

**THE ROLE OF INNOVATION ATTRIBUTES, KNOWLEDGE-BASED TRUST, PERCEIVED  
RISK AND BEHAVIOURAL INTENTION IN THE ADOPTION OF MOBILE BANKING AMONG  
SOUTH AFRICAN STUDENTS**

**BY**

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## DECLARATION

I, Takalani Vera Tshivhase, student number 3655-839-7, declare that this dissertation of limited scope, entitled “**The Role of Innovation Attributes, Knowledge-Based Trust Perceived Risk and Behavioural Intention in the Adoption of Mobile Banking among South African Students**”, is my own work, and that all sources that I have used or from which I have quoted have been indicated and acknowledged by means of complete references.

I further declare that ethical clearance to conduct the research has been obtained from the Department of Industrial and Organisational Psychology, University of South Africa, and from the participating organisation (University of Venda).

TAKALANI TSHIVHASE

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## **SUMMARY**

### **THE ROLE OF INNOVATION ATTRIBUTES, KNOWLEDGE-BASED TRUST, PERCEIVED RISK AND BEHAVIORAL INTENTION IN THE ADOPTION OF MOBILE BANKING AMONG SOUTH AFRICAN STUDENTS**

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The objective of this study was to: (1) to determine the relationship between mobile banking adoption, innovation attributes, perceived risk, knowledge-based trust and behavioural intention; (2) to assess whether innovation attributes, perceived risk and knowledge-based trust predict mobile banking adoption; (3) to determine what recommendations can be made for banking practitioners.

A non-experimental and cross-sectional survey design was used in this research, using 202 students at a South African higher education institution. The majority of participants in this research were black women, at a relatively early stage of their studies, aged 20 years and younger. 69.8 percent of participants had a matric certificate and 92.1% were single. Data was analysed by the mean of descriptive statistics, correlational and multiple regressions.

Significant relationships were found between innovation attributes, knowledge-based trust, perceived risk, attitudes, and behavioural intention. Innovation attributes, knowledge-based trust, perceived risk predicted attitudes and behavioural intention and adoption to mobile banking. The results of this study indicate that positive relationships exist between students' perceptions of innovation attributes, knowledge-based trust, perceived risk and attitudes/behavioural intention, and that innovation attributes, knowledge-based trust and perceived risk influenced students' attitudes and behavioural intention to use (or continue

using) mobile banking. It is recommended that the banking industry invest in the diffusion of innovations, build their trust and integrity which could drive customer's attitudes and behavioural intention towards use or continued use of mobile banking.

## **KEY TERMS**

Attitude, attributes, behavioural intention, innovation attributes; innovation diffusion theory; knowledge-based trust; mobile banking adoption; perceived compatibility; perceived risk; theory of planned behaviour; theory of reasoned action.

## TABLE OF CONTENTS

<b>DECLARATION</b> .....	<b>ii</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>iii</b>
<b>SUMMARY</b> .....	<b>iv</b>
<b>KEY TERMS</b> .....	<b>v</b>
<b>TABLE OF CONTENTS</b> .....	<b>vi</b>
<b>LIST OF FIGURES</b> .....	<b>x</b>
<b>LIST OF TABLES</b> .....	<b>x</b>
<b>CHAPTER 1</b> .....	<b>1</b>
<b>SCIENTIFIC ORIENTATION TO THE RESEARCH</b> .....	<b>1</b>
<b>1.1 BACKGROUND AND MOTIVATION</b> .....	<b>1</b>
<b>1.2 PROBLEM STATEMENT</b> .....	<b>4</b>
<b>1.2.1 Research questions with regard to the literature review</b> .....	<b>6</b>
<b>1.2.2 Research questions with regard to the empirical study</b> .....	<b>6</b>
<b>1.3 AIMS OF THE STUDY</b> .....	<b>7</b>
<b>1.3.1 General aim</b> .....	<b>7</b>
<b>1.3.2 Specific aims of the study</b> .....	<b>7</b>
<i>1.3.2.1 Literature review</i> .....	<i>7</i>
<i>1.3.2.2 Empirical study</i> .....	<i>7</i>
<b>1.4 THE PARADIGM PERSPECTIVE</b> .....	<b>8</b>
<b>1.4.1 Humanistic paradigm</b> .....	<b>8</b>
<b>1.4.2 Positivist paradigm</b> .....	<b>9</b>
<b>1.5 RESEARCH DESIGN</b> .....	<b>9</b>
<b>1.5.1 Exploratory research</b> .....	<b>9</b>
<b>1.5.2 Descriptive research</b> .....	<b>10</b>
<b>1.5.3 Explanatory research</b> .....	<b>10</b>
<b>1.5.4 Validity</b> .....	<b>10</b>
<i>1.5.4.1 Validity with regard to the literature review</i> .....	<i>11</i>
<i>1.5.4.2 Validity with regard to the empirical study</i> .....	<i>11</i>
<b>1.5.5 Reliability</b> .....	<b>11</b>
<b>1.5.6 Unit of analysis</b> .....	<b>11</b>
<b>1.5.7 Variables</b> .....	<b>12</b>

1.5.8	Ethical considerations .....	12
1.6	RESEARCH METHOD.....	12
1.6.1	LITERATURE REVIEW .....	13
1.7	CHAPTER DIVISIONS.....	13
1.8	SUMMARY OF CHAPTER .....	13
CHAPTER 2.....		15
LITERATURE REVIEW: MOBILE BANKING ADOPTION, INNOVATION ATTRIBUTES, KNOWLEDGE-BASED TRUST, PERCEIVED RISK, ATTITUDE AND BEHAVIOURAL INTENTION.....		15
2.1	MOBILE BANKING ADOPTION.....	15
2.1.1	Conceptualisation .....	15
2.1.2	Definition of mobile banking adoption.....	16
2.1.3	Mobile banking adoption model .....	17
2.1.4	Factors influencing mobile banking adoption.....	18
2.2	INNOVATION ATTRIBUTES .....	19
2.2.1	Conceptualisation of innovation attributes .....	19
2.2.2	Innovation diffusion theory (IDT).....	20
2.2.2.1	<i>Perceived relative advantage</i> .....	22
2.2.2.2	<i>Perceived ease of use</i> .....	22
2.2.2.3	<i>Perceived compatibility</i> .....	23
2.3	KNOWLEDGE-BASED TRUST.....	24
2.3.1	Conceptualisation of knowledge-based trust.....	24
2.3.2	Definition of knowledge-based trust .....	25
2.3.2.1	<i>Perceived competence</i> .....	25
2.3.2.2	<i>Perceived benevolence</i> .....	26
2.3.2.3	<i>Perceived integrity</i> .....	26
2.4	PERCEIVED RISK.....	26
2.4.1	Conceptualisation of perceived risk.....	27
2.4.2	Definition of perceived risk .....	28
2.5	ATTITUDE AND BEHAVIOURAL INTENTION .....	29
2.5.1	Conceptualisation .....	29
2.5.2	Definition of attitude and behavioural intention.....	29
2.5.3	Theory of planned behaviour (TPB) and theory of reasoned action (TRA) .....	30
2.5.4	Factors influencing attitude and behavioural intention .....	31

2.6	CHAPTER SUMMARY .....	31
	CHAPTER 3.....	32
	THE ROLE OF INNOVATION ATTRIBUTES, KNOWLEDGE-BASED TRUST AND PERCEIVED RISK AND BEHAVIORAL INTENTION IN THE ADOPTION OF MOBILE BANKING AMONG SOUTH AFRICAN STUDENTS .....	32
3.1	INTRODUCTION.....	33
3.1.1	BACKGROUND TO THE STUDY.....	33
3.1.2	South African context.....	34
3.1.3	Innovation attributes, knowledge based-trust, perceived risk, attitudes and behavioural intention .....	35
3.1.3.1	<i>Innovation attributes (IA)</i> .....	35
3.1.3.2	<i>Knowledge-based trust (KBT)</i> .....	36
3.1.3.3	<i>Perceived risk (PR)</i> .....	37
3.1.3.4	<i>Attitudes and behavioural intention (A&amp;BI)</i> .....	38
3.1.4	Innovation attributes, knowledge-based trust, perceived risk and attitudes and behavioural intention relationships.....	38
3.2	RESEARCH DESIGN .....	40
3.2.1	Research approach.....	40
3.2.2	Research method .....	40
3.2.2.1	<i>Research respondents</i> .....	40
3.2.2.2	<i>Measuring instruments</i> .....	42
3.2.2.3	<i>Research procedures</i> .....	43
3.2.2.4	<i>Statistical analysis</i> .....	43
3.3	RESULTS .....	44
3.3.1	Descriptive statistics: mean, standard deviation and Cronbach alpha coefficients .....	44
3.3.2	Person product-moment correlation coefficient.....	45
3.4	DISCUSSION .....	51
3.5	LIMITATIONS OF THE STUDY .....	52
3.6	RECOMMENDATION FOR FUTURE RESEARCH.....	52
3.7	CONCLUSION .....	53
3.8	CHAPTER SUMMARY .....	53

<b>CHAPTER 4.....</b>	<b>61</b>
<b>CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS .....</b>	<b>61</b>
<b>4.1 INTRODUCTION.....</b>	<b>61</b>
<b>4.2 CONCLUSIONS.....</b>	<b>62</b>
<b>4.2.1 Conclusions in respect of the literature review .....</b>	<b>62</b>
4.2.1.1 <i>Aim 1: To conceptualise mobile banking adoption from a theoretical perspectives ....</i>	62
4.2.1.2 <i>Aim 2: To conceptualise innovation attributes from the theoretical perspective.....</i>	63
4.2.1.3 <i>Aim 3: To conceptualise knowledge-based trust from a theoretical perspective.....</i>	63
4.2.1.4 <i>Aim 4: To conceptualise ease of use and perceived risk from the theoretical perspective.....</i>	63
4.2.1.5 <i>Aim 5: To conceptualise behavioural intention from the theoretical perspective.....</i>	64
4.2.1.6 <i>Aim 6: To discuss the theoretical relationship between mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, and behavioural intention .....</i>	64
<b>4.2.2 Conclusions regarding the empirical study .....</b>	<b>64</b>
<b>4.3 LIMITATIONS OF THE STUDY .....</b>	<b>65</b>
<b>4.3.1 Limitations of the literature review.....</b>	<b>65</b>
<b>4.3.2 Limitations of the empirical study.....</b>	<b>66</b>
<b>4.4 RECOMMENDATION FOR FUTURE RESEARCH.....</b>	<b>66</b>
<b>4.5 CONCLUSION .....</b>	<b>67</b>

## LIST OF FIGURES

<i>Figure 2.1: Technology acceptance model (TAM)</i> .....	17
<i>Figure 2.2: Adopters categories of theory of Diffusion Innovation</i> .....	20

## LIST OF TABLES

Table 3.1: <i>Biographical Characteristics</i> .....	41
Table 3.2: <i>Descriptive statistics: mean, standard deviations and Cronbach alpha coefficients</i> 45	
Table 3.3: <i>Correlations</i> .....	46
Table 3.4: <i>Hierarchical regressions; innovation attributes, knowledge-based trust and Perceived risk (independents) and Attitude (dependent)</i> .....	48
Table 3.5: <i>Hierarchical regressions; innovation attributes, knowledge-based trust and Perceived (independents) and Behavioural/intention (dependent)</i> .....	50

## CHAPTER 1

### SCIENTIFIC ORIENTATION TO THE RESEARCH

This chapter focuses on the role of innovation attributes, knowledge-based trust, perceived risk, and behavioural intention in the adoption of mobile banking at a South African higher education institution.

In this chapter, the background and motivation for the research are provided. The problem statement is discussed and the aims highlighted. The paradigm perspectives are given. Thereafter, the research design and methodology are presented, and the chapter layout. The chapter ends with a summary.

#### 1.1 BACKGROUND AND MOTIVATION

During the last decade, the improvement of mobile communication technologies has dramatically changed the banking industry, because users are able to receive banking services at any place and any time (Gu, Lee & Sun, 2009). It was revealed early in 2002 that more than 13 million banking transactions were done through mobile technologies in South Africa (Cellular Online, 2002). The numbers appear to be increasing annually. Advocates of information systems posit that mobile banking can be regarded as one of the most significant technological innovations of the 21<sup>st</sup> century. It is emerging as a key platform for expanding access to banking transactions via mobile or hand-held devices and wireless communication technologies (Lin, 2011).

In this regard, Brown, Cajee and Stroebel (2003) indicated that the South African mobile phone market had 13 million subscribers in 2003, and this number is still increasing. Mobile phone usage in South Africa increased from 17% in 2000 to an enormous 76% in 2010. It is clear that reliance on mobile phones has overtaken reliance on landline phones and other media (Vodazone, 2011). With more than 29 million mobile users, more South Africans have access to mobile phones than to clean drinking water. Combined with internet mobile technology, this means that South Africans can pay bills, do their banking, shop, retrieve news and even buy games from their mobile phones (Vodazone, 2011).

It appears that in most African countries, however, mobile banking services (internet banking using mobile device, also known as M-banking or SMS banking) is still in a developmental phase where limited markets with few users have been reported (Me, 2017). Some countries such as Kenya use M-Pesa, which is a mobile phone-based service for sending and storing money (Omigie, Zo, Rho, & Ciganek, 2017). It is a service operated by the mobile network Safaricom in Kenya that allows consumers to deposit money into their mobile phones and transfer it to another consumer with a simple text message. The money can be withdrawn at any of the outlets acting as banking agents.

A fundamental requirement for the development of mobile banking services is the identification and understanding of the factors that influence customers' attitudes and behavioural intentions regarding the adoption or continued use of mobile banking. Mobile banking is a bridge that brings traditional banking services to users of hand-held GSM (Global System for Mobile) mobile devices (San Boeuf, 2006). Mobile banking is described to as "anywhere, anytime banking", as most of the traditional banking services can be accessed, irrespective of place and time (Saleem & Rashid, 2011; Watts, 2002).

