

**THE ADOPTION RATE OF CELLPHONE BANKING: A  
TECHNOLOGY CLUSTER PERSPECTIVE**

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## **Introduction**

There is no guarantee that any technological advancement will necessarily translate into successful consumer adoption. Yet, consumers' acceptance and intentions to adopt new technology are crucial aspects of new product development and marketing. In most cases, the successful diffusion of new technology is partially determined by whether potential users adopt the innovation (Wang and Fang, 2008:101).

The planned research will attempt to gain a better understanding of the formation of intention to adopt new electronic services (e-services) by integrating the technology cluster theory of Everett Rogers with the Technology Acceptance Model (TAM) developed by Fred Davis. The integration of the two theories implies that the beliefs consumers have about an auxiliary e-service influence the formation of intention to adopt another e-service, given that the two e-services are compatible. Furthermore, earlier studies provide evidence that *Rate of use* can moderate the relationship between the use of one technology and the adoption of another technology. Thus, the moderating effect of *Rate of use* on the relationship between beliefs about an e-service and the formation of intention to adopt an auxiliary e-service will also be investigated. To summarise, the focus of the proposed Ph.D. is to study the moderating effect of the *Rate of use* of an auxiliary e-service (in this study internet banking) on the relationship between consumers' beliefs about the e-service and the formation of intention to adopt another e-service (in this study cellphone banking).

In the following section, the management dilemma will be explained and the demarcation of the proposed study will be justified. This will be followed by a review of the TAM theory that can be used to explain consumers' adoption of e-services. Next, a literature review of existing TAM cellphone banking research will be presented, followed by the research problem and objectives. The research method is then described and the potential contribution and limitations of the study are elucidated. Lastly, the framework for the proposed Ph.D. is presented.

## **The management dilemma**

One of the most fundamental changes in the banking industry in recent years has been the consumer movement from traditional branch banking to more stand-alone banking; in other words, a move towards using electronic delivery channels such as cell phones in private banking (Karjaluoto, Mattila

and Pento, 2002). This revolution may be one of the most dramatic innovations to affect the industry, because banking activities are easily digitised and automated (Bradley and Stewart, 2002:250).

Cellphone banking is considered by some researchers to be one of the most value-adding and important mobile services (Lee, McGoldrick, Keeling and Doherty, 2003a:340). Cellphone banking can be defined as “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, 2002:12). On the MTN website cellphone banking is described as the use of a cellular phone to view account balances, transfer funds between accounts, pay accounts and top up airtime (*Mobile banking*). , Mobile BankingCellphone banking, therefore, is defined as the delivery of financial services with mobile devices such as cellular phones and portable data assistants (PDA) (Cho and Jung, 2005). The mobile handset makes it very simple for banks to communicate with the target customers and to get them to react. As a result, financial service companies can now combine information services and marketing in ways that go way beyond sending customers a simple SMS message to inform them of their bank balance (Riivari, 2005:14).

The initial adoption of an e-service is an important first step toward realising e-service success (Hsu and Chiu, 2004:359). Even though technology and applications for cellphone banking services are available, the usage rates internationally have been fairly low (Luarn and Lin, 2005:873; Suoranta and Mattila, 2004:355). According to the Gartner *Hype cycle for consumer mobile applications* report (2007), the penetration rate of cellphone banking is only 1% to 5% of the target audience. In South Africa, only 1,5 million consumers are using cellphone banking (Botha, 2008) although the service has been available since 2000 (*One million cellphone banking clients reached*). Swift adoption of an e-service is essential for two reasons. If the technology is not used by the target market, unmet or underserved needs cannot be met. Secondly, slow adoption also prolong the time it takes to recover the initial investment in the service and/or to generate positive cash flow from the service. If the service can more quickly reach a critical mass of customers, then the respective bank’s investment in the e-service can be recouped more quickly (Gerrard and Cunningham, 2003:16). Therefore, the low adoption of cellphone banking, nationally and internationally, is identified as the management dilemma underpinning the study.

### **Demarcation of the field of study**

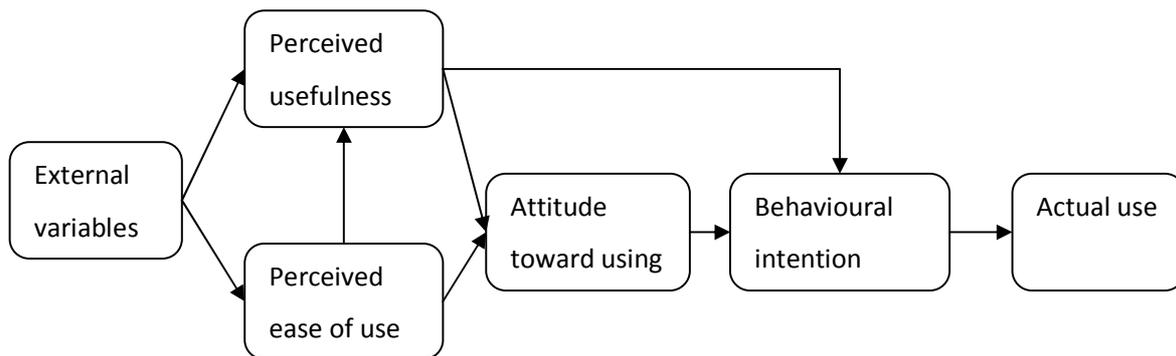
Marketing is one of the fundamental areas within a business for which a functional area strategy needs to be developed (Hough, Thompson, Strickland and Gamble, 2008:105). Marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and

services to create exchange that satisfy individual and organisational goals (Lamb, Hair, McDaniel, Boshoff and Terblanche, 2004:4). One of the key issues in product strategy deals with the introduction of new products. The development and commercialisation of new products are a vital part of a firm's efforts to sustain growth and profits over time (Ferrell and Hartline, 2008:93). A thorough understanding of consumer behaviour is a critical element in developing a successful marketing strategy (Peter and Olson, 1996:16), as it entails how individuals and businesses make decisions to spend their available resources on consumption-related items (Cant, Brink and Brijball, 2008:7). Therefore, the successful marketing of new products depends to a large extent on understanding the consumer.

