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### Online banking adoption

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## **TITLE: ONLINE BANKING ADOPTION: WE SHOULD KNOW BETTER 20 YEARS ON**

### **ABSTRACT**

During the 20 year lifetime of the Journal of Financial Services Marketing the study of online banking adoption has emerged and matured as a field. Now 20 years on, we reflect on the accumulated online banking adoption knowledge and consider what this tells us. Based on an audit of published research over a ten-year period, 1998-2008, we identify the core theories and approaches utilised to study online banking. The findings reveal the widespread application of the Technology Adoption Model (TAM). Drawing on the current debate regarding TAM within the Information Systems (IS) domain, we critically evaluate the ongoing appropriateness of TAM for online banking adoption research, and call for a refreshed approach to the study of bank technology adoption. The paper concludes by highlighting other theories that offer potential to extend knowledge in this area.

**Key words: Literature Review, Consumer Behaviour, Online Banking, Technology adoption.**

### **INTRODUCTION**

The Journal of Financial Services Marketing has an important role in providing relevant practitioner insight and guidance for future academic research (Grant et al 2013). During the 20-year lifetime of the Journal of Financial Services Marketing various theories and approaches have been applied to financial services innovation adoption. Our paper focuses on online banking adoption research and specifically re-evaluates the use of the Technology Acceptance Model (TAM), a widely used model in this area.

The adoption and use of banking innovation is a continuing issue for financial services marketing researchers. In the 1990s scholars identified that digital technology could transform

the banking business model and provide benefits to both financial organisations and their customers. Research focussed on generating greater understanding of the challenges to successful implementation (Waite and Harrison 2004). Twenty-five years later, the challenge of influencing innovation adoption persists despite a substantial volume of empirical research being conducted within a wide variety of disciplines. For example the Bill and Melinda Gates Foundation identifies that encouraging mobile payment adoption by merchants from developing regions is a “Grand Challenge” ([www.gcgh.grandchallenges.org](http://www.gcgh.grandchallenges.org)). Furthermore as digital channels continue to evolve there is a need to integrate and re-evaluate extant streams of evidence in order to identify where avenues of enquiry are exhausted and where there are areas that warrant attention.

The aim of this article is to review the theoretical development of knowledge in the area of online banking research and specifically to critically assess the contribution of TAM as a key model utilised in online banking research. We identify three theoretical bases that have underpinned innovation adoption research, and we use this to classify the research literature over a ten year period using a deductive approach that draws on both marketing and Information Systems (IS) theories. We argue that a synthesis of approaches is of critical importance for several reasons. First, the study of user acceptance of new technology is a mature research area within IS research (Taylor and Todd 1995, Venkatesh et al 2003, Wixom and Todd 2005). Second, it reflects a distinct trend towards multi-disciplinary approaches within digital technology research within which diversity is a central characteristic (Lee et al 2007:31). The article then draws on critical debate within the IS field regarding TAM and assesses the extent to which these criticisms apply to online banking studies. We conclude by offering guidance for future TAM research and identify emergent approaches to innovation adoption and priority areas for future research.

## **INNOVATION ADOPTION THEORY**

This paper begins by identifying a typology of three theoretical bases for classifying adoption research. The Diffusion of Innovation (DoI) Theory and the User-Intention (UI) Theory are founded within Information Systems research (Taylor and Todd 1995), whilst the Expectancy-Disconfirmation (ED) Theory has its basis within the marketing discipline and encompasses both user satisfaction and web site quality research, unlike previous schema (i.e. Wixom and Todd 2005). The application of this typology isolates the contribution of each theoretical domain to the overall body of knowledge and provides an additional theory to the model-based literature review presented by Yousafzai (2012). The following section provides an overview of the adoption models within each theory.

### **Diffusion of Innovation Theory**

Rogers' (1995) Diffusion of Innovation theory (DoI) identifies the processes and characteristics (both of the adopter and of the innovation) that result in adoption and increase the rate of diffusion over time (Rogers 1995). The DoI Theory provides a post-hoc explanation of adoption by identifying both innovation and innovator characteristics (Greenhalgh et al 2004). The innovation must be superior to any alternative and superiority is gained through high compatibility with adopters' circumstances and low complexity in understanding and use. The process of diffusion will be more rapid if the adoption decision is non-voluntary and collective rather than individual and voluntary (Rogers 1995). Innovators tend to be tolerant of risk and identify positively with innovation.