Herzberg (2003) asserts that mobile banking services create customers since they are inherently time and place independent, but also because of their effort-saving qualities. Innovation diffusion theorists such as Rogers (1995) believe that innovation attributes (as a relative advantage in innovation theory) influence an individual's use of an innovation, and technological innovations have been studied according to this perspective (Agardwal & Prasad, 1997; Lin, 2011; Papiés & Clement, 2008; Teo & Pok, 2003). Mobile banking may have new features, such as ubiquity, flexibility and mobility, in comparison with conventional banking methods such as automated teller machines, telephone banking and non-mobile internet banking. However, the effect of innovation attributes necessitate further research, in order to fully understand the concept of mobile banking (Sulainman, Jaafar & Mohezar, 2007). Lin (2011) indicates that when a new, innovative service such as mobile banking is introduced, customers might be fearful of using it during banking transactions. The main concerns in this regard could be related to wireless transaction security, which might include a lack of encryption of SMSes and fear of distributing personal information.

Mobile banking is particularly convenient because users can do their banking when and where it suits them. However, due to the virtual nature of the transactions and a possible experienced

lack of control, mobile banking users may face uncertainty and risk (Zhou, 2011). Previous studies on mobile-payment (m-payment) adoption concentrated on the motivations supporting m-payment (Oliveira, Thomas, Baptista, & Campos, 2016) but inhibitors of this process such as perceived risk have not been investigated extensively. Consumers may be aware of the potential benefits of m-payment, such as its ease of use and convenience, but they may also be concerned about the potential risks of adopting m-payment, which will hamper their acceptance of m-payment (Yang, Liu, Li & Yu, 2015).

Knowledge-based trust is a function of individual perceptions of the competence, benevolence and integrity of a product, service or person (Wingreen & Baglione, 2005). Trust helps to reduce fears and potential risks such as wireless transaction security risks, as mentioned, and eases business transactions in conditions of uncertainty (Lin, 2011). In this regard, Lin (2011) indicates that customers should be able to form knowledge-based trust as to whether or not mobile banking organisations (banks and other financial institutions) have the ability to provide banking services effectively, conveniently and with a high level of quality (i.e. competence), and whether or not mobile banking organisations are willing to deliver benevolent services (i.e. have benevolence) and establish good faith agreements (i.e. integrity) with regard to banking transactions.

Brown, Cajee, Davies and Stroebel (2003) conducted a study about the factors that influence the adoption of mobile phone banking in South Africa. They found that most of the factors influencing the adoption of mobile banking, such as relative advantage, compatibility, complexity and mobile phone experience, accounted for 38% of the variance in intention to use mobile phones. Gu, Lee and Suh (2009) developed an integrated model from the extended Technology Acceptance Model (TAM) and the trust- based TAM in their study on determinants of the behavioural intention to adopt mobile banking. Their study showed strong support for the validity of the proposed model, with 72% of the variance in behavioural intention to use mobile banking. Their findings also indicated that one of the key determinants of behavioural intention in mobile banking is perceived usefulness. However, Beiginia, Bessheli, Soluklu and Ahmadi's (2011) study on mobile banking adoption, based on the decomposed theory of planned behaviour, found that only 17% of the respondents had previously used mobile banking services, and most of them were more interested in using traditional banking services.

Research on mobile banking adoption, customer satisfaction with mobile phone banking, trust and usage intentions with regards to mobile banking took place within the United States of America, Europe and Asia, and in some African countries. However, a study that combines mobile banking adoption, the effect of innovation attributes (for example, perceived relative advantage, ease of use and compatibility), knowledge-based trust and perceived risk has not yet been conducted in South Africa, to the knowledge of the researcher. The purpose of the study is to examine the effect of innovation attributes, knowledge-based trust, perceived risk and behavioural intention among students at the University of Venda.

Against the above backdrop, it can be argued that research on knowledge-based customer trust and perceived risk could play an essential role in explaining the adoption of mobile banking. Clear findings in the current study should benefit the fields of banking, telecommunications and customer service, by considering the optimal management of the choice of using various technologies, and to adopt the technology that customers prefers. This will greatly reduce banking costs, increase profits for telecommunications companies and increase customer satisfaction. Insights gained from this study should have positive implications for customer satisfaction and business management development as a whole. In South Africa, such studies are still limited and this study is intended to assist in filling this gap.

## **1.2 PROBLEM STATEMENT**

In the light of the foregoing discussion, this research study is meant to extend research on consumer psychology practices in a higher education environment by empirically investigating the relationship dynamic between mobile banking adoption, innovation attributes, perceived risk and knowledge-based trust.

Rapid advances in mobile technologies and devices have made mobile banking increasingly important in the fields of mobile commerce and financial services in South Africa. Although most public and private banks actually offer mobile banking, many customers have not yet welcomed these services, because they are not familiar with this technology and, most importantly, do not have sufficient confidence in the electronic system (Beiginia et al., 2011). Statistics indicate that the mobile phone market in South Africa had approximately 13 million subscribers in 2002, and this figure is still growing rapidly (Brown et al., 2003; Cellular Online, 2002). According to the International Telecommunication Union (ITU), there is significant growth in the use of mobile

phones, with over 90% of the population in South Africa using mobile phones (ITU, 2009). Mobile phones have become a tool for everyday use, creating an opportunity for the evolution of banking services to reach the previously unbanked population through mobile banking.

With regards to mobile phone network provision, two companies dominated the South African market. Then the third cellular network provider gradually gained market share. Banking institutions need to be aware of the opportunities that technology is providing them, so that they can utilise these new technologies and provide high-level services to existing and potential customers. Lin (2011, p. 253) indicates that customer trust plays an essential role in explaining and solving the problems related to the adoption of mobile banking. This view has been supported by several other studies (Gu, Lee & Suh, 2009; Kim, Shin & Lee, 2009; Lee & Chung, 2009; Lin, 2011).

Few studies, however, have empirically investigated the relationship between knowledge-based trust (perceived competence, benevolence and integrity), innovation attributes, perceived risk and customer behaviour in the mobile banking context. Gu, Lee and Suh (2009) state that attracting potential customers and retaining existing ones should benefit the long-term business of mobile banking organisations. However, the central role of innovation attributes and knowledge-based trust with regard to mobile banking may differ significantly between existing and potential customers (Lin, 2011). The current study serves as an extension of Lin's study. In his study, Lin (2011), focused on innovation diffusion theory and knowledge-based trust literature and developed a research model to determine the effect of innovation attributes and knowledge-based trust on attitude and behavioural intention about adopting and continuing to use mobile banking across potential and repeat consumers. Lin (2011) recommended that perceived risk should be investigated in future studies.

In the context of mobile banking, little empirical research has compared the factors that influence the decision to adopt or continue using this technology among existing and potential customers. A deeper understanding is needed of how innovation attributes and knowledge-based trust facilitate the adoption (or continued use) of mobile banking among existing and potential customers, and how perceived risk impacts this process. Studies have been conducted on mobile banking adoption, customer satisfaction with mobile phone banking, trust and usage intentions with regard to mobile banking in the United States of America, Europe, Asia, with a few studies in African countries.

However, there seems to be a paucity of research on mobile banking adoption in the South African context, which is considered to be unique and distinctive. Hence this study focuses on the role of innovation attributes (perceived relative advantage, ease of use and compatibility), knowledge-based trust (perceived competence, benevolence and integrity), perceived risk on the attitudes and behavioural intentions with regard to the adoption and use of mobile banking. It is envisaged that research on the relationship between mobile banking adoption, innovation attributes, knowledge-based trust and perceived risk will make a significant contribution towards the disciplines of banking, risk management and consumer psychology.

Based on the above discussion, this study attempts to address the following questions:

### **1.2.1 Research questions with regard to the literature review**

Research question 1: How are the variables, namely mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, and behavioural intention conceptualised and explained in the literature?

Research question 2: Is a theoretical relationship between mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk and behavioural intention indicated in the literature?

Research question 3: What are the implications of mobile banking adoption for the banking sector and telecommunications organisations in terms of customer satisfaction?

### **1.2.2 Research questions with regard to the empirical study**

Research question 1: What is the nature of the statistical relationship between mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, and behavioural intention in a sample of students at a South African academic institution?

Research question 2:           What recommendations can be made for banking practitioners and future studies?

### **1.3    AIMS OF THE STUDY**

Given the above research questions, the aims of this study are as follows:

#### **1.3.1   General aim**

The general aim of this study is to investigate the role of innovation attributes, knowledge-based trust, perceived risk, and behavioural intention in the adoption of mobile banking among a sample of students at a South Africa academic institution.

#### **1.3.2   Specific aims of the study**

The following specific aims can be identified in relation to the literature review and empirical study.

##### *1.3.2.1   Literature review*

The specific aims of the literature review are:

- To conceptualise mobile banking adoption
- To conceptualise innovation attributes
- To conceptualise knowledge-based trust
- To conceptualise perceived risk
- To conceptualise behavioural intention

##### *1.3.2.2   Empirical study*

The specific aims of the empirical study are:

- To determine the relationship between mobile banking adoption, innovation attributes, perceived risk, knowledge-based trust and behavioural intention

- To determine whether innovation attributes, perceived risk and knowledge-based trust predict mobile banking adoption
- To make recommendations to the banking sector on how innovation attributes and knowledge-based trust facilitate the adoption (or continued use) of mobile banking among existing and potential customers and how perceived risk impacts on this process

## **1.4 THE PARADIGM PERSPECTIVE**

A paradigm is a lens through which researchers view the obvious and not so obvious principles of reality (Maree, 2009). In scientific terms, a paradigm refers to “the way of examining social phenomena from which particular understanding of these phenomena can be gained and explanations attempted” (Saunders, Lewis & Thornhill, 2009, p.119). For the purpose of this study, the term “paradigm” is used in its metatheoretical sense, coupled with the assumption underlying the theories and models to form the definitive context of a study (Scotland, 2012).

The metatheoretical context of this study is consumer behaviour, which is a sub-field of Industrial and Organisational Psychology (IOP). IOP applies various psychological principles, concepts and methods to study and influence human behaviour (Bergh & Theron, 2009). The constructs of mobile banking adoption, innovation attributes, knowledge-based trust and perceived risk will be studied in the context of consumer psychology. The literature review of these constructs is presented from the humanistic paradigm and the empirical study is presented within a positivist research paradigm.

### **1.4.1 Humanistic paradigm**

The humanistic paradigm is relevant to this study as it assumes that individuals have the capacity to decide what to do and what not to do, for example to adopt or not to adopt the mobile banking. According to Cilliers and May (2010), the basic assumptions of the humanistic paradigm are:

- The individual is an integrated whole
- The individual is a dignified human being
- Human nature is positive
- The individual has conscious processes

- The human is an active being

The humanistic paradigm is about understanding an individual's life experience.

#### **1.4.2 Positivist paradigm**

The empirical study was approached from the perspective of a positivist research paradigm. A positivist research approach is objective and aimed at describing the laws and mechanisms operating in society (Terre Blanche & Durrheim, 2002). Positivist methodology is directed at identifying causes that influence outcomes (Scotland, 2012). Correlation and experimentation are used to reduce complex interactions to their constituent parts (Scotland, 2012). Correlation was used in this study to investigate the correlation between the dependent variable (mobile banking adoption) and the independent variables, (innovation attributes, knowledge-based trust, perceived risk, and behavioural intention).

### **1.5 RESEARCH DESIGN**

A research design involves the planning and structuring of the manner in which research takes place in terms of the data collection and data analysis in a manner relevant to the purpose of the research (Sellitz et al. as cited in Mouton & Marais 1990:34). According to Terre Blanche, Durrheim and Painter (2006), a research design is a strategic framework which serves as the bridge between research questions and the execution of the research. The research design in this study was done with reference to the types of research conducted, followed by a discussion of the issues of validity and reliability. This study followed a quantitative research approach (Terre Blanche et al., 2006)

#### **1.5.1 Exploratory research**

Exploratory research is intended to gather information from a relatively unknown field (Mouton & Marais, 1990). The key components of this type of research are: to gain new insights, identify key concepts and constructs, and then establish priorities. This study is exploratory in nature, since it compares various theoretical perspectives on mobile banking adoption, innovation attributes and knowledge-based trust.

### **1.5.2 Descriptive research**

Descriptive research refers to the in-depth description of an individual, situation, group, organisation, culture, subculture, interaction or social object (Mouton & Marais, 1990). Its purpose is to systematically analyse the relationships between variables in the research domain. The overriding aim is to describe issues as accurately as possible. In the literature review of the current study, descriptive research is applicable to the conceptualisation of the constructs of mobile banking adoption, innovation attributes, knowledge-based trust and perceived risk.

### **1.5.3 Explanatory research**

Explanatory research goes further than merely indicating that a relationship exists between variables (Mouton & Marais, 1990). It indicates the direction of the relationship, and is useful when the researcher seeks to explain the direction of the relationship between variables. This form of research is applicable to the empirical study of the relationship between mobile banking adoption, innovation attributes, knowledge-based trust and perceived risk among a group of participants.

The end-goal of this study is to draw conclusions regarding the relationship between the constructs of mobile banking adoption, innovation attributes, knowledge-based trust and perceived risk. This study thus fulfils the requirements of this type of research, as outlined above.

### **1.5.4 Validity**

The aim of a research design is to plan and structure the research in such a way that the literature review and empirical study are valid in terms of the variables used in the study (Mouton & Marais, 1990). According to Terre Blanche, Durrheim and Painter (2006), both internal and external validity are important for a research design. In order for research to be internally valid, the constructs must be measured in a valid manner, and the data measured must be accurate and reliable.

Ensuring validity requires making a series of informed decisions regarding the purpose of the research, the theoretical paradigms used in the research, the context within which the research

takes place, and the research techniques used to collect and analyse data (Terre Blanche, Durrheim & Painter, 2006).

#### *1.5.4.1 Validity with regard to the literature review*

The validity of the literature review in this study was assured by using literature that is relevant to the research topic, problem statement and aims of the study. Every attempt was made to search for and make use of the most recent literature, although a number of classical mainstream publications may be referred to because of their relevance to the conceptualisation of the relevant constructs.