Consumer behaviour and the adoption of e-services have been discussed by many researchers and academics (e.g. Atkin, Jeffres and Neuedorf, 1998; Devlin and Yeung, 2003; Akinci, Aksoy and Atilgan, 2004; Chih-Chien, Shao-Kang and Wenchang, 2008). These studies have explored the adoption of e-services using different theories. However, none were dedicated to understanding how beliefs related to an existing e-service influence the formation of intention to use another e-service. Addressing this gap in the literature is the aim of the proposed study. Thus, the field of study falls broadly into the discipline of marketing and, more specifically, into the areas of consumer behaviour and the marketing of e-services.

### **Technology Adoption Model**

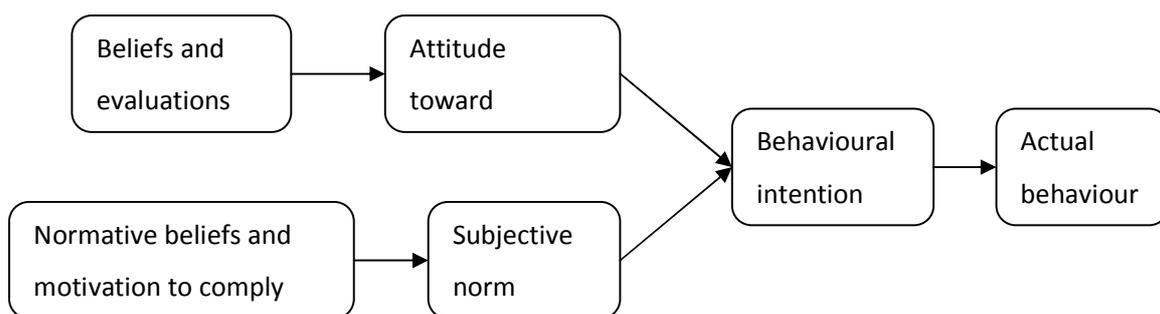
Information technology acceptance and its use have been the focal point in many studies for well over a decade. Several theoretical models have been used to study user acceptance and the usage behaviour of emerging information technologies, including Rogers' diffusion theory (see e.g. Bhatti, 2007), the Theory of Reasoned Action (TRA) (see e.g. Komiak and Benbasat, 2006) and the Theory of Planned Behaviour (TPB) (see e.g. Lim and Dubinsky, 2005). From this stream of research the Technology Acceptance Model (TAM) has emerged as a powerful and parsimonious model that represents the antecedents of technology usage through beliefs related to the *Perceived usefulness* and *Perceived ease of use* of a technology (see Figure 1) (Yousafzai, Foxall and Pallister, 2007). Previous research has also shown that the TAM explains a higher level of variance in systems use than the TRA, TPB and the Decomposed TPB (Lee, Kozar and Larsen, 2003b). Therefore, the TAM will be used in this study to gain an understanding of consumer adoption of cellphone banking.



**Figure 1: Technology Acceptance Model**

Source: Davis, Bagozzi and Warshaw (1989:985)

TAM is an adaptation of the Theory of Reasoned Action (TRA) from social psychology that is concerned with the determinants of consciously intended behaviours. According to TRA (see Figure 2), a person’s performance of a specific behaviour is determined by his or her *Behavioural intention* to perform the behaviour, and *Behavioural intention* is jointly determined by the person’s attitude and *Subjective norm* concerning the behaviour in question (Davis *et al.*, 1989). *Behavioural intention* is a measure of the strength of one’s intention to perform a specific behaviour. *Attitude* is defined as an individual’s positive or negative feelings about performing the target behaviour. *Subjective norm* refers to “the person’s perception that most people who are important to him think he should or should not perform the behaviour in question”.



**Figure 2: Theory of Reasoned Action**

Source: Davis *et al.* (1989:984)

The goal of the TAM is to provide an explanation of the determinants of computer acceptance that is general, yet capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically

justified (Davis *et al.*, 1989:985). The TAM suggests that two specific beliefs, *Perceived ease of use* and *Perceived usefulness*, determine one's behavioural intention to use a technology (Venkatesh, 2000; Venkatesh and Davis, 2000). *Perceived ease of use* can be defined as "the extent to which a person believes that using a technology will be free of effort". It is thus a construct tied to an individual's assessment of the effort involved in the process of using the system (Venkatesh, 2000). *Perceived usefulness* is defined as "the degree to which a person believes that using a particular technology will enhance his performance" (Sun and Zhang, 2006). Further, the TAM posits that *Perceived usefulness* will be influenced by *Perceived ease of use* because, other things being equal, the easier a technology is to use, the more useful it can be (Venkatesh, 2000). Similar to the TRA, the TAM postulates that computer usage is determined by *Behavioural intention*. However, the TAM differs from the TRA in that *Behavioural intention* is viewed as being jointly determined by the person's attitude towards using a system and *Perceived usefulness*.

The two major differences between the TRA and the TAM are that beliefs (such as *Perceived usefulness*) have a direct effect on *Behavioural intention* and not only a mediated influence as in the TRA. Davis *et al.* (1989) points out that alternative intention models provide theoretical justification and empirical evidence of the direct belief-intention links. According to Davis *et al.* (1989), the *Usefulness-behavioural intention* relationship is based on the idea that, within organisational settings, people form intentions toward behaviours they believe will increase their job performance, over and above whatever positive or negative feelings may be evoked toward the behaviour *per se*. Thus, the TAM hypothesises that people form intentions toward using computer systems based largely on a cognitive appraisal of how it will improve their performance.

