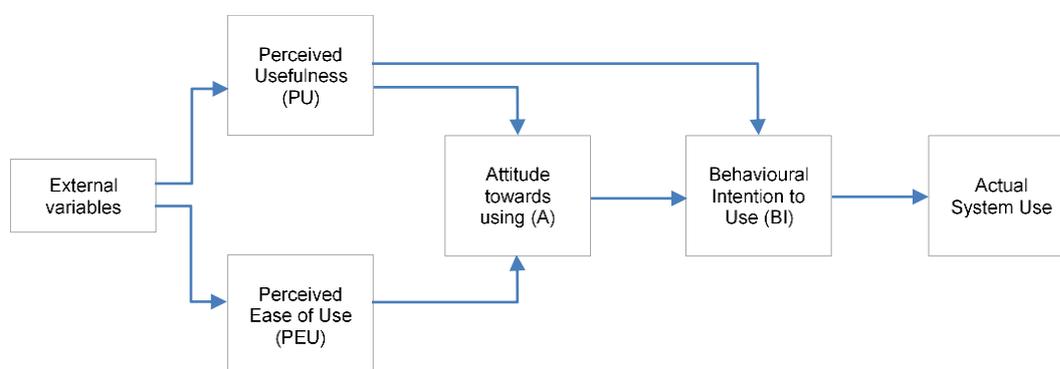


Figure 1: The basic TAM definition (Davis et al. 1989)

TAM developed from the psychology-based theory of reasonable action (TRA) and theory of planned behaviour (TPB). Application of TAM in research requires that the user understands the origins, modifications and developments of the model to accurately apply the model. Ajzen and Fishbein (1980) developed the TRA. It aims at understanding the behavioural intentions rather than the attitude. The theory is underpinned by the belief that individuals are rational and make systematic use of available information. The model suggests that a person's behaviour could be analysed, using their prior intention along with the beliefs the person would have for the given behaviour. With more widespread application of the model, its limitations became evident. One of the main limitations came to light, when certain individuals felt that they had little power over their behaviour and attitude. The limitation of the model led to the addition of a third dimension to create the TPB model. This element, the concept of perceived behavioural control aimed to estimate the level of behaviours that individuals have incomplete control over. Granić and Marangunić (2013:84) described the TPB model as follows:

“According to TPB, the individual's performance of the certain behaviour is determined by their intent to perform that behaviour. The intent is itself informed by attitudes toward the behaviour, subjective norms about engaging in the behaviour, and perceptions about whether the individual will be able to successfully engage in the target behaviour or not.”

The TPB model includes a framework that creates a direct connection between the perceived behavioural control and behavioural achievement. This link aims to differentiate between the views that individuals have on their own abilities, and whether they have confidence in completing a task successfully. The aim is to highlight the motivational influences that are not under the individual's control. However, the model's emphasis on this also created its strongest weakness – in the event, when an individual does not represent a clear behaviour not under complete control. The attributes describing the individual; i.e., demographics and personality, are not taken into consideration and do not fully define the individual's characteristics. There are various dimensions that influence the actual behavioural control and the TPB model assumptions do not have the rigidity to take these into consideration (Mathieson 1991). Fred Davis adapted the theory of reasoned action and planned behaviour and culminated these theories into TAM. Davis extended the TRA and TPB models for predicting behaviour by focusing on the individual's attitude towards a system rather than the subjective norm; and the two beliefs of perceived usefulness and perceived ease of use (Davis 1989).

At the core of the TAM model is the hypothesis that attitude of the user towards the system is a major determinant of whether the user will accept or reject the technology. PU and PEU, and the relationship between the concepts have been established as the drivers for attitude. PU is defined as the degree to which a person believes that using a specific form of technology would improve job performance. PEU, defined as the extent to which a person would go to apply the technology, forms the cornerstone of TAM (Granić & Marangunić 2013). After practical experimentation with TAM, Davis concluded that original hypothesis of the direct relationship between attitude as driver for PU and PEU is not always a valid assumption. This discovery led to an enhancement of the TAM model, where behavioural intention was included as a new variable. The goal with adding the behavioural intention was to cater for instances, where an individual perceived a system as useful and indicated strong behaviour to use the system, without an indicative attitude towards the system (Bagozzi et al. 1989).