#### *1.5.4.2 Validity with regard to the empirical study*

In the empirical study, validity was ensured through the use of appropriate and standardised measuring instruments. These measuring instruments were critically examined for their criterion-related validity (to ensure accurate prediction of scores on the relevant criterion); content validity; and construct validity (the extent to which the instruments measure the theoretical constructs they purport to measure).

### **1.5.5 Reliability**

Foxcroft and Roodt (2001) describe reliability as the extent to which a test is repeatable and yields consistency of results in terms of what is measurable. In the literature review, reliability was addressed by using existing literature sources, theories and models available to researchers. In the empirical study, reliability was ensured through the use of a carefully selected sample. The researcher followed the appropriate sampling procedure and used appropriate instruments, of which the reliability has already been proven through previous research.

### **1.5.6 Unit of analysis**

The most common object of research in the social sciences is the individual human being (Mouton & Marais, 1990). The unit of analysis distinguishes between the characteristics, conditions, orientations and actions of individuals, groups, organisations and social artefacts

(ibid). In terms of individual measurement, the unit of analysis was individual students at a higher education institution in South Africa.

### **1.5.7 Variables**

This study focuses on measuring the relationships between the following variables:

1. Mobile banking adoption (dependent variable)
2. Innovation attributes (independent variable)
3. Knowledge-based trust (independent variable)
4. Perceived risk (independent variable)
5. Behavioural intention (independent variable)

### **1.5.8 Ethical considerations**

The Health Professional Council of South Africa's (HPCSA's) ethical guidelines and the University of South Africa's (Unisa) Policy on Research Ethics formed the basis for the research. Prior to the research process, ethical clearance was obtained from the Unisa IOP research ethics committee. Permission to conduct the research was obtained from the participating university (University of Venda).

Informed consent was obtained from all participants. All information and data management and results were handled confidentially (Gray, 2014). Participation was voluntary (Sinclair, 2011). Participants had the option not to provide their names on the form and thus remaining anonymous (Bouma & Ling, 2010). Participants were assured of confidentiality and had the right to withdraw from the study if they wished to do so (Maxwell, 2013).

## **1.6 RESEARCH METHOD**

The study was conducted in a structured manner and is divided into two phases which are (1) the literature review and (2) an empirical study.

## **1.6.1 LITERATURE REVIEW**

**Phase 1:** Consists of the literature review, which is discussed in detail in Chapter 2

Step 1: A literature review will be conducted on mobile banking adoption

Step 2: Literature review on innovation attributes

Step 3: Literature review on knowledge-based trust

Step 4: Literature review on perceived risk,

Step 5: Literature review on behavioural intention.

**Phase 2:** Comprised of the empirical study

The empirical study is presented in the form of a research article in Chapter 3. It outlines the core focus of the study, the background of the study, the trends from the research literature, the potential value added by the study, the research design, the results, a discussion of the results, the conclusion, the limitation of the study and recommendation for future research. Chapter 4 integrates the research study and discusses the conclusions, limitations and recommendations in more details.

## **1.7 CHAPTER DIVISIONS**

Chapter 1: Scientific orientation to the research

Chapter 2: Literature review, conceptualization of mobile banking, innovation attributes, knowledge-based trust and perceived risk

Chapter 3: Research article

Chapter 4: Conclusions, limitations and recommendations

## **1.8 SUMMARY OF CHAPTER**

The purpose of this chapter was to examine the role of mobile banking adoption, innovation attributes, knowledge-based trust perceived risk, and behavioural intention among students at a

South African higher education institution. This chapter began by describing the background and motivation for the research. The problem statement and the aims of the research followed. The paradigm perspectives, research design, methodology, and flow of the research were explained. The chapter concluded by mapping an outline of the chapters in the study. Chapter 2 represents first the steps in the research, namely the literature study, which discuss mobile banking adoption, innovation attributes, knowledge-based trust perceived risk, and behavioural intention.

## CHAPTER 2

### LITERATURE REVIEW: MOBILE BANKING ADOPTION, INNOVATION ATTRIBUTES, KNOWLEDGE-BASED TRUST, PERCEIVED RISK, ATTITUDE AND BEHAVIOURAL INTENTION

This chapter conceptualises the constructs of mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, attitude and behavioural intention. Relevant literature is used to explain the theoretical relationship between these constructs for mobile banking adoption among students at a South African higher education institution.

#### 2.1 MOBILE BANKING ADOPTION

This section presents the conceptualisation of mobile banking adoption and provides a definition of mobile banking, a discussion on a mobile banking adoption model and factors influencing mobile banking adoption.

##### 2.1.1 Conceptualisation

Mobile banking is conceptualised as a technological innovation, in that it allows customers to conduct banking transactions without constraints of time and place, and to access banking services easily and quickly with their mobile devices (Laukkanen, 2007). Mobile banking refers to the use of mobile phones as a channel to provide banking services, which include traditional services, such as cash transfers, and new services, such as online or electronic payments (Beiginia, Besheli, Soluklu & Ahmadi, 2011). Already in 2004, Pousttchi and Schurig (2004) viewed mobile banking as one of the most successful business-to-consumer applications in the field of electronic commerce. Previous studies have indicated that factors contributing to the adoption of mobile banking are related to convenience and access to services, regardless of time and place. Cheah, Teo, Sim, Oon and Tan (2011) posit that mobile banking adoption is still in its infancy and has yet to meet both industrial and customer expectations.

Mobile technology is transforming the global banking and financial industry by providing convenience, affordability and accessibility to bank customers (Chawla & Joshi, 2017). For instance, Anderson (2010) indicates that banking is one of the top areas in adopting mobile and

internet technology for consumer markets. Oh and Lee (2005) aptly comment that before the advent of internet and mobile banking, the banks had long invested in information technologies. The operations of the banks were mostly accomplished electronically, with successful experience in developing systems such as automated teller machines (ATMs). The emergence of the internet made a big impact on the diffusion of electronic banking, which is one of the most successful business-to-consumer applications in e-commerce (Wu, 2005). Electronic banking has helped consumers tremendously in reducing bank charges and has increased convenience for customers as they can access their monies anytime (Aliyu, Younus, & Tasmin, 2014).

The growth in mobile banking has drawn researchers to investigate mobile banking adoption among consumers. Several studies were conducted of the behavioural intention of adopting mobile banking services (Amin et al., 2013; Cheah et al., 2011; Daud et al., 2014; Krishanan et al., 2015; Sulaiman et al., 2007; 2011;). Except for Cheah et al. (2011) all the studies mentioned used the technology acceptance model (TAM) and its extension, and Roger's diffusion of innovation model, as theoretical bases (Tan & Lau, 2016). The studies mentioned were mainly done among general consumers banking services. There is scarcity of literature that investigates the behavioural intention in adopting mobile banking specifically among university students. Most students will soon enter the job market and are viewed as a lucrative growth market for companies offering high-technology product and services such as mobile phones and banking services.

### **2.1.2 Definition of mobile banking adoption**

Mobile banking can be seen as an extension of internet banking through mobile devices (Brown et al., 2003). Laukkanen and Pasanen (2008) define mobile banking as a channel through which the customer interacts with the bank via a mobile device such as a smartphone or a personal digital assistant. Another definition by Donner and Tellez (2008) incorporates all terms associated with cell phones facilitated financial transactions. They state that "The term m-banking m-transfers, m-payments and m-finance refers collectively to assets of applications that enable people to use their mobile telephones to manipulate their bank accounts, store value in an account linked to their hand sets, transfer funds or even access credit or insurance products."

Luo, Li, Zhang and Shim (2010) define mobile banking as an innovative method of accessing banking services via a mobile device, e.g. mobile phone or personal digital assistant. Using mobile banking, customers can check account balances, check transactions made on the account, transfer money from one account to another, and pay accounts. Finally, according to Chong, (2013), mobile banking refers to banking activities conducted through mobile internet technologies

### 2.1.3 Mobile banking adoption model

Davis (1989) introduced the Technology Acceptance Model (TAM). It is considered one of the most popular and acceptable models in the Information system (IS) field (Rana, Dwivedi, & Williams, 2013). The goal of TAM is to provide an explanation of the determinants of computer acceptance. TAM is a well-established model that is based on the psychological interaction of the user with technology (Davis, 1989). It addresses the issue of how users accept and use information technology (Tan & Lau, 2016). TAM utilises the construct of perceived usefulness (PU), perceived ease of use (PEOU) and attitude towards usage (ATU) to explain and predict technology system adoption (Davis, 1989). Perceived usefulness (PU) is defined as the degree to which a person believes that using a system would be free of effort (Davis, 1989). In TAM, behavioural intention to use (BIU) a system is influenced by attitude towards use (ATU) and the direct and indirect effect of perceived ease of use (PEOU). Acceptance research (Davis, 1989) suggests that perceived ease of use and perceived usefulness are the two key determinants that influence the attitude of users towards using e-technology or the adoption of mobile banking.

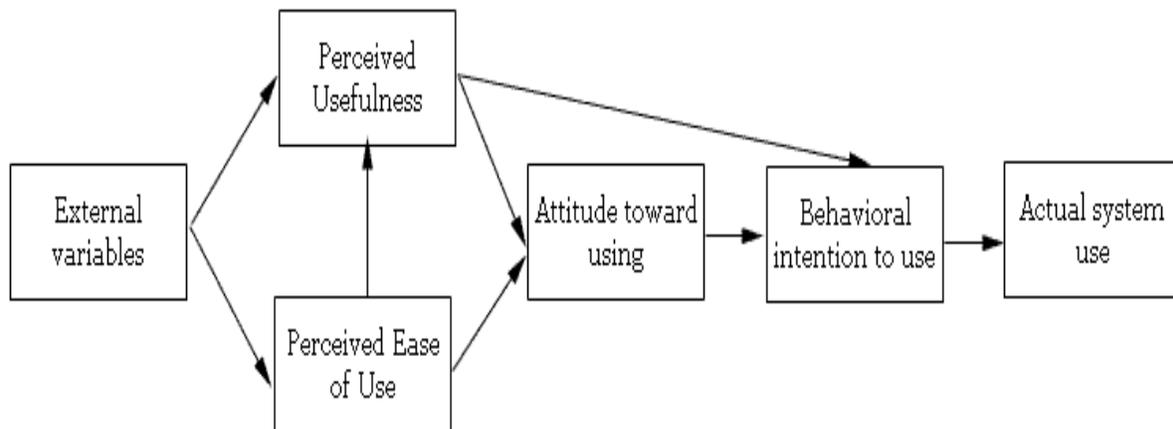


Figure 2.1: Technology acceptance model (TAM)

Source: Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* (Doctoral dissertation, Massachusetts Institute of Technology).

#### **2.1.4 Factors influencing mobile banking adoption**

Brown et al. (2003) examined the factors that influence the adoption of mobile banking in South Africa. The finding revealed that relative advantage, trial periods and consumer banking needs, along with perceived risk, have a negative influence on the adoption of mobile banking. In another study of mobile banking, Cracknell (2004) observes that accessibility to mobile banking services and their affordability are the important factors that influence the choice of such services. In a South African study, Porteus (2007) concluded that trust and awareness are the key determinants of the adoption of mobile banking.

According to Gu, Lee and Suh (2009), trust is the key determinant influencing the choice and usage of mobile banking. Their results further indicate that trust, in turn, is determined by the quality of the mobile banking system (Lee & Chung, 2009), familiarity and financial costs or benefits (Gu et al., 2009).

According to Riquelme and Rios (2010), usefulness, social norm and social risk are the factors that influence the intention to adopt mobile banking services. Ease of use has a stronger influence among female respondents than males, whereas relative advantage has a stronger effect on the perception of usefulness on male respondents.

New technologies, no matter how advanced, are adopted by or are acceptable to consumers only if they meet consumers' needs (Chawla & Joshi, 2017). Several factors influence the adoption of new technology. The factors could be social, technological, economic or demographic. A segment may decide to choose a technology which they perceived useful (Chawla & Joshi, 2017), another segment might be against it, if they perceive the technology to be difficult to use. Similarly, another segment might not adopt the technology because they are concerned about the security and privacy of the technology and therefore do not trust it. Yet another segment might be concerned about the cost incurred when using the technology. According to Chawla and Joshi (2017), some people may decide not to adopt a technology in spite of it being perceived as useful, because it might be considered as complex to use or vice-

versa. Hence, both ease of use and perceived usefulness are important factors in terms of technology adoption.

## **2.2 INNOVATION ATTRIBUTES**

This section presents the conceptualisation of innovation attributes and the innovation diffusion theory.

### **2.2.1 Conceptualisation of innovation attributes**

According to Lin (2011), mobile banking presents technological innovation, because it allows customers to conduct banking transactions without the constraints of time and place and to access banking services easily and quickly with their mobile devices. Innovation diffusion theorists, such as Rogers (1995), have indicated the importance of innovation attributes. Previous studies further indicated that user perceptions of innovation influence their decisions regarding the adoption of internet-based banking (Lean, Zailani, Ramayah & Fernando, 2009; Papias & Clement, 2008; Tan & Theon, 2001). The innovation diffusion literature mentions some key drivers that may affect these adoption decisions. These key factors include relative advantage, ease of use, compatibility, observability and testability. These above mentioned innovation attribute drivers were found to be the most commonly identified factors for the adoption and diffusion of internet-based technologies (Rogers, 1995; Liao, Shao, Wang & Chen, 1999; Lin 2011).

An innovation is an idea, practice, or object that is perceived as new by individuals or other unit of adoption (Rogers, 1995). The perceived attributes of an innovation are the important parts of the explanations or the rate of the adoption in an innovation (Al Gahtani, 2003). Researchers have found that those who adopt an innovation later have different characteristics from those who adopt an innovation earlier. According to Sun and Jeyaraj (2013), there are five different kinds of established adopter categories, namely:

1. Innovators. They are the first to try the innovation. They are adventurous and interested in new ideas. They are willing to take risks, and are often the first to develop new ideas. Not much needs to be done to appeal to this population.