The other important difference between the TRA and the TAM is an omission of *Subjective norm* from TAM. Initially, Davis *et al.* (1989:986) argued that *Subjective Norm* was omitted because it is difficult to disentangle direct effects of *Subjective norm* on *Behavioural intention* from indirect effects via attitude. An additional reason why *Subjective norm* was omitted from the original TAM is that the results of their study indicated that *Subjective norm* did not have a significant effect on *Behavioural intention*. However, Venkatesh and Davis (2000:187) believe that Davis *et al.* (1989) did acknowledge the need for additional research to "investigate the conditions and mechanisms governing the impact of social influences on usage behavior".

One of the characteristics of the TAM often cited in the literature is the parsimony of the model. The parsimony of the TAM, coupled with its predictive power, makes it relatively easy to apply in different

situations. However, it is also the model's key limitation in that it does not provide sufficient understanding from the perspective of providing system designers with the information necessary to create user acceptance for new systems (Venkatesh, 2000).

## **TAM research and cellphone banking**

An online search was conducted to identify previous research on cellphone banking. The purpose of the search was to find research published on the topic in accredited/peer-reviewed journals, dissertations, and theses that met the following criteria:

- The context was cellphone (also used cell phone and mobile) banking.
- The research model was the Technology Acceptance Model (TAM) and it included at least the two basic internal beliefs: *Perceived ease of use* and *Perceived usefulness*.
- Research that examined the influence of moderating variables, which included the overall result.
- The minimum statistical analysis included in the article, dissertation or thesis was testing for statistical significant relationships between dependent and independent variables.

The search included the following online resources: Africa-Wide: NiPAD (incorporating South African Studies and African Studies), ACM, EBSCOHost, Emerald, Gartner, Oxford Journals, Sabinet Online Ltd., ScienceDirect, Scirus, Scopus, Social Science Citation Index, SpringerLink and Google Scholar.

After the search had been conducted, potential articles were printed and dissertations and theses on cellphone banking in South Africa were requested through the University of the Free State Library's inter-library loan section to ascertain whether they met the criteria. After all the articles, dissertations and theses received had been evaluated in terms of the criteria, the following can be reported:

- Only one article in a peer-reviewed journal on cellphone banking adoption was found.
- No dissertation or thesis received (from South African higher education institutions) on cellphone banking met the criteria.

From the evaluation of articles, dissertations and theses, some inferences can be made. These inferences should be interpreted taking into account the 'file drawer' problem, also known as the 'publication bias' problem. Wolf (1987:37) argues that it is unlikely that a literature review will uncover every study of a hypothesis that has been conducted. Published research studies tend to be biased

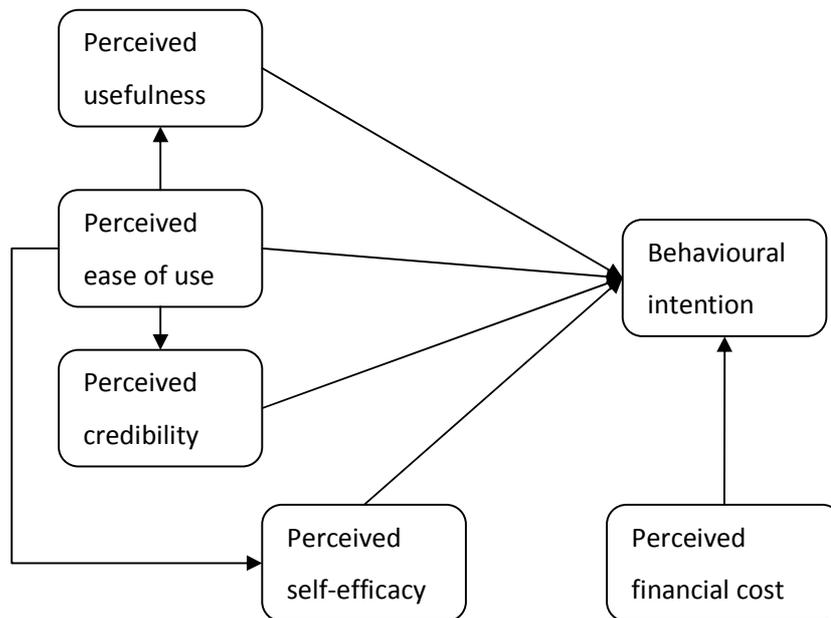
towards positive findings as it is generally difficult for editors to publish studies with non-significant findings, because of the many studies they receive with statistically significant findings. Further, it is also important to acknowledge that other researchers might have done research on the topic using the TAM and never published the research for a specific reason. Also, a dissertation or thesis might have been completed on the topic, without the information having been uploaded to one of the online databases. Thus, taking these limitations into account, the following inference is made:

- Explaining the adoption of cellphone banking using the TAM has received little attention internationally and nationally to date. At a national level, given the short time cellphone banking has been available in South Africa, this conclusion is in all probability correct.

Only the study of Luarn and Lin (2005), *Toward an Understanding of the Behavioral Intention to Use Mobile Banking*, meets the criteria set out above. Luarn and Lin's (2005) research model is shown in Figure 3. The objective of their study was to extend the TAM by adding *Perceived credibility*, *Perceived self-efficacy* and *Perceived financial cost* to the TAM model. They handed out questionnaires at an e-commerce exposition and symposium in Taiwan. Three hundred and ninety four (394) attendees were approached and 180 returned completed questionnaires.

According to Luarn and Lin (2005:878), continuing research efforts into computer self-efficacy can be observed in recent information systems studies, confirming the critical role that computer self-efficacy plays in understanding individual response to information technology. Using the critical role of computer self-efficacy in technology adoption as the starting point for their postulation, they focused their study on whether respondents believed they had the required knowledge, skill or ability to use cellphone banking. Thus, *Perceived self-efficacy* was operationalised as the judgement of one's ability to use cellphone banking.

During qualitative interviews conducted by Luarn and Lin (2005), several consumers confirmed that financial considerations, including a handset (hardware, software fee), subscription fee, service fee and communication fee, might influence their *Behavioural intention* to use cellphone banking.