The inclusion of time is the distinguishing characteristic and strength of DoI theory (Rogers 1995). Thus adoption is conceptualised as a longitudinal process of: innovation knowledge, persuasion, decision, implementation and confirmation. Consideration of uncertainty and risk is an inherent part of this process (Bauer 1960, Ostlund 1974). Prior to use there is uncertainty over the degree of relative advantage, compatibility and complexity,

and thus any decision to adopt an innovation involves a degree of risk. Innovation characteristics such as trialability and observability reduce uncertainty and risk perceptions. Trial can take place on a limited basis through the use of what are termed “divisible elements” and “innovations that can be divided for trial are generally adopted more rapidly” (Rogers 1995:171). In addition, the ability to observe others gaining advantage from an innovation is considered a vicarious trial and thus facilitates rapid diffusion. The strengths of DoI are its multi-disciplinary nature, its pragmatism and the simplicity of its approach (Rogers 1995).

### **User-Intention Theory**

User-Intention (UI) theories identify attitudinal influences upon individual intentions to adopt (Venkatesh et al 2003). Two behavioural theories underpin this research, the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975) and the Theory of Planned Behaviour (TPB) (Ajzen 1988, 1991) The underlying concept is that positive perceptions of innovation characteristics leads to intended and then actual use. There are a wide variety of adoption models that draw on Ajzen and Fishbein’s paradigm (see reviews by Venkatesh et al 2003, Cheung et al 2003, Monsuwe et al 2004). UI Theory has gained popularity due to its ability to account for a wide range of goal and task behaviour (Muthitacharoen et al 2006).

A dominant and established model within this theory is the Technology Acceptance Model (TAM) (Davis et al 1989). Davis’ model is considered parsimonious, easy to understand and simple to apply (Taylor and Todd 1995, Karahanna and Straub 1999). TAM proposes that innovation use is determined by the behavioural intention to use which in turn is informed by the individual’s attitude towards use. Davis et al (1989) propose two attitudinal constructs which reflect the fact that TAM was developed within an organisational context:

- Perceived Usefulness (PU), defined as the “user’s subjective probability that using a specific application system will increase his or her job performance” and

- Perceived Ease of Use (PEoU), defined as “the degree to which the user expects the target system to be free of effort” (Davis et al 1989, p985).

Both PU and PEoU are argued to fully moderate the influence of any external antecedents such as system attributes, user characteristics, task attributes, the process of IT implementation and organisational influences (Davis et al 1989). The use of perception rather than expectation indicates that TAM is designed to predict adoption after experiencing the innovation during trial. Evidence shows that TAM is hard to apply where participants have limited experience of the innovation (Agarwal and Prasad 1998). Empirical evidence shows that TAM has explanatory power and is able to account for over 40 percent of the variance in individual intention to use technology (Featherman and Fuller 2002, Venkatesh et al 2003).

### **Expectancy-Disconfirmation Theory**

Expectancy-Disconfirmation theory proposes that consumers make assessments of innovation performance based on a comparison of *a priori* expectations with *post hoc* perceptions (Oliver 1996). This comparison results in either: positive disconfirmation where performance is above standard, negative disconfirmation where performance is below standard or zero disconfirmation where *a priori* expectation standards are met (Oliver 1996). Consumer behaviour literature has formulated the concepts of consumer satisfaction and service quality based upon an evaluative gap model of differences between prior and post experiential evaluation and response (see for example Parasuraman et al 1988, 1991). Marketing and IS researchers have suggested that both satisfaction and service quality constructs may be important determinants of web site use (Rowley 2001) and in particular continued use (Bhattacharjee 2001). There has been an active stream of research into web site quality that has drawn on the SERVQUAL research design (for reviews see Bauer et al 2006, Halaris et al 2007). Research informed by ED Theory focuses on user expectation and perception of specific elements of innovation design to predict adoption. One strength of this

approach is that it provides results that are actionable for business practice (Loiacono et al 2007).

## **LITERATURE REVIEW PROCESS**

The study next applies the typology schema to the extant literature. We select studies for review using five criteria. First, only consumer adoption studies and not institution-level adoption research are included. Second, only online-banking services using a PC are included and mobile banking studies are omitted. Similarly only retail banking studies are included and not other product types such as pensions, stock broking services or investment products. Only empirical refereed journal articles and conference papers are included and the focus is on papers written in English.

Studies are classified according to the unpinning theory, year of publication, sampling technique, research strategy and analysis technique. The sampling frame, the method of participant recruitment, the number of participants in the achieved sample and the nature of the data (whether it was qualitative or quantitative), the collection instrument used and the analysis technique used to derive the main findings are noted (i.e. if a focus group was used to generate questionnaire items then this was not noted). SPSS V14 is used to calculate frequencies and other descriptive statistics.

Some studies did not explicitly refer to either a theory or a model as guiding the study and other studies utilised models found within more than one theory, in these instances we examined the key variables used in each study to determine classification. Where studies made no reference to any underpinning theory or model and where more than one theoretical base was applied then coding criteria were applied as outlined in Table 1.