2. **Early Adopters.** They represent opinion leaders. They enjoy leadership roles, and embrace change opportunities. They are quick to be aware of the need to change and are comfortable adopting new ideas. Strategies to appeal to this population include how-to manuals and information sheets on implementation. They do not need much information to convince them to change.
3. **Early Majority.** They are rarely leaders, but they do adopt new ideas before a considerable number of other people. They mostly need to see evidence that the innovation works before they adopt it. They need to see success stories first.
4. **Late Majority.** They are sceptical of change and will only adopt an innovation after many people have tried it. They need to be shown information on how many people have tried the innovation and have adopted it successfully.
5. **Laggards.** They are very conservative, and are very sceptical of change. They are the hardest group to bring on board. Strategies to appeal to this population include statistics, fear appeals, and pressure from people in the other adopter groups.

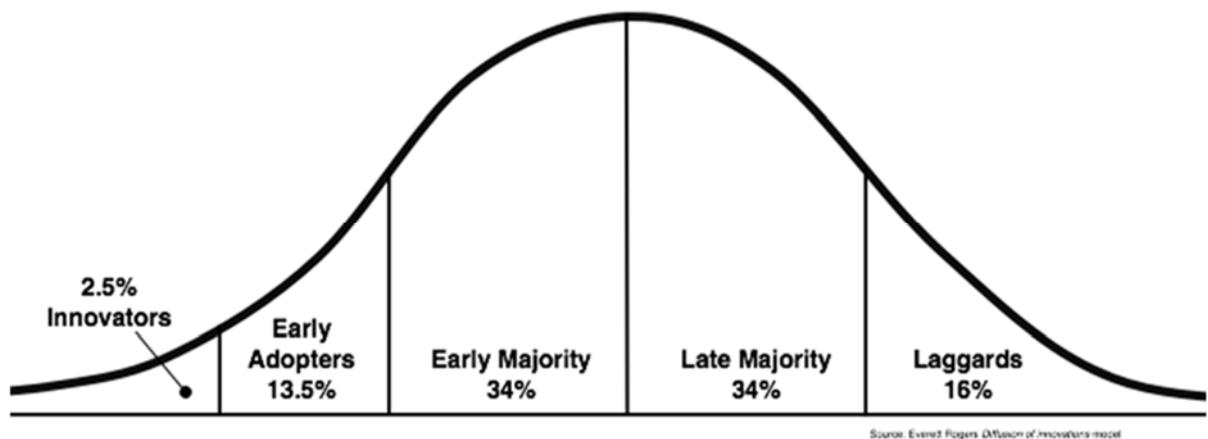


Figure 2.2: Adopters categories of theory of diffusion innovation

Source: Rogers, E.M. (1995). *Diffusion of Innovations*, (1<sup>st</sup> ed.), New York: Free Press.

## 2.2.2 Innovation diffusion theory (IDT)

Innovation diffusion theory (IDT) describes how innovations or technology become accepted and spread through societies, large or small (Rogers, 2003). In IDT the process of choosing to use a technology is known as the innovation-decision process. According to IDT, a person

passes from gaining knowledge about an innovation to forming an attitude about the innovation (Demir, 2006). The diffusion of innovation theory is the most established and frequently used theory in the field of innovation (Kapoor, Dwivedi & Williams, 2015).

The diffusion of innovation theory has four main variables: innovation attributes, communicated channels, time, and social system (Qasem & Zolait, 2016). Innovation attributes have five independent variables: relative advantage, compatibility, trialability, observability and complexity. Rogers introduced these attributes in 1995. According to Zolait and Sulaiman (2008), these attributes can predict behavioural intention and affect adoption rate. Zolait and Sulaiman (2008) noted that all variables have a positive correlation with adoption except for complexity. Innovations with higher relative advantage, compatibility, trialability, observability and less complexity have higher adoption rates (Zolait & Sulaiman, 2008).

Al-Jabri and Sohail (2012) studied the adoption of mobile banking in Saudi Arabia. They investigated how Rogers's theory of diffusion of innovation applies to the influence of mobile banking uptake in a developing nation, like Saudi Arabia. They used diffusion of innovation as a base-line theory to investigate factors that may influence mobile banking uptake and use. This research sought to examine the potential facilitators and inhibitors of mobile banking adoption. The study used six independent variables: relative advantage, complexity, observability, trialability, perceived risk, and compatibility (Rogers, 2003). It was found that observability, compatibility and relative advantage, have positive impact on adoption. Trialability and complexity were found to have no significant effect on adoption. Perceived risk has a negative impact on adoption ( Al-Jabri & Sohail, 2012)

According to Sun and Jeyaraj (2013), adopters are likely to consider the innovation attributes in their decision to adopt the innovation, during the early stages. During the later stage, non-adopters may attach some importance to the innovation attributes, whereas adopters are likely to evaluate the innovation in deciding to continue using it (Sun & Jeyaraj, 2013).

The current study examines the extent to which relative advantage, ease of use and compatibility affect the adoption of mobile banking. These three perceived innovation attributes were found to be the most frequently identified factors for adoption and diffusion of internet-based technologies (Papies & Clement, 2008). All three innovation attributes are expected to

exert a positive influence on the individual's intention to adopt or continue the innovation (Sun & Jeyaraj, 2013).

#### *2.2.2.1 Perceived relative advantage.*

Relative advantage is defined as the degree to which an innovation is perceived as better or superior than ever before (Rogers, 2003). It deals with the degree to which an innovation is perceived as being better than what it has superseded (Rogers, 2003). It manifest as increased efficiency, economic benefits and enhanced status (Rogers, 2003). Al-Jabri and Sohail (2012) found that relative advantage is one of the key factors influencing the adoption of mobile banking. In general, if customers perceive the advantages given by mobile banking, they are most likely to have a positive attitude towards adopting mobile banking, or continuing to use it.

Further studies suggest that when a user perceives the relative advantage or usefulness of a new technology over an old one, they tend to accept it (Rogers, 2003). Hsu et al. (2007) in studying the adoption of mobile internet found that relative advantage significantly influences adoption intentions. In the context of mobile banking adoption, benefits such as immediate fulfilment of needs, and affordability to customers have been reported (Lin, 2011). Therefore it is concluded that when customers know and understand the distinct advantages offered by mobile banking, they are more likely to adopt it. It can therefore also be concluded that cost effectiveness, enhanced social status and time saving are indicators of relative advantage that may have a positive effect on the adoption of mobile banking. The degree of relative advantage is often described in the form of economic profitability, social prestige, savings in time and effort and immediacy of reward or as a decrease in comfort (Rogers, 2003). Luarn and Lin (2005) also argue that cost is of great concern to acceptance of mobile banking.

#### *2.2.2.2 Perceived ease of use*

Perceived ease of use is the degree to which the innovation is easy to use. This means, "the degree to which the prospective user expects the target system to be free of effort" Davis et al., 1989, p985). This relates to how easy it is understand or operate mobile banking. In the technology adoption literature (Davis, 1989), indicates that the attributes, perceived ease of use and perceived usefulness significantly affect people's intention to use technology. Previous research has shown that if users perceive a new technology as easy to use, they are more likely

to adopt it (Chin & Todd, 1995). It was also found that perceived ease of use of a new technology had a positive effect on technology adoption (Chin & Todd, 1995).

Considering the nature of mobile banking, for instance, that requires a certain level of knowledge and skills, perceived ease of use could play a crucial role in determining the customers' intention to use the technology (Alalwan, Dwivedi, Rana, & Williams, 2016). Various mobile banking studies supported this idea (Akturan & Tezcan, 2012, Gu et al., 2009; Hanafizadeh et al., 2014). Davies et al. (1989) suggested that perceived ease of use could contribute to the behavioural intention (adoption) directly or indirectly by facilitating the impact of perceived usefulness on behavioural intention.

Considering the possibility of a useful system remaining "under-used" in terms of mobile banking, consumers do not need to extend significant effort in using mobile technology (Lin, 2010). Consumers are most likely to see it as easy to use, and to have a positive attitude towards it.

#### 2.2.2.3 *Perceived compatibility*

Compatibility is defined as an innovation which is considered consistent with the socio-cultural values, beliefs, experiences and needs of potential adopters (Rogers, 2003). Compatibility is a vital feature of innovation as conformance with users' lifestyle can propel a rapid rate of adoption (Rogers, 2003). It describes the fit between the technology and the adopter's work, needs and preferences and is related to the notions of work compatibility in predicting technology adoption (Sun, Bhattacharjee & Ma, 2009). Compatibility is a significant antecedent in determining consumers' attitude towards mobile banking adoption in Malaysia, for example (Ndubisi & Sinti, 2006).

Greater compatibility between individual needs and technological innovation is preferable, because it allows innovation to be interpreted in a more familiar context (Ilie, van Slyke, Green & Lou, 2005). This means that consumers that regards mobile banking to be compatible with their lifestyle, will have a positive attitude towards adopting or continue to use mobile banking. In a study carried out in Finland, Suoranta (2003) found out that compatibility drives acceptance and usage of mobile banking innovation. The findings are supported by Al-Jabri and Sohail (2012), who established that compatibility has a positive effect on mobile banking adoption.

## **2.3 KNOWLEDGE-BASED TRUST**

This section presents the conceptualisation and definition of knowledge-based trust.

### **2.3.1 Conceptualisation of knowledge-based trust**

Mobile banking is still a relatively new electronic delivery channel, and people may decide not to adopt it. Some are reluctant to do so because of security or privacy issues (Laforet & Li, 2005; Lee, McGoldrick, Keeling & Doherty, 2003). Further, lack of trust is one of the most frequently cited reasons for customers not adopting or using mobile banking (Kim, Shin & Lee, 2009; Lin, 2011). Previous studies show that trust is needed more for online transactions than face-to-face transactions (Grabner-Krauter & Kaluscha, 2003; Lee & Turban, 2001). Further, Aladawani (2001) argues that trust is an important future challenge of online banking transactions, because such transactions lack the physical presence of a branch, and face-to-face interactions between bank employees and consumers. To address the above concern in a mobile transaction environment, Lin (2011) suggests that trust could help not to both fill the gaps between bank employees and customers and, but also reduce fraud and potential risk, thereby increasing the likelihood of customers adopting mobile banking. Knowledge-based trust is, however, perceived as a trust belief, and is often defined as the belief of an individual in the trustworthiness of others, as determined by their perceived competence, benevolence and integrity (Mayer et al., 1995; McKnight, Choudhury & Kacmar, 2002). Lin (2011) posits that knowledge-based trust is a crucial element of shaping online user behaviour.

Al-Ajam and Nor (2013) found that trust plays an important role in internet banking adoption. Trust may be a reason for greater use of internet banking than mobile banking (Sharma, Govindaluri, Govindaluri, Al-Muharrami, & Tarhini, 2017). According to Sharma et al., the perception of lower security of mobile banking compared to internet banking can be attributed to the following reasons:

- Mobile banking is fairly new technology, compared to internet banking;
- Security systems for desktop computers are better known and more widely available than they are for smartphones; and
- There is less control over information sharing with mobile phones.

The high level of perceived risk associated with mobile banking relative to ordinary banking is mentioned by Kim et al. (2009) and underlines the importance of individual trust as a key antecedent in predicting mobile banking usage. Trust in technology relates to individuals depending on, or being willing to depend on, the technology to accomplish a specific task because the technology has a positive characteristic (McKnight et al., 2002).

With mobile banking, if the consumers believe that the technology used is trustworthy and reliable, then they are likely to evaluate the services favourably. Trust in electronic channels will determine the choices that the consumer has to make. Most customers prefer going to the bank to do their banking. They need a face-to-face interaction with bank employees to be sure that the transaction was done. Hanafizadeh et al. (2014) found trust to be an important antecedent explaining the adoption of mobile banking. While researchers agree that trust is essential for many human activities, they investigate it from their own disciplinary perspectives and in their own theoretical contexts.

### **2.3.2 Definition of knowledge-based trust**

Trust can be defined as the willingness of a party to be vulnerable to the action of another party based on the expectation that the latter will perform particular actions, which are important to the former (Allen & Wilson, 2003). In the context of technology trust, it is the user's understanding of the technology, based on having adopted and used the technology. Pavlou (2003) defined trust as a belief that customers entrust upon online retailers after careful consideration of the characteristics of the retailers.

Knowledge-based trust is a trust belief, and is often defined as the belief of an individual in the trustworthiness of others as determined by their perceived competence, benevolence and integrity (Lin, 2011). Mayer et al. (1995) and McKnight et al. (2002) as cited in Lin (2010) identified and validated three main elements of knowledge-based trust: competence, benevolence and integrity.

#### **2.3.2.1 *Perceived competence***

Competence is the ability of the trustee to meet the need of the trustor. In the context of mobile banking, competence belief refers to individual perceptions that mobile banking firms have the

ability, skills and expertise to understand their needs in relation to managing personal finances (Lin, 2010). This means that the consumers believe that their banks are able to give the customers the necessary platform to manage their monies or accounts. If the consumers do not believe that their banks have the ability, skill and expertise to give the appropriate transactional services, then they will not evaluate mobile banking favourably. If the consumers' beliefs are positive; this will result in a more positive attitude towards adopting or continuing to use mobile banking.

#### 2.3.2.2 *Perceived benevolence*

Benevolence is evident when the trustee is caring and motivated to act in the interest of the trustor. In the context of mobile banking, benevolence belief refers to the individual perceptions that the mobile banking firm cares about them and acts in their interest (Lin, 2011). This means that the consumers believe that the bank that is offering them the service cares about them, and will do everything to protect their finances or their transactions. If the consumer's belief is positive, (that the bank is benevolent), then they will have a positive attitude towards adopting or continuing to use mobile banking.

#### 2.3.2.3 *Perceived integrity*

Integrity refers to trustee honesty and promise keeping. In the context of mobile banking, integrity belief refers to the individual perception that mobile banking firms follow a set of principles such as honesty and keeping promises, generally accepted by adopters (Lin, 2011). Integrity is important because it instils confidence in the bank among consumers. Features of integrity by banks include giving accurate and timely information, maintaining the confidentiality of customer information, and maintaining customer commitment. Banks will be considered to have high integrity if they have strong justice, honesty and objectivity. If consumers believe that the bank has a high-level integrity, they will have a positive attitude towards adopting or continuing to use mobile banking.