**Figure 3: Conceptual model of Luarn and Lin (2005)**

Source: Luarn and Lin (2005:879)

Luarn and Lin (2005) based their operationalisation of *Perceived credibility* on the definition used by Wang, Wang, Lin and Tang (2003). Their definition of *Perceived credibility* in the cellphone banking context reads as follows: "... perceived credibility is defined as the extent to which a person believes that the use of cellphone banking will have no security or privacy threats". Like Wang *et al.* (2003), Luarn and Lin (2005) hypothesise that *Perceived credibility* will have a positive effect on *Behavioural intention* to use cellphone banking.

Luarn and Lin (2005) hypothesise that *Perceived ease of use* and *Perceived usefulness* have a positive effect on intention and on each other. They further add the hypothesis that perceived self-efficacy has a positive effect on *Perceived ease of use* as Wang *et al.* (2003) did in the internet banking context. They base the postulation on the theoretical argument by Davis (1989) and Mathieson (1991) and empirical evidence of a causal link reported in Davis and Venkatesh (1996) and Venkatesh (2000).

The study of Luarn and Lin (2005) found that significant effects influencing behavioural intention from *Perceived usefulness*, *Perceived ease of use*, *Perceived credibility*, *Perceived self-efficacy* and *Perceived financial costs* were observed. Luarn and Lin (2005) also found that *Perceived credibility* had a stronger

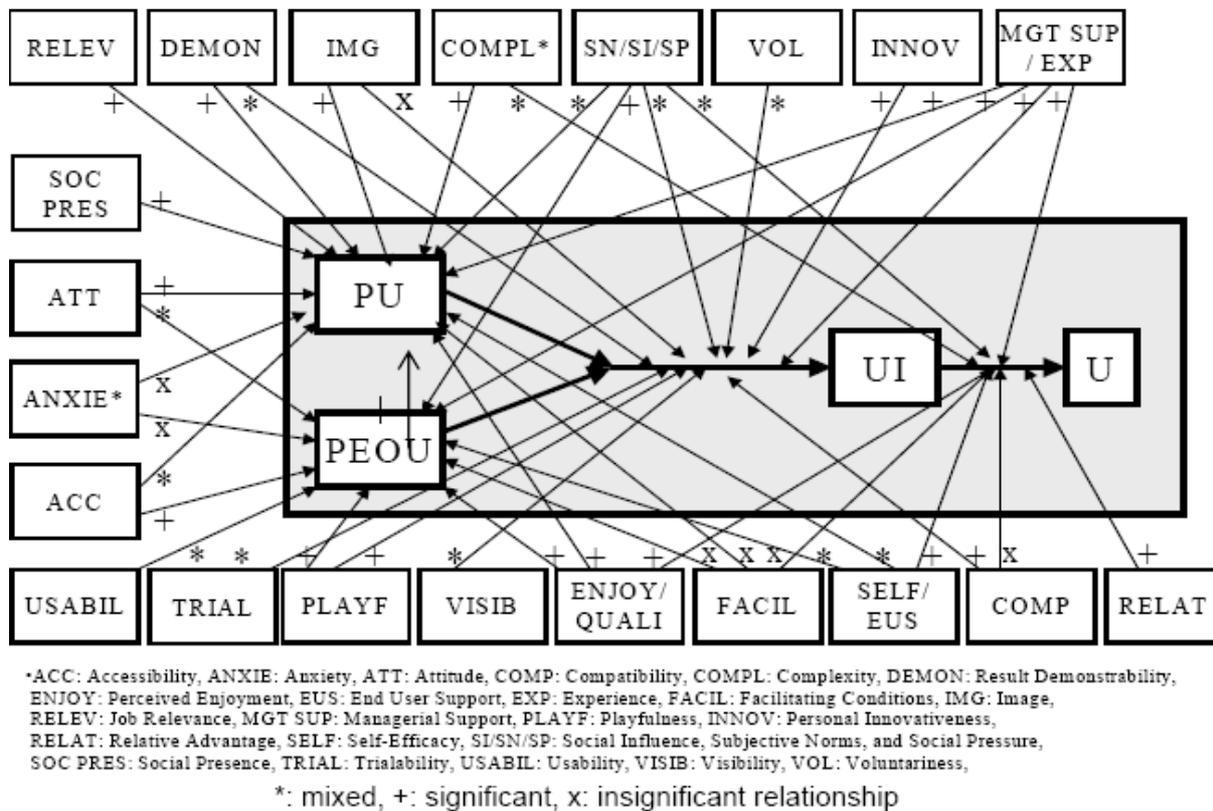
influence on *Behavioural intention* than traditional TAM variables. Thus, security and privacy issues were found to be a significant concern for consumers when using cellphone banking.

Luarn and Lin (2005:887) saw the contribution of their research in that it could assist cellphone banking authorities in the development of better user-accepted cellphone banking systems and the study provided insight into how to promote the use of information technology amongst potential users. Only two limitations are cited: one, the absence of a trust-based construct in the context of electronic/cellphone commerce and, two, the assumption that there are no barriers preventing an individual from using an information system if he or she should choose to do so.

## **Research question**

The slow adoption of cellphone banking by consumers can be investigated by following different approaches. One approach can be to add more explanatory variables to the TAM and test for direct and indirect effects on attitude towards cellphone banking on the one hand and intention or usage of cellphone banking on the other hand. The study reported by Luarn and Lin (2005) is an example of this approach. An alternative approach is that researchers can hypothesise that a specific variable, or variables, influence the two internal beliefs. Lastly, researchers can follow a combination of the two previous approaches. The TAM meta-analysis research of Lee *et al.* (2003) shows that various external variables were introduced to the TAM since the seminal work of Davis (1989) to gain a better understanding of technology adoption behaviour (see Figure 4 for the most frequent-used external variables). Some of these variables can be used to extend the TAM to study acceptance of cellphone banking.