Extensions to the Technology Acceptance Model

Based on the research conducted by Shaikh and Karjaluoto (2015) and the factors identified in **Error! Reference source not found.**, the research focused on applications of TAM+ with these components as extensions. Wentzel et al. (2013) stated that many studies have successfully applied TAM to predict the acceptance to information technology solutions in the workplace. This success has driven the application of TAM beyond the workplace environment; e.g., consumer services, where limitations have been experienced in applying the framework. This has led to the development of extensions to the TAM model. According to Venkatesh and Davis (2000), the first noteworthy extension led to the development of TAM 2, whereby social and organisational variables have been included in the testing criteria. Their research concluded that these factors have a direct impact on perceived usefulness. After establishing that context characteristics in addition to personal characteristics influence the level of technology acceptance, Chuttur (2009) also stated that additional factors need to be considered, when applying TAM. Wentzel et al. (2013) found 19 articles in their research that apply enhancements to TAM in the study for the acceptance of technology-enabled financial services. This conclusion emphasises the importance of deploying an enhanced, but proven model to the research to derive market-specific and useful results. To draw a correlation between the extended variables and the core constructs of the theory, Shaikh & Karjaluoto (2015)

conducted an analysis of the factors tested in the studies and their associated impact on the behavioural intentions to technology. To assess the significance of these factors for explaining attitude towards, intention to use and usage of m-banking services, a meta-analysis has been conducted on the top most applied factors to enhance the core of the TAM.

TAM enhancements for testing in financial services

Research conducted by Manocherhi and Sundarraj (2014) applied an enhanced model of TAM to determine the factors impacting the acceptance to online banking services. Based on conclusions from their research, Compatibility and Trust were identified as factors impacting online services and therefore introduced to the TAM. Agarwal and Karahanna (1998) described Compatibility as the relationship of the technology to a person's values, prior experienced and preferred style. Manocherhi and Sunderraj (2011) found a relationship between Compatibility and PU.

A second enhancement to the TAM model by Manocherhi and Sundarraj (2014) introduced the impact of Trust described as "the prediction of confidence on an action, based on what a party knows about another party" (Manocherhi & Sunderraj 2011:4). It was hypothesised that PEU impacted Trust, whereby Trust in turn impacts PU and Attitude. As hypothesised in the research model, conclusions from the research indicated that Compatibility and Trust have a significant impact on PU and that PEU impacts trust.

Various publications have highlighted the numerous advantages of m-banking and its evolution to driving the digital bank of the future. However, despite this expectation regarding its adoption, Akutran and Tezcan (2012) conducted further studies to establish, why customers still primarily access online banking services via the internet. The focus of their study was on understanding the Perceived Risks and Benefits to the adoption of mobile banking services by applying the enhanced version of TAM. The study hypothesised that the various categories of Perceived Risk have a negative impact on the Behavioural Intention to use m-banking.

This study has specifically been chosen based on its focus on understanding risks in the categories well as the focus on the youth market. The understanding of risks will also be an important factor in the study of the South African market. The outcomes of the research indicated that the perceived benefit and perceived risks are major determinants of the attitude towards m-banking.

A study conducted by Wentzel et al. (2013) indicated that various extensions of TAM were developed to cater for economic and demographic factors as well as other external variables. The research group applied grounded theory to categorise these constructs into five broad categories. This methodology enabled the analysis of the extended concepts in relation to the original TAM components and drew the necessary hypotheses. The extended model developed by Wentzel et al. (2013) applied Trust, Social, Hedonistic, Task and Self-efficacy as factors influencing the Behavioural Intention.

Hanafizadeh et al. (2014) investigated the growth of electronic communication and how this impacted the adoption of mobile banking. Based on their research and hypothesis of the market, they applied Compatibility, Trust, Perceived Cost of Use, Perceived Risk and Credibility as extensions to TAM impacting the Behavioural Intention.

The outcomes of the research indicated that the original hypotheses were valid and that Compatibility and Trust have a strong positive influence on the intention to use m-banking; Credibility had a moderate positive impact on the Behavioural Intention, and Perceived Cost and Risk had a negative impact.

PROPOSED MODEL

The factors with the highest frequency of application in TAM+ (DE), based on the research from Shaikh and Karjaluoto (2015), were used to find suitable applied models in online/mobile banking. Based on the outcomes from these studies, hypotheses were formulated. **Error! Reference source not found.** encapsulates the model derived from this process.