## 2.4 **PERCEIVED RISK**

This section presents the conceptualisation and definition of perceived risk.

### **2.4.1 Conceptualisation of perceived risk**

Bauer (1960) (the original creator of the term) pointed out that consumers often face risk since they may not be sure about the consequences of their purchase decisions. Perceived risk focuses on the uncertainties involved in consumers' buying decisions because they typically experience unfavourable consequences when they do not achieve desired purchase objectives.

Risk is explained in many ways in the literature. One view is that risk is "a situation or an event where something of human value (including humans themselves) is at stake and where the outcome is uncertain" (Rosa, 2003, p.56). In the context of mobile banking, the perception of risk is particularly important due to privacy and security concerns (Luarn & Lin, 2005). There is, for instance, fear of loss of personal identification number codes that may pose security threats. Some users fear that hackers may access their bank accounts via stolen PIN codes (Poon, 2008). Coursaris et al. (2003) found that the risk associated with mobile banking is high because of the high probability of theft and loss of mobile devices. These refer to the security fears that a client has to overcome to be able to subscribe to mobile banking service. Lee et al. (2003) claim that the perceived risk dimension, excluding psychological risk, could explain why some consumers might not want to adopt mobile banking services.

Cruz et al. (2010) found that perceived risk is a critical barrier that would discourage people from adopting mobile banking services. Previous research substantiated the negative impact that perceived risk has on consumers' possible acceptance of m-payment (Chandra, Srivastava & Theng, 2010; Martins et al., 2014). Further studies showed that perceived risk has a negative effect on the attitude towards and the adoption of mobile banking (Tan & Lau, 2016).

Zhou (2011, p. 528) points out that "due to the virtuality and lack of control, mobile banking involves great uncertainty and risk." Numerous empirical studies (Cruz, Neto, Munoz-Gallego, Laukkanen, 2010; Koenig-Lewis, Palmer & Moll, 2010; Riquelme & Rios, 2010) have identified perceived risk as a key indicator for the degree of adoption of mobile Internet banking services.

Pertinently, Kesharwani and Bisht (2012) found that perceived risk has a negative impact on the adoption of Internet banking in India. However, the construct of perceived risk has wider-ranging implications. Akturan and Tezcan (2012), for instance, identified the following dimensions of risk:

1. Performance risk, defined as the possibility of the product malfunctioning.
2. Financial risk, defined as the potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost of the product
3. Time risk, defined as the possibility of losing time to learn how to use the product.
4. Psychological risk, the risk that the selection of performance of the producer will have a negative effect on the consumer's peace of mind or self-perception.
5. Social risk, the potential loss of status in one's social group as a result of adopting a product.
6. Privacy risk, defined as a potential loss of control over personal information.
7. Security risk, the potential loss of control over transactions and financial information

Perceived social risk and perceived performance risk were identified as determinants of mobile banking adoption (Akturan & Tezcan, 2012).

#### **2.4.2 Definition of perceived risk**

Researchers generally define perceived risk according to their own research contexts. Yang et al. (2015), for instance, define perceived risk as the extent to which consumers perceive possible losses that may result from the uncertainties in using m-payment such as financial loss, the violation of privacy, dissatisfaction with performance, psychological anxiety or discomfort, and waste of time.

Perceived risk can be defined as a degree of uncertainty in the outcome of the use of innovation (Gerrard & Cunningham, 2003) or the level of uncertainty in the security of the use of innovation (Cruz et al., 2010). Initially, perceived risk was limited to fraud or product quality, but currently perceived risk is defined in relation to financial, physical, psychological, or social risk in online transactions (Im, Kim & Han, 2008).

Kesharwani and Bisht (2012) say that perceived risk “reflects the consumer's perception about the uncertainty of outcomes that pertain primarily to searching and choosing information of product and/or services before making any purchasing decision”. In this study, perceived risk refers to the extent to which consumers perceive the possible losses that could arise from the adoption of mobile banking. The losses include financial loss, dissatisfaction with performance, or waste of time.

## **2.5 ATTITUDE AND BEHAVIOURAL INTENTION**

In this section, conceptualisation, definition of attitude and behavioural intention, theories, and the factors influencing attitude and behavioural intention are discussed.

### **2.5.1 Conceptualisation**

A consumer's decision to adopt a product depends on their attitude towards the product (Polatoglu & Ekin, 2001). In online environment, it is expected that attitude facilitates transactions and reduces the barrier to the adoption of the terms of trade (Pavlou & Chai, 2002). Behavioural intention measures the likelihood of a person getting involved in a given behaviour.

Many studies, (e.g. Armitage & Christian, 2003), use the behavioural intention construct as a dependent variable, assuming that intentions are sufficiently predictive of behaviour and consistently lead to behaviour (Zolait & Sulaiman, 2008). Ajjan and Hartshorne (2008) cite Ajzen (1991) suggesting that behavioural intention is the most important determinant of the adoption decision. This means that behavioural intention affects adoption positively. Behavioural intention is an immediate determinant of actual use of a product (Gumussoy & Calisir, 2009).

### **2.5.2 Definition of attitude and behavioural intention**

Armitage and Christian (2003, p. 188) define attitude as “the individual's overall positive and negative evaluations of behaviour”. Attitude seems to be a person's evaluation or general feeling of favourableness and unfavourableness to use internet or mobile banking services (Zolait & Sulaiman, 2008).

Armitage and Christian (2003) regards behavioural intentions as an individual's decision to follow a course of action, and an index of how hard people are willing to try and perform the behaviour (Zolait and Sulaiman, 2008). Gumussoy and Calisir (2009) cite Ajzen & Fishbein (1980) in defining behavioural intention as a measure of the likelihood of a person getting involved in a given behaviour.

### **2.5.3 Theory of planned behaviour (TPB) and theory of reasoned action (TRA)**

Among the theories explaining human behaviour related to the adopting of new technologies is the theory of reasoned action (TRA) developed by Ajzen and Fishbein in 1980 and the Theory of Planned Behaviour (TPB) by Ajzen in 1991 (Liébana-Cabanillas, Ramos De Luna & Montoro-Rios, 2016). Both have been used to explain and the adoption and usage of various technologies. Davis also developed the technology acceptance model (TAM) on the basis of these theories (Liébana-Cabanillas et al., 2017).

Some studies found that the TAM appear to be superior to TPB in explaining behavioural intention to use an information system (IS) and that the decomposed TPB, which integrates the TPB and TAM, is better than the TAM, but the difference is not substantial (Chau & Hu, 2001). According to the theory of planned behaviour (TPB) an individual's behaviour can be explained by his or her behavioural intention, which is jointly influenced by attitude, subjective norms and perceived behavioural control (Luarn & Lin, 2005).

The TRA model was proposed by Ajzen and Fishbein in 1980. According to Zolait and Sulaiman (2008) the theory explains behavioural intention through two variables: attitude and subjective norms. Attitude refers to an individual negative or positive evaluation of the performance effect of a particular behaviour. Subjective norms refers to the individual's perceptions of other people's opinions of whether or not they should perform particular behaviour, and perceived behavioural control refers to an individual's perceptions in the presence or absence of the requisite resources or opportunities necessary for performing a behaviour (Zolait & Sulaiman, 2008). According to the TRA, the intention to perform behaviour is determined by a person's attitude and subjective norm regarding the behaviour in question (Lean, Zailan, Ramayah & Fernando, 2009). Attitude is determined by his/her salient belief about the results of performing the behaviour multiplied by the evaluation of those results. The subjective norm is determined by the multiplicative function of his/her normative belief and his/her motivation to comply with these expectation or belief (Lean et al., 2009).

#### **2.5.4 Factors influencing attitude and behavioural intention**

Ajzen and Madden (1986) differentiate between internal and external perceived behavioural control factors. The external control factors determine the extent to which the circumstances facilitates or interferes with the performance of the behaviour (Ajzen, 2005). Internal control factors are factors relating to individual disposition and include the amount of information a person has, along with that person's skills, abilities, emotions and compulsions concerning a specific behaviour (Ajzen, 2005).

Many factors influence behavioural intention. In previous research, consumers confirmed during an interview that financial considerations, including the handset (hardware/software) fee, subscription fee, service fee and communication fee, might influence their behavioural intention to use mobile banking (Luarn & Lin, 2005). According to Min, Ji and Qu (2008), trust, privacy, convenience and cost also affect behavioural intention. Ching *et al.* (2011) studied the factors influencing the adoption of mobile banking in Malaysia. Their study revealed that perceived usefulness, perceived ease of use, relative advantage and perceived risks were the factors influencing the behavioural intention of mobile users to adopt mobile banking services.

Finally perceived risk is recognised as one of the most important and most common factor influencing customer intention to use and adoption of different electronic banking channels (Taylor & Strutton, 2010).

#### **2.6 CHAPTER SUMMARY**

This chapter presented the literature relating to the study at hand. Mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, attitude and behavioural intention were all conceptualised, definitions of the constructs were discussed and previous views were discussed. Chapter 3 discusses the empirical findings of the study in the form of a research article.

## CHAPTER 3

### THE ROLE OF INNOVATION ATTRIBUTES, KNOWLEDGE-BASED TRUST AND PERCEIVED RISK AND BEHAVIORAL INTENTION IN THE ADOPTION OF MOBILE BANKING AMONG SOUTH AFRICAN STUDENTS

#### ABSTRACT

**Orientation:** The rapid and exponential expansion of the diffusion of information and communication technologies in the global banking industry has been considerable in the past decade. These technologies have been implemented and considered as key factors for achieving competitive advantage through economies of scale resulting from larger customer base, personalization of banking services and reductions of operational cost.

**Research purpose:** The purpose of this study was to investigate the role of innovation attributes, knowledge-based trust and perceived risk and behavioural intention in the adoption of mobile banking among South African students at a selected institution.

**Motivation for the study:** Evidence exist in the literature regarding the effects of innovation attributes, knowledge-based trust and behavioural intention, but the combine association between these variables including perceived risk has never been tested empirically.

**Research design, approach and method:** A non-experimental and cross-sectional survey design was used in this research, using 202 students at a South African higher education institution. Data was analysed by the mean of descriptive statistics, correlational and multiple regressions.

**Main findings:** The results showed that innovation attributes, knowledge-based trust, and perceived risk related to attitudes and behavioural intention. Further, the results indicated that innovation attributes, knowledge-based trust, and perceived risk predicted attitudes and behavioural intention.

**Practical or managerial implications:** The study reflects the students' opinions (as the important future market) from a South African higher education perspective. The research makes a

significant contribution to consumer behaviour literature by understanding how the variables under investigation related to each other. The finding can be gainfully used by South African banks to understand student consumers and to design appropriate strategies to attract them as customers.

**Contributions or value-added:** The study offers deeper understanding of the relationship between innovation attributes, knowledge-based trust and perceived risk and behavioural intentions in the adoption of mobile banking particularly among South African students.

**Keywords:** Attitude, behavioural intention, innovation attributes; innovation diffusion theory; knowledge-based trust; mobile banking adoption; perceived compatibility; perceived risk; theory of planned behaviour; theory of reasoned action.

### **3.1 INTRODUCTION**

The following section aims to clarify the focus and background of the study. The general trends found in the literature will be highlighted.

#### **3.1.1 BACKGROUND TO THE STUDY**

The rapid expansion and development of the banking industry has greatly impacted on people's everyday banking activities, such as the availability of flexible payment methods and user friendly banking services (Akktura & Tezcan, 2012; Hanafizadeh, Behboudi, Koshksaray & Tabar, 2014). According to Hanafizadeh et al. (2014), experts in these technological fields are striving to efficiently apply in order to facilitate daily business, so that the owner of industries, service organisations and financial organisations are able to interact with their clients in the earliest time at lower cost and free from restrictions of time and place. For three decades major technology-enhanced product and services, from automated teller machines (ATMs) to e-banking and mobile banking, have become available everywhere 24/7 (Akturan & Tezcan, 2012; Liao & Cheung, 2002). Mobile banking is considered to be one of the most value-adding and important mobile services (Lin, 2011). Mobile banking adoption refers to the use of mobile hand-held devices to communicate, inform, transact and entertain using text and data via connection to public and private networks (Saljoughi, 2002). According to the Gartner Hype Cycle for consumer mobile applications reports (2007), the proliferation and penetration rate of mobile

banking is only 1% to 5% of the target audience. In South Africa, only 1.5 million consumers are using mobile banking (Botha, 2008).

Furthermore, mobile banking is essential to a modern economy and is a focal point of growth strategies for both the banking and mobile career industries (Akturan & Tezcan, 2012; Goswami & Raghavendran, 2009), but it remains in its exploratory stage as international and national adoption rates are low (Datamonitor, 2009; Botha, 2008; Lin, 2011). Therefore, identifying the factors that influence attitudes and behavioural intention towards adopting mobile banking is crucial for understanding the development of mobile banking services. Previous studies revealed that factors such as innovation attributes and knowledge-based trust significantly influenced attitudes and behavioural intention to adopt or continue using mobile banking (Lin, 2011). Although previous studies established the link between these variable, there is little on the role of innovation attributes, knowledge-based trust and perceive risk on attitudes and behavioural intention in a South African higher education institution. This study builds on the call by Lin (2011) for future researchers, to investigate other factors that could potentially influence students' attitudes and behavioural intention about mobile banking.

### **3.1.2 South African context**

South Africa has one of the largest markets for mobile communication services in Africa (UNCTAD, 2017). Mobile banking activity is highest in Africa, with South Africa as one of the leading players after Nigeria (Business Tech, 2014). The rapid growth in the development of mobile devices has placed South African banks in a strategic position to leverage the growth into innovation and value added services ((Bankole & Bankole, 2017)). Statistics on global mobile banking activities revealed that South Africa has about 78% of mobile banking activity, which is more than the global average of 66% (Business Tech, 2014). Currently, South Africa is the hub of creative mobile banking innovations with their success attributed to the applications made for customers from varied economic backgrounds (CNBC Africa, 2014).