It seems from Figure 4 that a potential area of TAM research, including TAM research related to cellphone banking, that has been neglected is beliefs about the functionally similar technologies. Rogers (2003:14) refers to the influence of an existing functionally similar technology on the adoption of another technology as a *technology cluster*. He is of the opinion that innovations are often not viewed singularly by individuals, but that perceptions about a specific innovation may trigger the adoption of another innovation (Rogers, 2003:249). Consumers are more likely to adopt an innovation that they are comfortable with and that is compatible with other technologies that they already use. The degree of compatibility can either increase the rate of adoption or slow it down (Eastin, 2002, citing Rogers, 1995).



**Figure 4: Prior TAM research**

Source: Lee *et al.* (2003:760)

A general view of compatibility that is widely accepted and used is the view of Rogers (1962) who operationalised compatibility as a belief that using an innovation is perceived as consistent with existing socio-cultural values, beliefs, past and present experiences and the needs of potential adopters (Karahanna, Agarwal and Angst, 2006:783). A very similar view of compatibility is that of Tornatzky and Klein (1982), who are of the opinion that there are two types of compatibility: normative or cognitive compatibility, referring to compatibility with what people feel or think about an innovation, and practical or operational compatibility, referring to compatibility with what people do. Recently, Karahanna *et al.* (2006) extended this perspective and operationalised compatibility as a perceived cognitive distance between an innovation and precursor methods for accomplishing tasks. According to them, compatibility consists of four dimensions: (1) compatibility with existing work practices; (2) compatibility with preferred work style; (3) compatibility with prior experience; and (4) compatibility with values (Karahanna *et al.*, 2006:787).

In an online search only one article was found in which prior experience with a technology is included as an antecedent for *Perceived ease of use* and *Perceived usefulness*. Agarwal and Prasad (1999) hypothesise that *Prior experiences* with similar technologies are positively associated with the *Perceived ease of use* and *Perceived usefulness* of an information technology innovation. The findings of their study only confirms that *Prior experiences* with similar technologies have a significant influence on *Perceived ease of use* (Agarwal and Prasad, 1999:377). The key limitation of their research is that they use one construct, *Prior experiences*, to research the affect of existing technology on the adoption of new technology. From a consumer behaviour perspective, it still does not provide an understanding of how beliefs about one technology influence the adoption rate of another technology.

In other words, the research question is: How do beliefs about other e-services that a bank offer to customers influence the adoption of cellphone banking? In this study the other e-service is internet banking.

### **Internet banking and cellphone banking as a technology cluster**

Internet banking and cellphone banking are both subsets of electronic banking (Lassar, Manolis and Lassar, 2005:177; Wang *et al.*, 2003). Internet banking can be defined as an electronic banking system that allows customers to perform a wide range of banking transactions electronically via the bank's website (Tan and Teo, 2000:4). However, in the present day, cellphones also provide web surfing capabilities, enabling cellphone users to access the Internet through a hand-held device and conduct Wireless Application Protocol (WAP) cellphone banking. The look and feel of the interface of WAP cellphone banking is very similar to internet banking and a handset that supports WAP, GPRS, 3G or EDGE is required (*What is WAP cellphone banking?*). The initial definition of internet banking needs to be modified to provide a clearer differentiation between internet banking and cellphone banking, since both forms of electronic banking are done through the Internet. According to Michael Karlin, President and Chief Operations Officer of Security First Network Bank, a client also needs a computer and a modem to do internet banking (Chan, 2001:10). Thus, internet banking for the purpose of the study is redefined as an electronic banking system that allows customers to perform a wide range of banking transactions electronically via the bank's website, by using a computer and modem to connect to the Internet. Considering the definition of cellphone banking already presented, the main difference between cellphone banking and internet banking is that at least one part of the transaction is conducted via a mobile device, commonly a mobile telephone (Mallat, 2004:2).

Internet banking and cellphone banking can be viewed as a technology cluster for several reasons. Firstly, internet banking and cellphone banking provide similar benefits to the consumer. (See Table 1 for summary of advantages as advertised on the Big Four's web site.) Both electronic banking services offer convenience, cost-effectiveness and time saving, which makes cellphone banking compatible with internet banking from the perspective that it complements the preferred banking mode and existing banking routines made possible by internet banking. Secondly, with both e-banking services transaction information are sent over computer networks that may pose a security or privacy risk for the users. Current users of internet banking are more likely to appreciate the risk perceptions of internet banking than non-users and exhibit confidence in using it. Thus, prior experience with internet banking can influence the adoption of cellphone banking.

To date, a few researchers have considered the influence of internet banking on the adoption of cellphone banking. According to Suoranta and Mattila (2004:364), "it seems that typical Internet banking users will continue to use the wired channel and the current users of automatic bill payment and branch offices will be more likely to 'leap' to use cellphone banking. Internet banking is obviously not the related service product category as suggested". They further argue that new cellphone banking innovators are not likely to be drawn from heavy users of internet banking services, as they will more probably continue to use internet banking. They add that it is more reasonable for banks not to invest in convincing regular internet banking customers to change from one electronic channel to another, but that they should rather try to get customers outside this segment interested in the advantages of cellphone banking. Lee *et al.* (2003a:346) argue that problems with internet banking may either prevent customers from adopting 3G cellphone banking services or encourage them to adopt the service. They are of the opinion that additional research is required to identify under what conditions customers' adoption of the new product may or may not be affected by their experiences with the previously adopted product.

The research of Suoranta and Mattila (2004) also suggests that the *Rate of use* of internet banking can moderate intention to use cellphone banking. This notion is in line with the use-diffusion model developed by Shih and Venkatesh (2004) from the perspective that rate of use of an existing technology influence interest in new technologies. The research findings of Shih and Venkatesh (2004) suggest that the higher the rate of use of a technology, the stronger the interest in future technologies. Thus, users who have successfully integrated the technology into their lives should be least resistant to acquiring similar technologies (p. 83). This is a contradiction to the view of Suoranta and Mattila (2004). These

conflicting views and apparent lack of research to understand the moderating effect of *Rate of use* in technology cluster theory call for further research to fill the gap in the current literature.