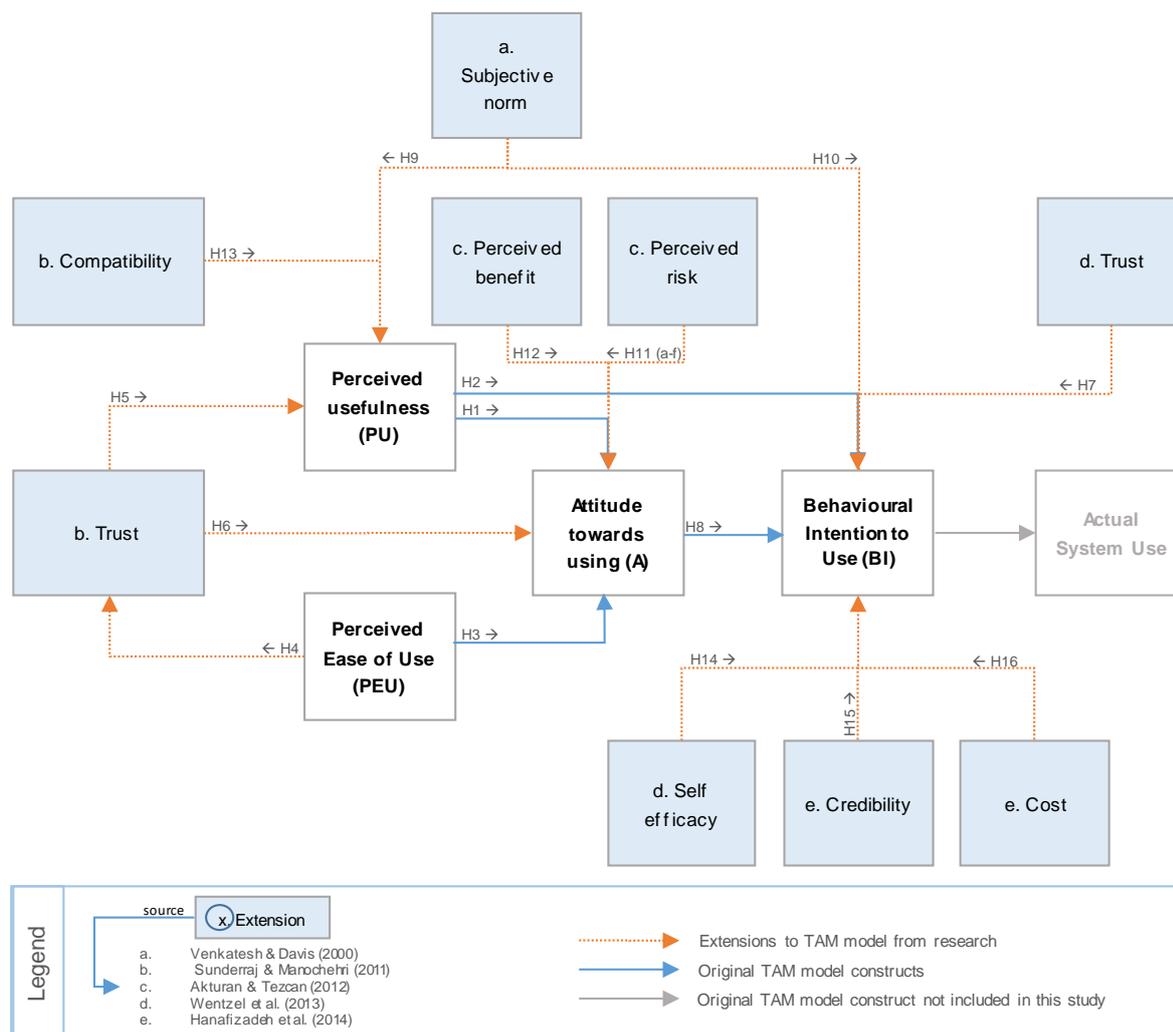


Figure 2: Conceptual Model for Establishing the Factors driving Adoption to Digital Banking

In the relevant context of this research project, the factors were defined according to the descriptions in **Error! Reference source not found.**. These factors were identified and examples of its application in online banking services researched.

Table 3: Description of factors tested in the conceptual model

Number	Factor	Author	Description	Reason for inclusion
F1	Perceived usefulness (PU)	Marangunic & Granic (2013)	The degree to which a person believes that using a specific form of technology would improve job performance.	Core to TAM methodology
F2	Perceived ease of use (PEU)	Marangunic & Granic (2013)	The extent to which a person would go to apply the technology in the intended manner, based on the expected ease of use.	Core to TAM methodology
F3	Credibility	Hanafizadeh et al. (2014)	"Credibility is defined as the trustability of a system and its capacity in transferring and doing transactions..." (Hanafizadeh et al. 2014:68)	Credibility has been identified to impact the adoption of mobile banking. The credibility of the technology also related to the perceived risk that users see in the application of the technology.
F4	Attitude (A) towards use	Sunderraj & Manocheri (2011)	Attitude of the user towards the application of the technology.	Core to TAM methodology
F5	Social influence / subjective norm	Venkatesh & Davis (2000) Wentzel et al. (2013)	"...The influence of others on the user's decision to use or not to use the technology" (Marangunic & Granic 2013:86). "Related to how individuals perceive themselves within their broader social context, and in particular how they perceive that others would view their decisions" (Wentzel et al. 2013:663)	People may choose to perform behaviours, even if they do not have a favourable position to it themselves since referents think they should. Various studies of applying TAM in banking, i.e., internet, mobile and e-commerce, (applied as an extension).
F6	Trust	Sunderraj & Manocheri (2011)	"...the prediction of confidence in an action based on what a party knows about another party." (Sunderraj & Manocheri 2011:4)	Trust is an important element in defining a relationship, the nature of digital banking being remote (as is the case with internet banking in the study), the parties cannot be verified and the decision to accept is based on the nature of the trust in the relationship.
F7	Perceived risk	Akturan & Tezkan (2012)	"...the nature and amount of risk perceived by a consumer in contemplating the particular purchase decision" (Akturan & Tezkan 2012:447)	Perceived risk has been identified as having an influence on the adoption of technology, specifically in cases, where personal finances are involved, such as mobile banking. <i>Note:</i> Security as an extension has been included as security risk as opposed to the standalone measure of the variable.
F8	Compatibility (lifestyle, device)	Sunderraj & Manocheri (2011)	"...whether an innovation is consistent with the needs and past experiences of potential adopters..." (Sunderraj & Manocheri 2011:3)	It has been established that compatibility is a factor that influences the acceptance of innovation. When the application of technology does not align with an individual's needs, it may lead to rejection.
F9	Cost	Hanafizadeh et al. (2014)	The impact of the perceived cost to use the technology, i.e., the higher the cost, the more reluctant a user will be to use the technology.	The study has been applied to mobile banking and aims to understand the cost pressures associated with adoption to the technology.
F10	Self-efficacy	Wentzel et al. (2013)	"...belief that one has the capabilities to execute the courses of actions required to manage prospective situations and the	The study has relevance to mobile banking and was applied in the South African environment.