In a previous study by Brown et al. (2003), it was mentioned that mobile banking in South Africa was mainly adopted by residents of urban areas. According to Pretorius (2013) South African mobile banking records witnessed increases in the number of people using mobile devices to do their banking since 2011.

Njenga and Ndlovu (2010) noted that perceived benefits of mobile banking had a much stronger influence on South African bank consumers' psyche than perceived risk, again largely influenced by the perceived ease of use of a technology as opposed to perceived risk. Wentzel et al. (2013) found that consumers' trust in technology-enabled financial services was the third most important construct, after attitude and perceived benefits.

### **3.1.3 Innovation attributes, knowledge based-trust, perceived risk, attitudes and behavioural intention**

The innovation diffusion (ID) model developed by (Rogers, 1995), the technology acceptance model (TAM) developed by Davis (1985); the knowledge based-trust (KBT) model proposed by Mayer, Davis and Schoorman (1993) and the perceived risk (PR) model developed by Bauer (1960) provide a comprehensive theoretical, empirical and explanatory basis for attitude and behavioural intention for adopting or using mobile banking.

#### *3.1.3.1 Innovation attributes (IA)*

Mobile banking is considered a technology because it permits customer to conduct banking activities or transaction without constraints of time and place (Lin, 2010). The concept of IA has been documented in the literature (Rogers, 1995). The innovation diffusion theory (Rogers, 1995) asserts that perceived IA is seen as a relative advantage in the innovation theory that could influence individuals' usage of an innovation. Previous studies by Lean, Zailani, Ramayah and Fernando (2009) and Papiés and Clement (2008) indicated that users' perceptions of the innovation affected the adoption decisions towards the internet-based information system. For instance, Lin (2011) indicates that innovation theory offers a set of attributes that may influence individuals' decision to adopt or not adopt the devices. These IA comprise three key aspects (Rogers, 1995):

- (1) Perceived relative advantage – refers to the extent to which an innovation brings benefit to the organisation. Relative advantage manifests also as an increased efficacy, economic benefits and can enhance the status;
- (2) Perceived ease of use – refers to the extent to which mobile banking is perceived as ease to understand and operate; and

- (3) Perceived compatibility – refers to the extent to which an innovation fits the values, previous experiences and needs of the adopter. Perceived compatibility is also seen as the best indicator of attitudes towards online transactions (Ilie, van Slyke, Green & Lou, 2005).

Prior research (Lin, 2011) revealed that perceived advantage related positively with customers' attitudes to adopt the mobile banking. This implies that, when individuals perceive the clear advantages offered by mobile banking they are likely to demonstrate positive attitude toward adopting or continuing to use the mobile banking. The subsequent research indicates that if the mobile banking has a very user friendly interfaces, and compatible with their lifestyle, individual customers will likely show positive attitudes to adopt or continue to use the mobile banking (Vijayasathy, 2004). In the next section knowledge-based trust is discussed.

#### 3.1.3.2 Knowledge-based trust (KBT)

Trust is an important construct catalyst in many transactional relationships (Wang, Ngamsiriudom & Hsieh, 2015). According to Luhmann (2017), trust is of considerable importance in the process of building and sustaining relationships. For instance, Vazifehdost, Vaezi and Tavanazadesh (2015) aptly comment that trust plays an important role in exchange relationships involving unknown risks when there are no guarantees that vendors will not take advantage of customers. Trust is a positive driver of customer relationship commitment or loyalty (Wang et al., 2015). KBT as a sub-dimension of trust is perceived as the trust belief and is often described as the belief of an individual in trustworthiness of others as determined by their perceived competence, benevolence and integrity (Kong 2015). KBT has been found to be a key element for shaping online user behaviour (Galadima, Akinyemi & Asani, 2014). According to Mayer et al.'s (1995) model of trust, KBT involves cognitive assessment of relevant trustee attributes. The literature identifies three main elements of KBT namely:

- (1) Perceived *competence* – refers to the ability of the trustee to meet the needs of the trustor. Competence also refers to the degree to which an individual perceive that mobile banking organisations have the ability, skills and expertise to understand their needs;
- (2) Perceived *benevolence* – reflects the extent to which the trustee is caring and motivated to act in the interest of the trustor. *Benevolence* refers also to the belief that individuals

have, that mobile banking organisation are concerned about them and acts in their interest;

- (3) *Perceived Integrity* – reflecting the extent to which the trustee is honest and considered as keeping its promises. *Integrity* refers also to the individual's perceptions that mobile banking organisations follows a set of principles such as honesty and keeping promises generally approved by adopters (Mayer et al. 1995).

According to Lin (2011), these three components of KBT (perceived competence, benevolence and integrity) play an important role in determining an individual's attitude towards the adoption (or continuing using) mobile banking. Next the perceived risk is discussed.

#### 3.1.3.3 *Perceived risk (PR)*

The construct of risk is described in many ways in the consumer behaviour literature (Martins, Oliveira, & Popovič, 2014). According to Rosa (2003), risk is perceived as a situation or an event where something of human value (including humans themselves) is at stake and where the outcome is uncertain. Kesharwani and Bisht (2012, p. 308) defined perceived risk as reflecting the customer's perceptions about the uncertainty of outcomes that pertain primarily to searching and choosing information pertaining to product and/or service before making any purchasing decision. Perceived risk reflects the extent to which customers identify the possible financial losses, dissatisfaction with performance or waste of time that may occur due to the adoption of a mobile banking (Zhou, 2011). Perceived risk is the combined effects of probabilities, the uncertainty intricate in a purchase decision, and the consequences of taking an undesirable action (Choi, Lee & Ok, 2013). Perceived risk is an important factor for consumer resistance in various technology adoption instances, especially ones which involve financial transactions, such as online shopping and internet banking (Akturan & Tezcan. 2012). The reason is that the internet is an inherently risky environment and customers perform their transaction with no face-to-face with the cashiers or suppliers' personnel and lack of transaction security and privacy protection (Bashir & Madhavaiah, 2015). Recent research in internet banking has incorporated perceived risk as a construct in the TAM to overcome its lack of task environment focus and to enhance customers' behavioural predictability. Previous studies established that perceived risk influenced negatively customers' attitude and behavioural intention to adopt or continue using mobile banking (Bashir & Madhavaiah, 2015; Kesharwani &

Tripathy, 2012). Further, studies by Lee (2009) found that perceived risk negatively affects perceived ease of use of Internet banking. In the next section, attitude and behavioural intention are discussed.

#### *3.1.3.4 Attitudes and behavioural intention (A&BI)*

The construct, attitudes towards the adoption of mobile banking, has been well documented in the literature (Lin, 2011; Vazifehdoost et al., 2015). According to Lu, Liu, Yu, and Yao (2005), attitude refers to a positive or negative evaluation of special behaviour and behavioural intention is the level of probability of using a system by an individual. The theory of reasoned action (TRA) model developed by Fishbein (1967) helps to understand the relationship between attitude and behaviour. The TRA posits that the immediate cause of behaviour is one's intention to perform the behaviour: Attitude is determined by individuals' beliefs about outcomes or attributes of performing the behaviour (behavioural intention), which are the decisions to act in a particular way (Kesharwani & Bisht, 2012). Many researchers made use of behavioural intention as a dependent variable and they assumed that intentions are sufficiently predictive of behaviour and lead to behaviour (Zolait & Sulaiman, 2008). For instance, the technology acceptance model (TAM) hypothesised that the actual use of technology is influenced by behavioural intention, which in turn is affected by attitudes (Yunus, 2014). The literature suggests that attitudes toward use the mobile banking play an important role in adopting new mobile phone services (Norizah & Siti, 2007). For instance, Bryson and Atwal (2013) aptly comment that attitude toward use facilitate conditions for better relationships between perceived usefulness, perceived ease of use, complexity, compatibility and the intension to use mobile banking. Previous studies explored the idea that perceived usefulness and perceived ease of use are key factors in predicting user satisfaction with information systems, attitudes and behavioural intention (Yee-Loong Chong, Ooi, Lin & Tan, 2010; Kim & Qu, 2014).

#### **3.1.4 Innovation attributes, knowledge-based trust, perceived risk and attitudes and behavioural intention relationships**

Research has produced evidence that innovation attributes, knowledge-based trust and perceived risk have a positive influence on individuals' attitudes and behavioural intention to use mobile banking (Kappor, Dwivedi & Williams, 2015; Yunus, 2014).

Various components of the TAM model such as perceived use, perceived ease to use, perceived risk, and compatibility were found to have a positive influence on the adoption of mobile banking (Chen, 2008). Mallat (2007) found that relative advantage and compatibility influenced individuals' decision to use mobile banking. Schierz, Schilke and Wirtz (2010) conducted an exploratory study on mobile banking payment, which showed that compatibility, individual mobile and subjectivity norm significantly influence customer acceptance of m-payment services. The risk factor is important in mobile services, and because mobility increase the threat to security, there is more risk in m-banking than with fixed devices due to the distance connection (Hanafizadeh, Behboudi, Koshksaray & Tabar, 2014). Coursaris, Hassanein and Head (2012) found that risk is related with m-banking. Perceived risk was also found to be related with intention to use mobile. The study on the effect of risk on attitudes toward using mobile banking by Wessels and Drennan (2010) found that risk factor has a negative effect on individuals' attitudes and behavioural intention to use mobile banking. Although previous studies evidenced the effects of innovation attributes, knowledge-based trust and perceived risk on attitudes and behavioural intention, the nature of this influence across difference sectors still need to be explored in a South African higher education institution context.

The purpose of the present study is to address this gap in the research by identifying the links that innovation attributes, knowledge-based trust, perceived risk may have on attitudes and behavioural intention in a South African university. It also aims to establish how these variables influence attitudes and behavioural intention to use (or continue using) mobile banking. Based on the literature, the following hypothesis was formulated: H<sub>1</sub>: Innovation attributes knowledge-based trust and perceived risk positively relate to attitudes and behavioural intention. The research question was formulated as follows: Do students' perceptions of innovation attributes knowledge-based trust and perceived risk relate to their attitude and behavioural intention to use (or to continue using) mobile banking? This study contributes at both theoretical and practical levels. With regard to theory, it adds to the body of knowledge in the discipline of industrial and organisational psychology and consumer psychology or behaviour pertaining to the association between innovation attributes, knowledge-based trust and perceived risk. Moreover, this study contributes at the practical level by providing recommendations for consumer behaviour concerning the adoption of mobile banking.

## **3.2 RESEARCH DESIGN**

The review of the relevant literature briefly outlined in the preceding introduction constitutes the foundation for the research design. The methodology presented in this section refers to the planning and structure of any given research project (Mouton & Marais, 1994)

### **3.2.1 Research approach**

In this study, a quantitative research approach following a cross-sectional design was used (Tabachnick & Fidell, 2013). The cross-sectional design is very important and ideally suitable in describing and predicting functions and it is thus appropriate for the achievement of the objective of the current study (Hair, Black, Babin & Anderson, 2010).

### **3.2.2 Research method**

Research methodology explains how the research data were collected; this helps with the reliability and validity of results. This section discusses the research method followed in this study in terms of the research participants, the measuring instrument, research procedure and statistical analyses.

#### **3.2.2.1 *Research respondents***

The population of this study comprised 500 individual students at a South African university. A convenience sampling method was used (Hair, et al., 2010) resulting in a sample of 202 respondents, indicating a response rate of 40.4%. This was above the sample size of 10% as recommended by Gay and Diehl (1992). Table 3.1 below comprises the respondents' biographical characteristics.

Table 3.1

*Biographical characteristics*

<b>Variable</b>	<b>Category</b>	<b>f</b>	<b>%</b>
<b>Gender</b>	Male	80	39.6
	Female	122	60.4
<b>Race group</b>	White	-	-
	African	201	99.5
	Indian	-	-
	Coloured	1	0.5
<b>Age group</b>	20 and younger	115	56.9
	21 –30	67	32.2
	31–40	12	5.9
	41 and older	8	4
<b>Educational level</b>	Matric	141	69.8
	Certificate	5	2.5
	Diploma	3	1.5
	Degree	29	14.4
	Postgraduate	24	11.9
<b>Marital status</b>	Single	186	92.1
	Married	14	6.9
	Widowed	1	0.5
	Separate/Divorced	1	0.5
<b>Employment status</b>	Permanent employee	6	3.0
	Part-time employee	5	2.5
	Contract employee	3	1.5

The sample consisted of 60.4% women and 39.6% men. The participants were predominantly African (99.5%) and from the age group of 20 years and younger (56.9%). The majority of participants (69.8%) had a matric, were single (92.1%) and most of them (93.1%) were full-time students.

### 3.2.2.2 *Measuring instruments*

A demographic measure was included to determine participants' gender, race, age, educational level, marital status and employment status (See Table .3.1).

The scales for three innovation attributes (IA) (perceived relative advantage, ease of use and compatibility) were measured by using the items adapted from Karahanna et al. (1999), Moore and Benbasat (1991) and Lin (2011). Perceived relative advantage was measured by four items, perceived ease of use by four items, and perceived compatibility by three items. The innovation attributes scales consists of 11 items, which are measured on a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Lin (2011) reported Cronbach alpha coefficients as high as .85 for relative advantage, 0.94 for ease of use and .87 for compatibility. The present study presents an internal consistency coefficient ranging from .79 to .82 for the IA scale.

The knowledge-based trust instrument (perceived competence, benevolence and integrity belief) developed by McKnight et al. (2002) was further used. It consists of nine items measured on a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Lin (2011) reported a Cronbach alpha coefficient of .93 for competence, .90 for benevolence and .93 for integrity belief. The present study obtained internal consistency ranging from .71 to .84.

The perceived risk (PR) consisted of four items adapted from Stone and Gronhaug (1993). The PR consists of four items, which measure consumers' behaviour and inclination to online transactions. The PR items use a seven-point Likert scale (1= strongly disagree; 7 = strongly agree). Example of items from the measures includes: "I feel that conducting my banking transactions on my mobile phone would be secure"; "I know that mobile phone banking will handle my business correctly". Hanafizadeh et al., (2014) reported a Cronbach alpha coefficient of .77 to .72 for the PR scale. In the present study, a Cronbach alpha coefficient of .78 was found.