Considering the discussion to this point, the research question can be reformulated as: How does the *Rate of use* of internet banking moderate the influence of consumers' beliefs about internet banking on the formation of intention to adopt cellphone banking?

### **The objectives of the study**

Given the research problem specified in the previous section, the following objectives for the study can be formulated.

#### **Primary objective**

The primary objective of this study is to investigate the moderating effect of internet banking *Rate of use* on the relationship between consumers' beliefs about internet banking and the formation of intention to adopt cellphone banking by means of structural equation modelling multi-group analysis.

#### **Secondary objectives**

To address the primary objective, the following secondary objectives will be pursued:

- To consider the use of the Internet and mobile networks for the delivery of electronic banking services by means of a literature review.
- To generate a theoretical depiction of technology acceptance based on the Technology Acceptance Model.
- To identify external variables (beliefs pertaining to internet banking) from literature that could influence *Perceived ease of use* and *Perceived usefulness* of cellphone banking.
- To investigate the moderating effect of *Rate of use* of internet banking on the relationship between consumers' beliefs about internet banking and the formation of intention to adopt cellphone banking by means of structural equation modelling multi-group analysis.
- To offer recommendations towards the crafting of effective cellphone banking marketing strategies.

## **Research method**

### **Literature study**

Secondary sources of information will be used to explore the role of consumer behaviour in the marketing of new technology, and gain an understanding of the TAM and identify beliefs about internet banking that could influence *Perceived ease of use* and *Perceived usefulness* of cellphone banking. Typical secondary sources would include: articles published in accredited and other journals, conference papers, newspaper articles and academic books. For the literature study, the following databases will be consulted: Africa-Wide: NiPAD (incorporating South African Studies and African Studies), ACM, EBSCOHost, Emerald, Gartner, Oxford Journals, Sabinet Online Ltd., ScienceDirect, Scirus, Scopus, SSCI, SpringerLink, and Google Scholar.

### **Empirical study**

#### Research design

A formal, cross-sectional research design has been selected for the study. A formal research design tests stated hypotheses (Cooper and Schindler, 2006:140). The cross-sectional research design is appropriate as the study investigates beliefs on internet banking and cellphone banking at a specific point in time. The research design may furthermore be classified as statistical modelling, since a model is constructed through a process of abstraction from what is theorised to be the process in the “real world” (authenticity) (Mouton, 2005).

#### Measurement

For each construct in the conceptual model a conceptual definition will be formulated. These definitions can be compiled from previous research that used similar constructs. The purpose of the conceptual definition is to specify the theoretical basis for the summated scale by defining the concept being represented in terms applicable to the research context (Hair, Black, Babin, Anderson and Tatham, 2006:136). Next, a list of items (statements) will be generated that is relevant to each construct and will reflect a favourable or unfavourable position on the construct. This list can be generated from previous research in which similar constructs were used, as well as the literature. The items listed to measure each construct will then be tested for content validity by means of panel evaluation (Cooper and Schindler, 2006:319). Content validity is the assessment of the degree of correspondence between the items selected to constitute a summated scale and its conceptual definition (Hair *et al.*, 2006:136). The panel should consist of academics in the field of e-commerce (2), marketing managers of internet

banking services in South Africa (2) and consumers (5). Next, a pilot study can be undertaken to assess the reliability of the questionnaire. The sample of the pilot study will be 100 respondents.

A Likert scale is selected as the appropriate measurement scale, seeing that the purpose is to gain an understanding of the influence of internet banking beliefs on the formation of intention to use cellphone banking. A Likert scale is an appropriate measurement scale to measure cognitively, affectively and behaviourally based attitudes (Cooper and Schindler, 2006:339) such as beliefs about internet and cellphone banking, and intention to use cellphone banking.

The *Rate of use* variate can be measured by asking respondents the overall incidences of specific banking activities in a month and the frequency of use of internet banking to complete those banking activities. An example of how *Rate of use* will be calculated is shown in Table 1. In Table 1 two respondents indicated the overall incidence of three hypothetical banking activities and the frequency of use of internet banking to complete each of those activities. From this information the percentage of use of internet banking for each banking activity is calculated. Next, the calculated average percentages are used to calculate an overall average percentage for each respondent. The advantage of the approach is that the *Rate of use* is calculated for each individual, taking into consideration the range and incidence of banking activities in which the individual engages. Respondent B engages in only two of the three banking activities, hence his/her *Rate of use* is calculated taking only activity A and B into consideration. According to Table 1 the *Rate of use* of internet banking of respondent B is higher than that of respondent A.

**Table 1: Example to illustrate how Rate of use will be calculated**

	Respondent A			Respondent B		
	Overall N	Internet banking N	Percentage	Overall N	Internet banking N	Percentage
Activity A	10	5	50	4	2	50
Activity B	12	8	67	8	7	88
Activity C	5	2	40	Not applicable	Not applicable	
Average			52			69

Data collection

Two modes will be followed to collect the data. The survey will be advertised on WOMF an Internet word-of-mouth-forum. The online forum has eight regional sites covering central South Africa, Gauteng (Gauteng has five main regional sites), the Lowveld and KwaZulu-Natal. The central South African site

has approximately 12 000 users, of which 6 000–7 000 WOMFers are unique users. Recently the central South Africa site has reached 100 000 postings. The Gauteng, Lowveld and KwaZulu-Natal sites were recently established. It is anticipated that by the end of 2010 the sites will have achieved critical mass in the user base. The link to the online questionnaire will be e-mailed to every registered user of WOMF. WOMFers can click on the link which will redirect them to the online questionnaire hosted on the University of the Free State servers.