			various emotions associated with executing such decision” (Wentzel et al. 2013:662)	
F11	Perceived benefit / Relative advantage	Akturan & Tezcan (2012)	“...consumers generally engage in ‘cost-benefit’ analysis, when selecting a decision-making procedure... in studying mobile banking, it has been suggested the customer’s purchase of a product includes cognitive and affective evaluation of utilitarian and hedonistic benefits” (Akturan & Tezcan 2012:449).	It has been established as a factor with a positive influence on BI in a study assessing internet banking.

The Conceptual Model and the factors identified in financial services acceptance research, guided the development of the hypotheses summarised in **Error! Reference source not found.** The data collection and analysis phase was centred around the methods to determine whether these hypotheses should be accepted or rejected when applied to the acceptance of a digital bank in South Africa.

Table 4: Hypotheses formulated from the conceptual model

Hypothesis Number	Hypothesis
H1	PU positively impacts the attitude towards digital banking.
H2	PU positively impacts the BI to use digital banking.
H3	PEU positively impacts the attitude of an individual to use digital banking.
H4	PEU has a positive impact on trust of digital banking.
H5	Trust has a positive impact on PU of digital banking.
H6	Trust has a positive effect on the attitude towards digital banking.
H7	Trust has a positive effect on the BI to use digital banking.
H8	The Attitude of the user towards the digital banking has a positive impact on the BI to use digital banking.
H9	The Subjective Norm / Social Influence has a positive impact on PU of digital banking.
H10	The Subjective Norm / Social Influence has a positive impact on BI of digital banking.
H11a	Perceived Performance Risks negatively impact the user’s attitude towards digital banking (includes the presence of psychological risk, indicating the risk related to the selection of the producer of the service)
H11b	Perceived Financial Risks negatively impact the user’s attitude towards digital banking.
H11c	Perceived Time Risks negatively impact the user’s attitude towards digital banking.
H11d	Perceived Social Risks negatively impact the user’s attitude towards digital banking
H11e	Perceived Privacy Risks negatively impact the user’s attitude towards digital banking.
H11f	Perceived Security Risks negatively impact the user’s attitude towards digital banking.
H12	Perceived benefit positively impacts the attitude to use digital banking products and services.
H13	Compatibility positively impacts the PU of the system.
H14	Self-efficacy negatively impacts the user’s BI towards the system.
H15	The Credibility of the technology positively impacts the BI to digital banking.
H16	The Perceived Cost of using the technology negatively impacts the BI of digital banking.

RESEARCH METHOD

The concept of a fully-fledged end-to-end digital bank will be a new concept in South Africa. Thus, the aim of the research was to test the acceptance of digital banking, which is more than the utilisation of mobile banking as a channel. The aim is to test the acceptance of a new digital-only bank. Therefore, the target audience was any person eligible for transactional banking products

(over 16 years of age), but specifically individuals currently using mobile banking and/or familiar with the digital concept of banking. The research was conducted using online surveys as well as structured interviews with the same questionnaire (for less educated individuals or individuals who do not have access to a computer). These two methods have been selected to ensure a broad approach to obtain a statistically significant population. To enable further categorisation and control of the data, information related to the individual, which does not divulge anonymity, was collected. This included: Age; Gender; Highest level of education; Current main bank; Province of residence most of the year; and Employment.

In the early stages of data collection, it was noted that the online survey was skewed towards well-educated participants. With the concern that the level of education may have an impact on the results, the facilitated discussions were initiated to collect data from a broader group of individuals. Fifty-two (52) responses were obtained from online survey (Survey Monkey) and 210 responses from the facilitated questionnaires. In total, 262 responses were obtained and 252 of the 262 (96%) completed the full questionnaire. The following summarise the nature of the acquired data:

- i. 52.31% of participants were male;
- ii. 39.15% of participants were between the ages of 26 – 35;
- iii. 31.40% of participants bank with First National Bank;
- iv. 80.77% of participants have a secondary education;
- v. 42.69% of participants live in the Free State;
- vi. 65% of participants were employed full time;
- vii. 87.31% of participants currently use a form a mobile banking.