Attitude and behavioural intention were measured using the items developed by Taylor and Todd (1995). The intention to adopt consists of six items, which are measured in order to assess the likelihood of potential customers adopting mobile banking in the future. The intention to continue use assessed the likelihood of repeat customers continuing to use mobile banking in the future. The items for attitude are: bad or good, negative or positive, and dislike or like. The items for behavioural intentions are: likely to adopt, plan to adopt, and believe it is worthwhile to adopt. All items were measured on a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Fen Lin (2011) reported a Cronbach alpha coefficient ranging from 0.87 for attitude and 0.92 for behavioural intention. In the present study, a Cronbach alpha coefficient of .84 to .86 was found for both attitudes and behavioural intention scales. All the internal consistency Cronbach alpha coefficients were acceptable (Nunnally & Bernstein, 2010).

### 3.2.2.3 *Research procedures*

Permission to conduct the research was obtained from the management of Venda University and the University of South Africa's Ethical Research Committee. Each participant received a package consisting of hard copies of the following: an invitation letter indicating the purpose of the study, measurement procedure, university management approval letter, safekeeping and confidentiality of the responses; a separate form explicating the individual's consent form and voluntary participation to the research project, requiring participants' signature; and instructions on how to complete the demographic information and the questionnaire. After completing the questionnaire, each participant was requested to ensure that the consent form was signed before returning the questionnaire to the researcher.

### 3.2.2.4 *Statistical analysis*

The data was analysed by means of the Statistical Program for Social Sciences (SPSS) version 24 for Windows software (SPSS, 2016). The descriptive statistics were used to analyse the data. The first stage involved determining the mean, standard deviations, and Cronbach alpha coefficients. The second stage of data analysis involved the correlations. The correlations were used to specify the relationship between innovation attributes, knowledge-based trust, perceived risk and attitudes and behavioural intention. The statistical significance levels used in this study were  $p \leq .05$  and  $p \leq .01$  respectively (Tabacknick & Fidell, 2009). A cut-off point of .14, .30 and

.50 (small, medium to large effects; Hair et al., 2010) were set for the practical significance of correlation coefficients.

Hierarchical multiple regression analysis was used to determine the degree to which innovation attributes, knowledge-based trust and perceived risk (independent) variables predicted attitudes and behavioural intention to use or continue using mobile banking (dependent) variables. In order to counter the probability of type I errors, the significance value was set at 95% confidence interval level ( $p \leq .05$ ). For the purpose of this study  $R^2$  values larger than .25 (large effects) at  $p \leq .05$  (Cohen, 1992) were regarded as practically significant. Prior to conducting the various regression analyses, collinearity diagnostics were examined to ensure that zero-order correlations were below the level of concern ( $r \geq .80$ ), that the variance inflation factors did not exceed .10 and that the tolerance values were close to 1.0 (Hair et al., 2010).

### **3.3 RESULTS**

This section presents the results.

#### **3.3.1 Descriptive statistics: mean, standard deviation and Cronbach alpha coefficients**

The mean, standard deviations and Cronbach alpha coefficients of the measurement instruments are reported in Table 3.2.

Table 3.2

*Descriptive statistics: mean, standard deviations and Cronbach alpha coefficients*

<b>Variables</b>	<b>Mean</b>	<b>SD</b>	<b>Cronbach</b>
<b>Innovation attribute</b>			
Perceived advantage	5.71	1.35	.81
Perceived Easy to Use	5.31	1.46	.82
Perceived Compatibility	5.44	1.47	.79
<b>Knowledge Based-Trust</b>			
Perceived benevolence	4.06	1.17	.77
Perceived Competence	5.26	1.36	.84
Perceived Integrity	5.02	1.34	.71
<b>Perceived Risk</b>	4.83	1.48	.78
<b>Attitudes</b>	5.77	1.20	.86
<b>Behavioural/ Adoption Intention</b>	5.91	1.27	.84

As can be observed in Table 3.2, behavioural intention scored the highest (M = 5.91; SD = 1.27), perceived risk (M = 5.83; SD = 1.48), attitudes (M = 5.77; SD = 1.20), perceived advantage (M= 5.71, SD = 1.35), perceived compatibility (M=5.44; SD = 1.47) and perceived ease to use (M = 5.31; SD= 1.46), perceived competence (M = 5.26; SD = 1.36) perceived integrity (M = 5.02; SD = 1.34) and perceived benevolence (M = 4.06; SD = 1.17) subscales respectively.

### **3.3.2 Person product-moment correlation coefficient**

Person product-moment correlation coefficients were used to determine the strength of the relationship between the constructs of the present study. Table 3.3 below reports the correlations between innovation attributes, knowledge-based trust, perceived risk and attitudes and behavioural intention.

Table 3.3  
Correlations

Variables	Perceived relative advantage	Perceived easy to use	Perceived compatibility	Perceived benevolence	Perceived Competence	Perceived Integrity	Perceived Risk	Attitude	Behavioural/Adoption intention
Perceived relative advantage	1								
Perceived easy to use	.44**	1							
Perceived Compatibility	.43**	.64***	1						
Perceived benevolence	.01	.16*	.29*	1					
Perceived Competence	.34**	.40**	.40**	.29*	1				
Perceived Integrity	.35**	.43**	.40**	.23*	.53***	1			
Perceived Risk	.23*	.44**	.37**	.34**	.41**	.42**	1		
Attitude	.38**	.49**	.54***	.24*	.56***	.52***	.38**	1	
Behavioural/Adoption Intention	.35**	.41**	.46**	.27*	.36**	.35**	.33**	.58***	1

N =202. \*\*. p. ≤ 0.01, \*\*p. ≤ 0.02, \* p. ≤ 0.05, ++ r ≥ 0.12 ≤ 0.20 (small practical effect size)

Source: Calculated from survey

Table 3.3 shows that significant correlation coefficients identified between the innovation attributes, knowledge-based trust and perceived risk ranged from  $r \geq .16$  (small practical effect size) to  $r \geq .64$  (large practical effect size). The results in Table 3.3 also show that the significant correlation coefficients observed between the attitudes and behavioural intention was  $r \geq .58$  (large practical effect size). These results show that the zero-order correlations were below the threshold level of concern ( $r \geq .90$ ) of multi-collinearity (Hair et al., 2010).

Overall perceived advantage, perceived easy to use, perceived compatibility, perceived benevolence, perceived competence, perceived integrity, perceived risk related to attitudes and behavioural intention variables (the p value ranged between  $p \leq .001$  and  $p \leq .005$ ). These

results evidenced hypothesis true that innovation attributes, knowledge-based trust and perceived risk positively related to attitudes and behavioural intention variables.

### **Hierarchical multiple regression analyses between innovation attributes, knowledge-based trust, perceived risk (independent variables) and attitudes (dependent variable)**

Table 3.4 includes the hierarchical multiple regression results.

In the **first step**, perceived compatibility, perceived ease of use and perceived relative advantage variables showed a significant regression model ( $F_{(3, 196)} = 30.390$ ), accounting for 33% ( $R^2 = .33$ ;  $P \leq .001$ ; large practical effect) of the variance in attitudes. More specifically, perceived compatibility ( $\beta = .34$ ;  $p \leq 0.001$ ), perceived ease of use ( $\beta = .21$ ;  $p \leq .001$ ) and perceived relative advantage ( $\beta = .14$ ;  $p \leq .001$ ), contributed significantly towards explaining the proportion of variance in the attitudes variables.

Introducing perceived competence, perceived benevolence and perceived integrity in the **second step**, perceived compatibility, perceived competence and perceived integrity variables showed a significant regression model ( $F_{(6, 193)} = 29.983$ ), accounting for 47% ( $R^2 = .47$ ;  $P \leq .001$ ; large practical effect) of the variance in attitudes. More specifically, perceived competence ( $\beta = .28$ ;  $p \leq .001$ ), perceived compatibility ( $\beta = .24$ ;  $p \leq .001$ ) and perceived integrity ( $\beta = .23$ ;  $p \leq .001$ ), contributed significantly towards explaining the proportion of variance in the attitudes variables.

Introducing perceived risk in the **third step**, perceived competence, perceived compatibility and perceived integrity variables showed a significant regression model ( $F_{(7, 192)} = 25.611$ ), accounting for 46% ( $R^2 = .46$ ;  $P \leq 0.001$ ; large practical effect) of the variance in attitudes. More specifically, perceived competence ( $\beta = 0.27$ ;  $p \leq .001$ ), perceived compatibility ( $\beta = .24$ ;  $p \leq .001$ ) and perceived integrity ( $\beta = .23$ ;  $p \leq .001$ ), contributed significantly towards explaining the proportion of variance in the attitudes variables.

Table 3.4

*Hierarchical regressions; innovation attributes, knowledge-based trust and perceived risk (independents) and attitude (dependent)*

Variables	$\beta$	t	Sr <sup>2</sup>	R	R <sup>2</sup>	R Change
Step1		7.61***		.338	.328	.338
Perceived relative advantage	.14	2.18*	.01			
Perceived easy to use	.21	2.67*	.03			
Perceived Compatibility	.34	4.39***	.09			
Step2		4.06**		.482	.466	.144
Perceived relative advantage	.07	1.07	.01			
Perceived easy to use	.09	1.28	.01			
Perceived Compatibility	.24	3.35***	.05			
Perceived Competence	.28	4.26***	.08			
Perceived benevolence	.02	.40	.00			
Perceived Integrity	.23	3.54***	.09			
Step3		4.02***		.483	.464	.000
Perceived relative advantage	.07	1.07	.01			
Perceived easy to use	.08	1.16	.01			
Perceived Compatibility	.24	3.34***	.05			
Perceived competence	.27	4.16***	.08			
Perceived Benevolence	.02	.30	.00			
Perceived Integrity	.23	3.41***	.06			

Note: N =839; \*p < .05, \*\*p < .01, \*\*\*p < .001;

+ R<sup>2</sup> ≤ 0.12 (small practical effect size), ++ R<sup>2</sup> ≥ 0.13 ≤ 0.25 (moderate practical effect size)

**Hierarchical multiple regression analyses between innovation attributes, knowledge-based trust, perceived risk (independent variables) and behavioural intention (dependent variable)**

Table 3.5 includes the hierarchical multiple regression results.

In the **first step**, perceived compatibility, perceived relative advantage and perceived ease of use variables showed a significant regression model ( $F_{(3, 196)} = 21.901$ ), accounting for 24% ( $R^2 = .24$ ;  $P \leq .001$ ; large practical effect) of the variance in the behavioural intention. More specifically, perceived compatibility ( $\beta = .29$ ;  $p \leq .001$ ), perceived relative advantage ( $\beta = .16$ ;  $p \leq .001$ ) and perceived ease of use ( $\beta = .15$ ;  $p \leq .001$ ), contributed significantly towards explaining the proportion of variance in the behavioural intention variables.

Introducing perceived competence, perceived benevolence and perceived integrity in the **second step**, perceived compatibility, perceived benevolence and perceived ease of use variables showed a significant regression model ( $F_{(6, 193)} = 13.515$ ), accounting for 27% ( $R^2 = .27$ ;  $P \leq 0.001$ ; large practical effect) of the variance in the behavioural intention. More specifically, perceived compatibility ( $\beta = .21$ ;  $p \leq .001$ ), perceived benevolence ( $\beta = .14$ ;  $p \leq 0.001$ ) and perceived relative advantage ( $\beta = .15$ ;  $p \leq .001$ ), contributed significantly towards explaining the proportion of variance in the behavioural intention variables.

Introducing perceived risk in the **third step**, perceived compatibility and perceived relative advantage variables showed a significant regression model ( $F_{(7, 192)} = 11.707$ ), accounting for 27% ( $R^2 = .27$ ;  $P \leq .001$ ; large practical effect) of the variance in the behavioural intention. More specifically, perceived compatibility ( $\beta = 0.21$ ;  $p \leq .001$ ) and perceived relative advantage ( $\beta = .15$ ;  $p \leq .001$ ), contributed significantly towards explaining the proportion of variance in the behavioural intention variables.

Table 3.5

*Hierarchical regressions; innovation attributes, knowledge-based trust and perceived (independents) and behavioural/intention (dependent)*

Variables	$\beta$	t	Sr <sup>2</sup>	R	R <sup>2</sup>	R Change
Step 1		7.97***		.251	.240	.251
Perceived relative advantage	.16	2.25*	.03			
Perceived easy to use	.15	1.86*	.02			
Perceived Compatibility	.29	3.51**	.06			
Step 2		4.61***		.296	.274	.045
Perceived relative advantage	.15	2.09*	.02			
Perceived easy to use	.11	1.36	.01			
Perceived Compatibility	.21	2.47*	.03			
Perceived Competence	.10	1.37	.01			
Perceived benevolence	.14	2.12*	.02			
Perceived Integrity	.08	1.06	.01			
Step 3		4.55***		.299	.274	.003
Perceived relative advantage	.15	2.09*	.02			
Perceived easy to use	.10	1.11	.01			
Perceived Compatibility	.21	2.46*	.03			
Perceived competence	.09	1.23	.01			
Perceived Benevolence	.13	1.84	.02			
Perceived Integrity	.07	.87	.00			
Perceived Risk	.07	.95	.00			

Note: N =839; \*p < .05, \*\*p < .01, \*\*\*p < .001

+ R<sup>2</sup> ≤ 0.12 (small practical effect size), ++ R<sup>2</sup> ≥ 0.13 ≤ 0.25 (moderate practical effect size)

### 3.4 DISCUSSION

The objective of this study was to examine the influence of innovation attributes, knowledge-based trust and perceived risk on attitudes and behavioural intention on mobile banking among the South African students.

The majority of participants in this research were black women, at a relatively early stage of their studies, aged 20 years and younger. Sixty-nine point eight percent of participants had a matric certificate and 92.1% were single. It is important to mention that 93.1% were full-time students, possibly proposing that younger people tend to make use of their mobile phones during transactions.