The second mode of collecting data entails using a mall-intercept survey approach to generate an e-mail list. Considering that WOMF covers the northern, eastern and central parts of South Africa, the mall-intercept survey will take place in the Western Cape. The main and sole purpose of the mall-intercept survey is to collect names, surnames and email addresses of consumers willing to participate in the survey. From this an e-mail list will be created and the link to the survey will be emailed to those consumers.

To encourage participation, incentives will be presented to respondents. The incentives can be monetary like electronic vouchers or technological products like iPods.

#### Sampling

The target population is South African bank customers, 18 years and older, who have access to the Internet, a bank account and a cell phone. A purposive quota sampling method will be used. Purposive sampling entails drawing a sample that conforms to certain criteria. Quota sampling is necessary to improve representativeness in the different groups (*Rate of use groups*) (Cooper and Schindler, 2006:424).

According to Hair *et al.* (2006:740-742) a number of issues must be considered in estimating the sample size required for structural equation modelling (SEM). Firstly, the multivariate normality of the data should be taken into account. If the data deviate more from the assumption of multivariate normality, the ratio of respondents to parameters needs to be higher. The suggested ratio to minimise problems with deviations from normality is 15 respondents for each parameter estimate in the model. Since the number of parameter estimates is not known at this point in time, this rule of thumb cannot be used in estimating sample size. Secondly, the estimation method also plays a role in the sample size decision. The use of maximum likelihood estimation method requires a sample size of between 150 and 400 respondents. Furthermore, model complexity, missing data and average error variance of indicators are other issues that must also be considered. Of these three issues, missing data will not be a problem, as

the online survey system will prompt respondents to answer unanswered questions before the submission of the questionnaire will be accepted. It is anticipated that the model will consist of more than six constructs, which will also impact sample size. In addition, adopting a pessimistic view that low communalities can be present and some of the constructs may have less than three measured items as indicators, the sample size should be more than 500 respondents per group (Hair *et al.*, 2006). What's more, it is anticipated that the *Rate of use* ordinal variable will consist of four categories: non-users of internet banking, low use, moderate use and high use. Thus, the minimum sample size is approximately 2 000 respondents.

### **Data analysis**

In order to address the research objectives, SEM is the preferred statistical analysis technique. Conceptually, SEM is a collection of statistical techniques between one or more independent variables (IVs), either continuous or discrete, and one or more dependent variables (DVs), either continuous or discrete, to be examined. Both IVs and DVs can be either measured variables or latent variables. On a continuum of complexity of the general linear model, with a simple bivariate correlation or t-test as the most basic form, and with multiple regression in the middle of the continuum, a full structural equation model would be at the complex end (Hardy and Bryman, 2004). An important advantage of SEM over the basic general linear model is that dependent variables can also play the role of predictor variables within the same model.

As the DVs and IVs will be latent variables, the data collected for the measurement model must be tested for reliability and construct validity. The reliability of a measure indicates the extent to which the measure is without bias (error free) and hence offers consistent measurement across time and across various items in the instrument (Sekaran, 2000:206). Because there are different types of random error, it is often necessary to evaluate different aspects of a measure's reliability (Kline, 1998:194). For the purpose of this study, inter-item consistency reliability is an appropriate reliability measure. The reasons are that internal consistency is indicative of the homogeneity of the items in the measure that taps the construct and inter-item consistency test the consistency of the respondent's answers with which the items are independent measures of the same concept (Sekaran, 2000:206). Since the items making up the beliefs in the conceptual model will be measured with a Likert scale, the Cronbach's coefficient alpha is the reliability test of choice. While reliability concerns the consistency of test scores, validity concerns, broadly-speaking, how they should be interpreted (Kline, 1998:195). Construct validity refers to how well the study's results support the theory or constructs behind the research and asks whether

the theory supported by the findings provides the best available theoretical explanation of the results (Graziano and Raulin, 2000:187). Construct validity can be assessed by means of convergent and discriminant validity. Convergent validity is confirmed when the scores obtained by two different instruments measuring the same concept are highly correlated. On the other hand, discriminant validity is confirmed when two variables are predicted to be uncorrelated, and the scores obtained by measuring them are indeed empirically found to be so (Sekaran, 2000:208). Evidence of construct validity can be confirmed through an exploratory factor analysis (EFA), a multivariate technique which would confirm the dimensions of the concept that have been operationally defined, as well as indicate which of the items are most appropriate for each dimension (Sekaran, 2000:208).

Next, the EFA will be followed up with a confirmatory factor analysis (CFA) to confirm construct validity. A CFA confirms that a set of variables define a construct (Schumacker and Lomax, 1996:45). In a SEM CFA measurement model, latent variables are assessed by indicator variables (also known as observed variables). The relationship between the observed variables and latent variables are described by factor loadings, which serve as validity coefficients. The measurement error is defined as that portion of an observed variable that is measuring something other than what the latent variable is hypothesised to measure (Schumacker and Lomax, 1996:81). The specification of a multifactor CFA model in which each indicator loads onto a single construct, implicitly tests convergent and discriminant validity (Kline, 1998:214). Moderate to low estimated correlations between the factors support discriminant validity, while the percentage of variance explained by each indicator variable indicates convergent validity (Kline, 1998:216).