RESULTS

Summary of descriptive statistics

To summarise the data, **Error! Reference source not found.** contains information related to the number of completed responses, minimum and maximum values, the mean, Cronbach's Alpha to confirm internal consistency and the standard deviation in the spread of the responses. The following outcomes provide insights to the descriptive statistics:

Most participants agreed with the statements around the Perceived Usefulness (F1), Perceived Ease of Use (F2), Credibility (F3), Attitude (F4), Self-efficacy (F10) and Perceived Benefit (F11). When comparing the Standard Deviation to the Mean, it can be deduced that the spread in the data is small and less than one response upwards or downwards. This result is not unexpected as the overall goal of digital banking is to deliver value to customers in the sense of a superior offering and convenience.

Most participants chose a response between "Neutral" and "Agree" for Trust (F6) and Compatibility (F8). When comparing the Standard Deviation to the Mean, it can be deduced that the spread in the data is small and less than one response upwards or downwards. This result indicates the level of scepticism that some individuals still have related to the trust in the technology and the concern, whether they would use it correctly.

Most participants chose a response below “Neutral” for Subjective Norm (F5), Perceived Time Risk (F7.4) and Cost (F9). When comparing the Standard Deviation to the Mean, it can be deduced that the Standard Deviation is more significant in relation to the value of the Mean, therefore indicating a broader

Table 5: Summary descriptive statistics

Variable	Description	N	Cronbach's Alpha	Mean	Std. Deviation
F1	Perceived Usefulness	252	0.841	3.8909	0.77208
F2	Perceived Ease of Use	252	0.887	4.0913	0.74283
F3	Credibility	252	0.867	3.7632	0.82616
F4	Attitude	252	0.964	4.0893	0.85675
F5	Subjective Norm	252	0.859	2.8757	1.03949
F6	Trust	252	0.901	3.4206	0.84231
F7.1	Perceived Social Risk	252	0.781	2.6587	0.97144
F7.2	Perceived Performance Risk	252	0.746	2.9643	0.97310
F7.3	Perceived Financial Risk	252	0.872	2.7857	0.90828
F7.4	Perceived Time Risk	252	0.812	2.5714	0.94267
F7.5	Perceived Security Risk	252	0.652	3.0397	0.83378
F7.6	Perceived Privacy Risk	252	0.830	3.5159	0.87066
F8	Compatibility	252	0.830	3.9004	0.87409
F9	Cost	252	0.813	2.8413	1.00966
F10	Self-efficacy	252	0.869	4.1230	0.81342
F11	Perceived Benefit	252	0.807	3.9220	0.82168

Linear regression

A first round of analysis with and without the control variables of Gender, Age, Education and Employment indicate that these factors have a low R^2 value and do not have a significant β -value impact on any of the dependant variables. However, control variables are necessary to the regression models as one wants to remove their effect from the equation. By using hierarchical linear regression (in this research the control variables are in the first model and then adding other important variables in the second model) is a way to determine to what extent these important variables in the second model explain a statistically significant amount of variance in the dependent variable after accounting for the control variable (by examining the change of R-square value in the second model).

Perceived usefulness of Digital Banking

Table 6: Regression analyses: Perceived usefulness of Digital Banking (N=252)

Variables	Dependent Variable: Perceived Usefulness of Digital Banking	
	Model 1	Model 2
Constant	4.435***	1.984***
Gender	-0.06	-0.036
Age	0.013	-0.008
Education	0.096	-0.150**
Employment	-1.114*	-0.022
Trust		0.267***
Subjective Norm		-0.010
Compatibility		0.402***

Variables	Dependent Variable: Perceived Usefulness of Digital Banking	
	Model 1	Model 2
R ²	2.1%	45%
Δ R ²	2.1%	42.9%
F-value	1.337	28.456***
Δ F-value	1.337	63.26***
VIF	1.042 – 1.191	1.058 – 1.651

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table Summary:

- i. Two models have been created:
 - a. Model 1 with the following control variables: Gender, Age, Education and Employment.
 - b. Model 2, in addition to model 1, Trust, Subjective Norm and Compatibility are included as independent variables.
- ii. The inclusion of Trust, Subjective Norm and Compatibility in Model 2 leads to a R2 value which increases to 45%. This result means that the inclusion of these variables causes a 42.9% increase in variability of the PU of Digital Banking.
- iii. Trust and Compatibility have a statistical significant impact on PU at the $p < 0.01$ level. Compatibility has a higher β -value of 0.402.
- iv. When adding Trust, Subjective Norm and Compatibility in the model, F-value is of 28.456 significant at the $p < 0.01$ level. This indicates that the data fits the proposed regression model.
- v. The Variable Inflation Factor (VIF) values associated with variables in the regression model are less than 10, indicating that no serious multicollinearity problems exist in these models.