Significant relationships were found between innovation attributes, knowledge-based trust, perceived risk, attitudes, and behavioural intention. When participants' perceptions of innovation attributes, knowledge-based trust and perceived risk were high, their self-reported attitudes and behavioural intention were also high. These findings were consistent with those of previous research, which reported customers' positive perceptions of innovation attribute and knowledge-based trust and perceived risk to be important factors that influence their attitudes and behaviour to use or continue using mobile banking (Bashir & Madhavaiah, 2015; Kesharwani & Tripathy, 2012; Wessels & Drennan, 2010). The findings are likely explained by the fact that individual students who considered mobile banking as a good tool that help them to conduct banking transaction, who have trust in the competence and integrity of the bank and who are aware of the dissatisfaction that may occur during the transactions will likely show positive attitudes and perform behavioural intention to use (or continue using) mobile banking (Baptista & Oliveira, 2015). Participants were students who perceived that mobile banking has the ability and skills to understand their needs, care about them and follow clear set of principles and who identify that financial loss is not an issue. They will less likely be inclined towards the adoption of mobile banking (Lu, Tzeng, Cheng, & Hsu, 2015).

The results suggest that innovation attributes, knowledge-based trust and perceived risk predict students' attitudes and behavioural intention to use (or continue using) mobile banking (Lin 2011). This might be explained by the fact that, when students are high in innovation attributes, knowledge-based trust and perceive low risk they demonstrate positive attitudes and behavioural intention towards using or continuing to use mobile banking. For instance, previous

research findings suggest that individuals with higher levels of innovation attributes, knowledge-based trust and financial risk perceptions demonstrate a relatively higher level of attitudes and behavioural intention towards adopting or using the mobile banking (Lu, et al., 2015). Participants often conduct banking activities, show high levels of trust and low levels in risk will more likely to demonstrate positive attitudes and perform behaviour, which is the decision to use or continue using mobile banking. The present study supports previous studies that found that innovation attributes, knowledge-based trust and perceived risk are important drivers of attitudes and behavioural intention (Gupta & Arora, 2017).

### **3.5 LIMITATIONS OF THE STUDY**

This study has several limitations. Firstly, with the cross-sectional survey method used, it was not possible to ensure causality among variables. Secondly, because the research was conducted on a non-probability sample of students in only one South African university with a relatively small sample size of 202, it is not possible to generalise the results to other higher education institutions. The sample was female dominated. Fourthly, they yielded positive perception of perceived risk which may be caused by the use of self-reported questionnaire. Collecting data at a single point in time does not take care of maturational effects. Self-reported questionnaires are a preferred method of data collection, but they may lead to response biases, which can affect the reliability and validity of the data (Strydom, 2011).

### **3.6 RECOMMENDATION FOR FUTURE RESEARCH**

The results of this study indicate that positive relationships exist between participants' perceptions of innovation attributes, knowledge-based trust, perceived risk and attitudes or behavioural intention, and that innovation attributes, knowledge-based trust and perceived risk influenced participants' attitudes and behavioural intention to use (or continue using) mobile banking.

- It is recommended that the banking industry invest in the diffusion of new innovations, build their trust and integrity which could drive customers' attitudes and behavioural intention towards use or continue using mobile banking (Gumussoy, 2016).
- It is recommended also that future studies make use of longitudinal design to determine the causality connection or link among the variables of the study. Future studies can

make use of large sample from different higher education institutions. It is also recommend that future studies investigate if knowledge-based trust or perceived benefit can mediate or moderate the relationship between innovation attributes and attitudes and behavioural intention.

### **3.7 CONCLUSION**

This research study suggests that higher levels of participants' innovation attributes, knowledge-based trust and perceived risk influenced their level attitudes and behavioural intention to use (or continue using) mobile banking among South African Students.

This study adds values to the literature and empirical study of consumer psychology in a university. The study contributes to the body of knowledge in the disciplines of marketing as well as industrial and organisational psychology, pertaining to the psychometric relationship between the constructs. More specifically, the study emphasises the importance of innovation attributes, knowledge-based trust variables of perceived relative advantage, perceived ease of use, perceived compatibility, perceived benevolence, perceived competence, perceived integrity and perceived risk and their influence on attitudes and behavioural intention

### **3.8 CHAPTER SUMMARY**

This chapter reported on the findings of the empirical research of mobile banking (innovation attributes, knowledge-based trust, perceived risk and attitudes and behavioural intention). The findings have been integrated to reflect key observations regarding the relationship between the variables of relevance to the present study. Chapter 4 discusses the conclusions and limitations of the study and makes recommendations for future research.

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## CHAPTER 4

### CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

In this chapter, conclusions are drawn from the research findings, and the limitations of the research are highlighted. The chapter concludes with recommendations for future research.

#### 4.1 INTRODUCTION

This section clarifies the general and the specific aims of this research. The general aim of this study was to investigate the role of innovation attributes, knowledge-based trust, perceived risk, and behavioural intention in the adoption of mobile banking among a sample of students at a South African academic institution.

The specific aims of the literature review were:

- To conceptualise mobile banking adoption;
- To conceptualise innovation attributes;
- To conceptualise knowledge-based trust;
- To conceptualise perceived risk;
- To conceptualise behavioural intention; and
- To discuss the theoretical relationship between mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, and behavioural intention.

The specific aims of the empirical study were:

- To determine the relationship between mobile banking adoption, innovation attributes, perceived risk, knowledge-based trust and behavioural intention;
- To determine whether innovation attributes, perceived risk and knowledge-based trust predict mobile banking adoption; and
- To make recommendations to the banking sector on how innovation attributes and knowledge-based trust facilitate the adoption (or continued use) of mobile banking among existing and potential customers and how perceived risk impacts on this process.

## 4.2 CONCLUSIONS

This section presents the conclusions of the literature review and the empirical study.

### 4.2.1 Conclusions in respect of the literature review

Chapter 2 reviewed the broad literature and research conducted on the topic. Chapter 3 provided the article comprising the data analysis of the collected data, which offers a presentation of the statistical association between mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk and behavioural intention. The statistical analyses evidenced the correlations between subscales: innovation attributes, knowledge-based trust, perceived risk predicted attitudes and behavioural intention. Through this investigation, the researcher is able to gain a better understanding of how these constructs relate to each other.

The specific literature aims were achieved in Chapter 2 where the conceptualisation, models and theoretical integration on the constructs were reviewed.

#### 4.2.1.1 *Aim 1: To conceptualise mobile banking adoption from a theoretical perspectives*

From the review of literature, mobile banking (MB) is perceived as an innovative method of accessing banking services whereby the customer interacts with the bank via a mobile device, for example a mobile phone or personal digital assistant (Luo, Li, Zhang & Shim. 2010). In South Africa, Brown et al. (2003) found that banking customers are enthusiastic to adopt mobile banking by relative advantage, trialability, and consumer banking needs (Alalwan et al., 2016). Similarly, Lin (2011) found that the attribute ease of use, customer trust, relative advantage and compatibility were the key drivers to consumers' attitudes towards mobile banking and to facilitate the consumers' willingness to adopt mobile banking. According to Jeong and Yoon (2013), financial cost was the least important factor when predicting consumers' intention to adopt mobile banking. Perceived risk has negative impact on the adoption of mobile banking. (Alalwan et al., 2016).

#### *4.2.1.2 Aim 2: To conceptualise innovation attributes from the theoretical perspective*

Innovation attributes are perceived as the key element in the innovation diffusion theory (Rogers, 2003). The innovation diffusion theory provides a set of innovation attributes that may affect the decision to adopt mobile banking (Rogers, 2003). Rogers (2003) proposed that adoption is determined by several innovation attributes, which are: relative advantage, complexity, compatibility, trialability and observability. Among these innovation attributes, relative advantage, ease of use and compatibility were found to be the most frequently identified factors for adoption and diffusion of internet-based technologies (Papies & Clement, 2008). According to Lin (2011), perceived relative advantage and ease of use were found to have significant effects on attitude and intention to use mobile banking. Consumers who had a positive belief about the perceived relative advantage of mobile banking formed a positive attitude towards adopting mobile banking (Lin, 2011). This means that consumers who found mobile banking to be easy to use are willing to use it or do mobile banking transactions.

#### *4.2.1.3 Aim 3: To conceptualise knowledge-based trust from a theoretical perspective*

Knowledge-based trust plays an essential role in the adoption of mobile banking. Consumers cannot use something they do not trust. Knowledge-based trust includes perceived competence, integrity and benevolence. According to Lin (2011), perceived competence and integrity have a significant effect on attitude, while benevolence appear not to have a significant effect. Banks should make sure that there is adequate protection from fraud and there is privacy. Banks should focus on improving the reliability and convenience to attract consumers.

#### *4.2.1.4 Aim 4: To conceptualise ease of use and perceived risk from the theoretical perspective*

Perceived ease of use means, “the degree to which the prospective user expects the target system to be free of effort” (Davis et al., 1989, p.320).

According to Baek and King (2011), consumers are reluctant to adopt mobile banking services if there is uncertainty. Although service providers and policy makers should understand the sources of perceived risks in order to develop effective measures to alleviate consumers’ perceived risk, the sources of perceived risks in m-payment have not yet been clearly identified

(Lang et al. 2015). An increasing level of uncertainty will definitely enhance the level of perceived risk towards the mobile banking services (Tan & Lau, 2016). Further studies show that perceived risk had a negative effect consumers' attitudes towards mobile banking adoption (Tan & Lau, 2016).

#### *4.2.1.5 Aim 5: To conceptualise behavioural intention from the theoretical perspective*

Behavioural intention is an individual's subjective probability of performing a specified behaviour, and is the major determinant of actual usage behaviour (Lin, 2011). Kuo and Yen (2009) found that TAM proved to be a parsimonious model with high explanatory power of the variance in users' behavioural intention related to IT adoption and usage across a wide variety of contexts. The results indicate that there is a significant and positive association between knowledge base trust and behavioural intention (Lin, 2011).

#### *4.2.1.6 Aim 6: To discuss the theoretical relationship between mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, and behavioural intention*

The conclusion to chapter 2 connects the five constructs theoretically. Literature links mobile banking adoption, and innovation attributes, as well as knowledge-based trust, perceived risk, and behavioural intention. The literature review highlighted the association between the constructs as well as the broaden-and-build models.

## **4.2.2 Conclusions regarding the empirical study**

**There were three main aims to the empirical study undertaken in this research:**

- *Aim 1: To determine the relationship between mobile banking adoption, innovation attributes, perceived risk, knowledge-based trust and behavioural intention.*

Significant relationships were found between innovation attributes, knowledge-based trust, perceived risk, attitudes, and behavioural intention.

- *Aim 2: To determine whether innovation attributes, perceived risk and knowledge-based trust predict mobile banking adoption.*

Innovation attributes, knowledge-based trust and perceived risk predicted attitudes and behavioural intention to, and adoption of, mobile banking.

- *Aim 3: To make recommendations to the banking sector of how innovation attributes and knowledge-based trust facilitate the adoption (or continued use) of mobile banking among existing and potential customers and how perceived risk impacts on this process.*

The results of this study indicate that positive relationship exist between students' perceptions of innovation attributes, knowledge-based trust, perceived risk and attitudes or behavioural intention, and that innovation attributes, knowledge-based trust and perceived risk influenced students' attitudes and behavioural intention to use (or continue using) mobile banking. It is recommended that the banking industry invest in the diffusion of new innovations, build the students trust and integrity, which should drive consumer's attitudes and behavioural intention towards using (or to continue using) mobile banking

### **4.3 LIMITATIONS OF THE STUDY**

Several limitations in terms of both the literature review and the empirical study were identified. The limitations of this study are as follows:

#### **4.3.1 Limitations of the literature review**

Despite the fact that a broad research base exists in respect of mobile banking adoption, innovation attributes, knowledge-based trust, perceived risk, attitude and behavioural intention, only a few studies that focused specifically on higher education students exist.

### **4.3.2 Limitations of the empirical study**

A number of limitations were present in this study, pointing to caution when interpreting the results. Firstly, with the cross-sectional survey method used, it was not possible to ensure causality among variables.

Secondly, because the research was conducted on a non-probability sample of students in only one South African university with a relatively small sample size of 202, it is not possible to generalise the results to other higher education institutions.

Thirdly, the sample was female dominated. Fourthly, the positive perception of perceived risk may have resulted from the use of a self-report questionnaire. Fifth, self-report questionnaires are a popular method of data collection, but they may lead to response biases, which can affect the reliability and validity of the data (Strydom, 2011).

### **4.4 RECOMMENDATION FOR FUTURE RESEARCH**

The results of this study indicate that a positive relationships exist between students' perceptions of innovation attributes, knowledge-based trust, perceived risk and attitudes or behavioural intention, and that innovation attributes, knowledge-based trust and perceived risk influenced participants' attitudes and behavioural intention to use (or continue using) mobile banking.

It is recommended that the banking industry invest in the diffusion of new innovations, and build their trust and integrity, which should drive customers' attitudes and behavioural intention towards using (or to continue using) mobile banking (Chiu, Bool, & Chiu, (2017).

It is recommended also that future studies make use of a longitudinal design to determine the causality connection or link among the variables of the study. Future studies can make use of large sample from different higher education institutions. It is also recommended that future studies try to investigate if knowledge-based trust or perceived benefit can mediate or moderate the relationship between innovation attributes and attitudes and behavioural intention.

This study provided also evidence of how innovation attributes, knowledge based-trust and perceived risk influenced students' attitudes and behavioural intention to use (or continue using) mobile banking, it is advisable that subsequent studies employ larger samples from different Higher Education Institution. It is also recommended that future studies investigate whether knowledge based-trust or perceived benefit may mediate or moderate the relationship between innovation attributes and attitudes and behavioural intention to adopt mobile banking among students.

#### **4.5 CONCLUSION**

In this chapter, the main findings of the research were summarised and discussed, and investigated whether the aims of the study were achieved. Thereafter, the limitations of the study were outlined and recommendations for future search were proposed.

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