To address the primary research objective, a SEM multi-group analysis will be performed. A SEM multi-group analysis answers the question of whether estimates of model parameters vary across groups (rate of use categories) (Kline, 1998:181). In other words, does *Rate of use* moderate the relations specified in the model? Cluster analysis can be used to group the respondents who do make use of internet banking into three homogeneous groups based on the *Rate of use* variate. Through the imposition of cross-group equality constraints, the significance of group differences on a model parameter or set of parameters can be tested. Before the structural weights can be compared to test for invariance, metric equivalence (invariance) must be established (Hair *et al.*, 2006:875). The importance of metric invariance is that it enables meaningful comparisons about the strength of relationships between constructs from one group to the next (Hair *et al.*, 2006:823). Metric invariance can be established by testing for factor loading equivalence, which entails constraining the factor loading estimates equal in all the groups. The

model fit of the unconstrained model must then be compared to the model fit of the constrained measurement weights model by using the chi-square difference test. A non-significant chi-square difference test indicates that the constrained model is not significantly different from the unconstrained model. Metric invariance is thus confirmed. If the chi-square difference test is significant, the minimum requirement of partial metric invariance must be met before relationships between constructs can be compared across groups. Partial metric invariance requires that at least two loading estimates for each construct be equal between groups (Hair *et al.*, 2006:823). The process to establish partial metric invariance entails constraining one factor loading equal across all the groups and then comparing the fit of the constrained model with the unconstrained model by means of the chi-square difference test. A non-significant result indicates invariance. This process is repeated with all the factors until two equal factor loading estimates per construct can be identified.

To determine if invariance is present in the structural weights comparison between the groups, the structural weights will be constrained equally across groups. A non-significant chi-square difference test between the constrained model and the unconstrained model indicates invariance. However, if the result of the chi-square difference test is significant, each structural weight must in turn be constrained equally across the groups, whilst the remaining structural weights are left unconstrained. Once again the chi-square difference test is applied to determine if the structural weights are invariant or not. This step enables the identification of the structural weight(s) that is(are) non-invariant across the groups.

### **Contribution of the proposed study**

Senior bank management structures have an interest in studies that investigate e-services such as internet banking or cellphone banking, as the results can shed light on how to market such a service better and accelerate the rate of adoption. If the service can more quickly reach a critical mass of customers, then the respective bank's investment in the e-service can be recouped more quickly (Gerrard and Cunningham, 2003:16). The findings of the study can provide marketing practitioners with pertinent information that can be useful in the formulation of marketing strategies for faster adoption of cellphone banking. The study would also add to a better understanding of the influence of internet banking beliefs on the formation of cellphone banking beliefs, and the overall influence on cellphone banking behavioural intention. This study could make a contribution by using internet banking beliefs as antecedents of cellphone banking beliefs, and thus determine the overall influence on intention to use cellphone banking services. Lastly, the research can provide more insight into cellphone banking

consumer behaviour by grouping the respondents into different user-rate groups. The influence of each internet banking belief on intention can be determined, which can put cellphone banking practitioners in a position to formulate effective marketing strategies.

In terms of marketing theory, the study will make a contribution to the body of knowledge pertaining to the marketing of electronic services. Explicitly, the contribution will be towards the marketing of new electronic services considering the influence of existing electronic services on adoption behaviour.

The proposed study can also make a contribution to the TAM body of knowledge by investigating the influence of beliefs about an existing technology as antecedents for *Perceived ease of use* and *Perceived usefulness*. The literature review indicated that previous TAM research only included *Prior experience* as a construct that can influence *Perceived ease of use* and *Perceived usefulness*. Such research can also validate the robustness of technology cluster theory through applying it in an electronic services context and extending the underlying theory to the TAM.

### Limitations of the study

The study has two main limitations. Firstly, the study will only explain how perceptions about internet banking influence formation of intention to adopt cellphone banking. Internet banking may not be the only banking service that could influence adoption of cellphone banking. From a technology adoption theory perspective the research can validate the theory that perceptions in relation to an e-service can influence the adoption of another e-service, but the findings will be very context specific. The antecedents of *Ease of use* and *Usefulness* in this study (specific internet banking beliefs) may not be fundamental constructs in every technology as *Ease of use* and *Usefulness* are.

### Framework of the study

Chapter	Title	Main aim of the chapter
Chapter 1	General orientation	
Chapter 2	The role of marketing in business management	To consider the role of marketing as a business function.
Chapter 3	Marketing of banking services through electronic networks	Explore the delivery of banking services to consumers through the Internet and mobile networks.

Chapter	Title	Main aim of the chapter
Chapter 4	Cluster technology theory and the formation of intention	To identify from literature internet banking beliefs that can be antecedents of <i>Perceived ease of use</i> and <i>Perceived usefulness</i> of cellphone banking.
Chapter 5	Research method	To describe the research method.
Chapter 6	Empirical research and findings	To test the conceptual model by means of structural equation modelling multi-group analysis.
Chapter 7	Conclusions and recommendations	To present final conclusions and recommendations with regard to the marketing of cellphone banking.

## Conclusion

The successful marketing of a new technology remains a critical aspect for all businesses using that technology to satisfy the needs of consumers. This challenge can be addressed by a better understanding of the factors that influence consumers' decision to adopt the new technology, specifically how beliefs about an existing technology influence the formation of intention to adopt a new technology and how this influence is moderated by use of the existing technology. The study will aim to gain an understanding of how beliefs related to a technology influence the formation of intention to adopt another technology through a literature review, followed by an empirical research among consumers. This study will not only make an academic contribution to the field of marketing, but will also provide marketing managers and practitioners with possible strategies to market cellphone banking.

## Appendix A

Benefit for the consumer	Internet banking				Cellphone banking			
	ABSA*	Standard Bank**	Ned-bank***	FNB****	ABSA+	Standard Bank++	Ned-Bank+++	FNB++++
Convenience (including 24/7 access from anywhere)	X	X	X	X	X	X	X	
Safe and secure environment		X		X			X	
Real-time account info				X				
Cost-effective			X			X	X	
Time-saving			X					X
Management of personal finances	X						X	
Access to account information	X							
Easy to use		X			X	X	X	

Sources: *Internet banking*, *Internet Banking\**, *Internet Banking: Overview\*\**, *Digital Banking - Frequently Asked Questions\*\*\**, *FNB Online Banking\*\*\*\**, *Cellphone Banking - Features and Benefits\**, *Cellphone Banking – Overview\*\**, *Cellphone Banking\*\*\** and *Cellphone Banking. Is This for You?\*\*\*\**

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