Trust of Digital Banking

Table 7: Regression analyses: Trust of Digital Banking (N=252)

Variables	Dependent Variable: Trust of Digital Banking	
	Model 1	Model 2
Constant	3.548***	1.520***
Gender	-0.081	-0.079
Age	0.020	-0.06
Education	0.043	0.012
Employment	-0.13*	-0.074
PEU		0.517***
R ²	2%	22.2%
Δ R ²	2%	20.2%
F-value	1.233	13.998***
Δ F-value	1.233	63.799***
VIF	1.042 – 1.191	1.044 – 1.195

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table Summary:

- i. Two models have been created:
 - a. Model 1, with following control variables: Gender, Age, Education and Employment.
 - b. Model 2, in addition to model 1, PEU is included as independent variables.
- ii. The inclusion of PEU in the model leads to an R2 value of 22.2%. This result means that the inclusion of PEU causes a 20.2% increase in variability in the Trust of digital banking.
- iii. PEU has a statistically significant impact on attitude at the $p < 0.01$ level. PEU has a β -value of 0.517.
- iv. The inclusion of PEU provides an F-value of 13.998 statistically significant at the $p < 0.01$ level. This implies that the data fits the proposed regression model.
- v. The VIF values associated with variables in the regression model are less than 10, indicating that no serious multicollinearity problems exist in these models.

Attitude towards using Digital Banking

Table 8: Regression analyses: Attitudes towards using Digital Banking (N=252)

Variables	Dependent Variable: Attitude towards using Digital Banking		
	Model 1	Model 2	Model 3
Constant	3.503***	-0.060	0.341
Gender	-0.196*	-0.176**	-0.199***
Age	0.084	0.051	0.060
Education	0.271***	0.263***	0.214***
Employment	-0.153**	-0.058	-0.036
PEU		0.590***	0.580***
PU		0.281***	0.254***
Trust			0.061
Perceived Benefit			-0.064
Perceived Social Risk			0.010
Perceived Performance Risk			-0.002
Perceived Financial Risk			0.026
Perceived Time Risk			-0.142**
Perceived Security Risk			0.063
Perceived Privacy Risk			-0.001
R ²	7.5%	57.8%	60.2%
ΔR^2	7.5%	51.3%	2.4%
F-value	5.001***	57.966***	25.522***
ΔF -value	5.001***	151.646***	1.078
VIF	1.042 – 1.191	1.078 – 2.530	1.140 – 3.999

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table Summary:

- i. Three models have been created:
 - a. Model 1, with following control variables: Gender, Age, Education and Employment.

- b. Model 2, in addition to model 1, the core TAM constructs of PEU and PU are included as an independent variable.
- c. Model 3, in addition to model 2, the following extensions to the TAM model are included as independent variables: Trust, Perceived Benefit, Perceived Social Risk, Perceived Performance Risk, Perceived Financial Risk, Perceived Time Risk, Perceived Security Risk and Perceived Privacy Risk.
- ii. The inclusion of the PEU and PU as independent variables in the model leads to an R2 value, which increases to 57.8%, which implies a ΔR^2 of 51.3%. This result means that the inclusion of these variables causes a 51.3% increase in variability of attitudes towards the use of digital banking, in addition to the control variables.
- iii. By adding the variables in model 3, the R2 value increases to 60.2%, which implies a ΔR^2 of 2.4%. These variables have a much smaller impact than PEU and PU and do not lead to a significant ΔF -value.
- iv. PEU, PU ($p < 0.01$) and Perceived Time Risk ($p < 0.05$) have a significant impact on attitude. PEU has a higher β -value in both model 2 and model 3.
- v. Education and Gender are significant control variables in all three models, with a negative impact on A.
- vi. The F-value is significant in all three models ($p < 0.01$). This implies that the data fits the proposed regression model.
- vii. The VIF values associated with variables in the regression models are less than 10, indicating that no serious multicollinearity problems exist in these models.

Behavioural intention to use Digital Banking

Table 9: Regression analyses: Behavioural intention to use Digital Banking (N=252)

Variables	Dependent Variable: Behavioural intention to use Digital Banking		
	Model 1	Model 2	Model 3
Constant	3.195***	1.387**	1.657**
Gender	-0.149	-0.112	-0.108
Age	-0.020	-0.001	-0.005
Education	-0.159	-0.163	-0.163
Employment	0.016	0.077	0.068
Attitude		0.115	0.130
PU		0.294***	0.308**
Trust			0.045
Self-efficacy			-0.074
Subjective Norm			0.009
Credibility			-0.033
Cost			-0.042
R ²	2.4%	12.9%	13.5%
ΔR^2	2.4%	10.5%	0.6%
F-value	1.050	4.248***	2.362**
ΔF -value	1.050	10.417***	0.214
VIF	1.059 – 1.187	1.114 – 1.678	1.117 – 2.184

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table summary:

- i. Three models have been created:
 - a. Model 1, with following control variables: Gender, Age, Education and Employment.
 - b. Model 2, in addition to model 1, the core TAM constructs of Attitude and PU are included as independent variables.
 - c. Model 3, in addition to model 2, the following extensions to the TAM model are included as Independent Variables: Trust, Self-efficacy, Subjective Norm, Credibility and Cost.
- ii. The inclusion of Attitude and PU in model 2 leads to an R2 value of 12.9%. This result means that the inclusion of these variables causes a 10.5% increase in variability in the BI to use digital banking. These variables also lead to a significant Δ F-value.
- iii. PU has a positive and statistically significant impact in both models 2 and 3.
- iv. The inclusion of the variables provides a statistically significant F-value in models 2 and 3, indicating that the data fits the proposed regression model.
- v. The VIF values associated with variables in the regression model are less than 10, indicating that no serious multicollinearity problems exist in these models.

CONCLUSIONS AND RECOMMENDATIONS

From the output from the linear regression, updates have been made to the conceptual model as in **Error! Reference source not found.** This model highlights the relationships where significant relationships were identified. The greyed-out sections indicate variables where the hypotheses were rejected during the linear regression. The significant impacts identified are:

- i. Compatibility has a significant positive impact on PU
By considering the definition that informed the research questions and the results from the analysis, it can be derived that a person needs to feel that the Digital Banking solution aligns with their experiences in mobile technology and self-service banking, to be perceived useful. It is therefore imperative that the Customer Experience (CX) is a cornerstone in the development of Digital Banking solutions. The CX needs to relate to the core mobile skills of the users and evoke the confidence that they can apply these skills in using Digital Banking. The users need to be able to relate to the way the technology is presented to them and have a sense of familiarity with the interface. The opportunity for the new bank is to ensure that the customer journey in using their banking services creates comfort, minimises anxiety and performs consistently.
- ii. Perceived Time Risk has a significant negative impact on A
The results from the analysis indicate that potential users will have an increasingly negative attitude towards the solution as the perceived time risk increases. For the Digital Banking services, it is necessary to position the efficiencies of banking wherever the customers find themselves at their convenience. The design of the interface needs to be clear and intuitive to ensure customers have quick access to frequently used services such as transfers, payments and pre-paid purchases. During the design of the Digital Banking solution, it is advised that the associated capabilities necessary for measurement of the key behavioural

metrics are embedded in the solution. Ongoing monitoring, analysis and understanding of customer behaviour will assist in identifying areas in need of improvement / revision. As the solution matures, the ongoing evolution and customer-centric focus will enforce the feeling of effective banking that saves time and effort.

iii. Trust has a significant positive impact on PU

The results are not surprising, but highlight the importance of creating trust with the potential users of Digital Banking. The technology needs to be trustworthy and consistent, but the trust in the brand and the overall offering will also dictate, whether potential customers see potential usefulness in the application of the technology.

iv. PU has a significant positive impact on A

The PU of the technology will impact the user's attitude towards using Digital Banking and eventual behaviour. It is therefore imperative to position the solution in relation to the traditional disadvantages that are improved with Digital Banking, i.e. being in control of your banking, banking wherever you are, whenever you want to, simplicity in the offering, and so forth.

v. PU has a significant positive impact on BI

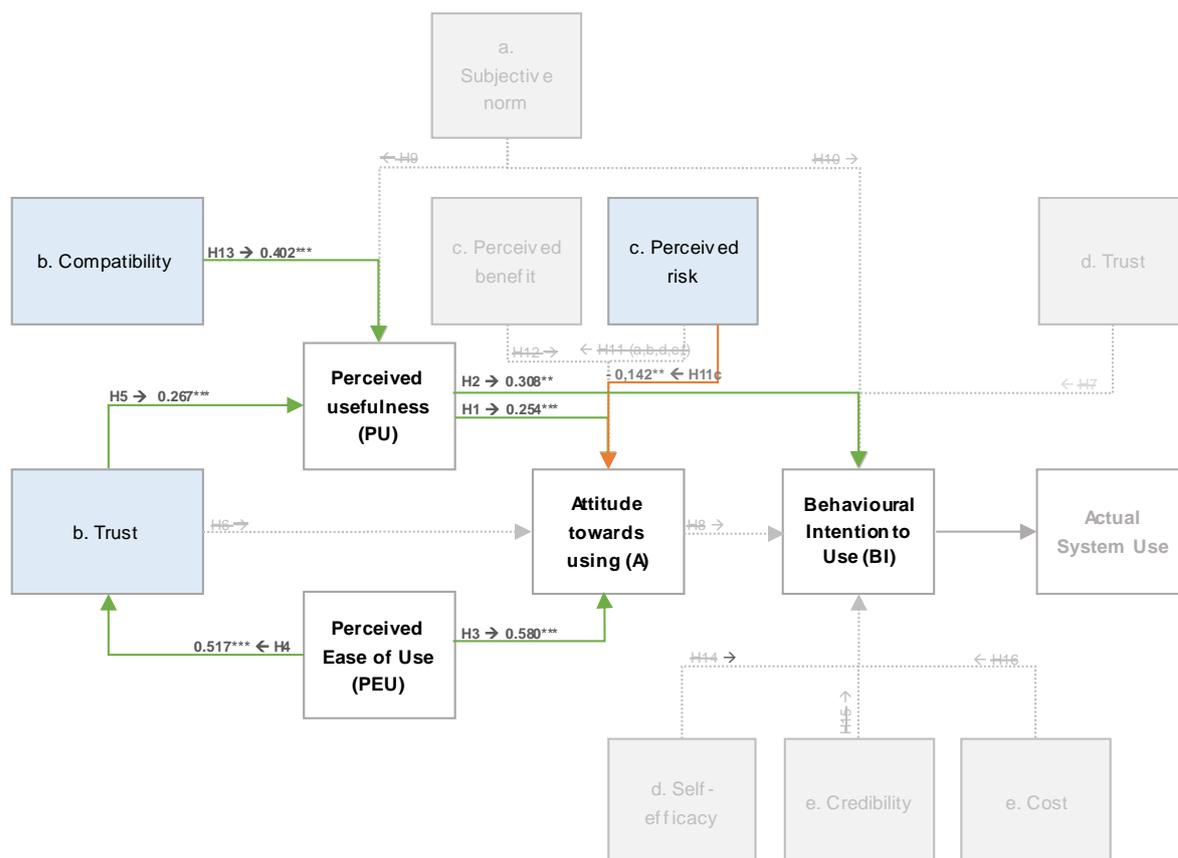
From the analysis, it was identified that PU has a significant impact and Attitude does not have such impact. This is interesting as it seems as if users are willing to consider the usage of the technology even if their attitude is not positive. This finding will have to be investigated further to determine the driver of this behaviour.

vi. PEU has a significant positive impact on Trust

PEU has been defined as the extent to which a person would go to apply the technology in the intended manner, based on the expected ease of use. A positive increase in the PEU has a positive impact on the Trust of Digital Banking. Therefore, with Trust being such a critical component in FS customer relationships, the marketing of Digital Banking needs to speak to the ease of using the technology. Capitec has consistently communicated simplicity in its marketing messages. This is integrated into the overall design philosophy; and based on these results, it is clear why this has been such a successful approach. Customers want fit-for-purpose and secure Digital Banking products.

vii. PEU has a significant positive impact on A

Considering that PEU also has a significant positive impact on Trust, it is understandable that it would also have a positive impact on Attitude. This is one of the core TAM constructs and does not yield an unexpected result.



*p < 0.10; ** p < 0.05; *** p < 0.01

Figure 3: Conceptual model post data analysis

Limitations of the research

During the literature review, the researcher noted the lack of academic resources considering the acceptance of an end-to-end Digital Bank – most sources considered the application of mobile channels and the transformation of traditional banking models. The concept of Digital Banking is not new, however the level of maturity in digitisation has rapidly evolved over the last couple of years. The following aspects are highlighted as limitations to the study:

- i. The understanding of “Digital Banking”: The South African banks, and in particular FNB, have focused marketing messaging on making customers aware of Digital Banking channels, the convenience and associated low cost to the consumer of Digital Banking. FNB has even embedded Digital Banking behaviours in its loyalty programme’s tiering calculations, furthering the incentive for customers to primarily use Digital Banking. The researcher used this market momentum in defining the concept of Digital Banking in a way that participants can relate to the concept; however, no physical infrastructure or prototypes were developed to bring the ideas to life. This limitation may have impacted the customers’ understanding of how the bank will service its customers and associated value proposition, which may have impacted the responses.

- ii. **Digital Banking Products and Services:** The emphasis of this project has been on the broader Digital Banking concept and not on the product and services level. The research questionnaire focused on the potential users' understanding and acceptance of the Digital Banking concept and did not test granular components such as the specific product and service preferences. The data obtained during this research is sufficient to provide context to the acceptance of the overall offering, but not necessarily the actual digital products, i.e. transactional, savings and lending products. Detailed and very specific research will have to be done to analyse the acceptance criteria in each instance, as the relationship the consumer has with the bank is different for each product type. This implies that a different set of factors / perceptions will be triggered in the acceptance decision.
- iii. **The Sample Population:** The obtained data indicates that 81% of this population have a secondary education, 43% live in the Free State, 65% are full-time employed and 87% currently use mobile banking. These statistics therefore translate to the acceptance of users of a specific profile. Acquiring data from a broader set of participants and architecting this closely aligned with the South African population attributes may yield different results.
- iv. **Territory:** All the participants in the study reside in South Africa and are users of the South African banking system. The participants have thus been exposed to an instance in banking in a specific environment. A broader, international sample may provide further insights or highlight preferences informed by the banking systems the users have been exposed to.

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