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This is not claimed to be an exhaustive data base, rather an adequate sample and it is important be aware of the danger of creating a false objectivity by the use of “reality of numbers” (Hanson and Grimmer 2007:63) which is inherent when creating and using a database. In addition we acknowledge any classification system is subject to the conscious or subconscious judgement of the researcher (King and He 2005).

## **AUDIT FINDINGS**

The achieved sample from the review process was 110 studies from 28 different countries, with the earliest publication appearing in 1998. The three most researched national contexts are the UK (18.2%, n=20) and US (18.2%, n=20) and then Australia and New Zealand (10%, n=11). However, as results could reflect the focus on studies published in English it is not appropriate to draw conclusions about international research activity.

There is some evidence that preliminary literature search and evaluation needs to be improved. For example a fifth of these empirical studies (20%, n=22) fail to use a research model either to generate research propositions or to contextualise findings and that the majority of these studies (72.6% n=16) are published after 2005. Theory is important as it enables the empirical researcher to identify the appropriate research tools, provide insight in ways of understanding and draw out different assumptions as to the nature of online activity (Brown et al 2003).

UI Theory accounts for the largest proportion of studies (36% n=40) compared to ED Theory (33% n=36) and DoI Theory (31% n=34) (Figure 1). The bias towards the UI Theory means that the focus is on prediction rather than evaluation of consumer behaviours. Indeed Maenpaa et al (2008) argue that the focus of online banking research should be on the perception and experiences of online banking users at different stages of familiarity with the service.



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Equal numbers use deductive (n=55) and inductive (n=55) research designs. Figure 2 shows a movement between deductive and inductive research approaches. Nineteen inductive studies draw on ED theory in the period 2001-2006. In these studies, researchers inductively derive a range of consumer expectations of website features for testing. Figure 3 shows the sample frame and sampling technique. Bank customers (n=31) and online bankers (n=25) are frequently used and additional groups are students (n=16), the general population (n=16) and internet users (n=12). The mean smallest reported sample is 4 (Benamati and Serva 2007) and the largest is 274,000 (Hitt and Frei 2002). However a typical sample is 300 which is the median. Non-probability sampling technique dominates (n=77), yet 10 of the audited studies do not explicitly state a sampling technique.

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There is an extraordinary emphasis on quantitative data collection (n=99), with 75% of the studies using surveys, which are administered face-to face (n=29), by mail (n=19) and online (n=18). The most frequently used analytical technique is structural equation modelling (SEM) (n=24) which is applied in most cases to non-probability samples (n= 17) and in some instances to samples of less than 200 (n=5). Tabachnick and Fidell (2007) state that as a covariance based technique SEM test statistics are susceptible to sample size. In general it is argued that a sample size of 200 is critical (Bentler 1990, Spector 1992, Hair et al 1998). Figure 4 shows the number of studies using a probability or non-probability sample for each analytical technique.

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Our audit highlights issues of generalisability, validity and reliability related to the over-reliance upon non-probability sampling and choice of population of interest. For example, if the aim of the study is to explore adoption choice then there will be a pro-

innovation bias in surveying only current and continuing users (Bhattacharjee 2001). Thus studies that gather data only from users of online banking do not account for those who have never tried the distribution channel or for those that have tried but discontinued use of the distribution channel. Equally, sampling bank customers without controlling for internet use may not account for individual attitudes towards Internet use in general. In their meta analysis of TAM research King and He (2006) find that the level of user experience is a moderator between PEOU and intention to use and should be reported in studies, they also find that students can act as surrogates for organisational users but not for individual users such as consumers. However only a small number of studies utilise Internet users as a population of interest (n=12) and the majority of this research is based on non-probability sampling (n=9).

The over-use and mis-use of SEM is of concern when the confirmatory technique is used for exploratory data analysis (Tabachnick and Fidell 2007). This occurs when numerous model deletions and modifications are made in search of model fit. Such fit results are questionable since “a strong goodness of fit is achieved in the second stage more through skill of deletion rather than on any theoretical basis” (Chin 1998: xii). For example, Sundarraj and Wu (2005) use a sample of 72 student participants to study attitudes towards technology. They find that by deleting three (p 440) however there is no statistical support for the theoretically derived hypothesised relationships between reported use and “perceived ease of use” and “perceived usefulness”. Whilst the authors acknowledge the limitations of a student sample they do not question their analytical approach.

## **A CRITICAL APPRAISAL OF TAM**

Our focus now moves to TAM, first we examine the online banking studies that use TAM. Clearly in choosing to report here on TAM we have purposively rejected other models. However, we feel that this attention is warranted given its “central position” within adoption

research (Hirschheim 2007, Lucas et al 2008). Within the UI theory stream 60% of studies (n=24) use TAM as an explicit foundation. All these TAM studies are quantitative, the smallest reported sample is of 52 students (Sukkar and Hasan 2005) and the largest is 1831 online banking users (Eriksson et al 2005), typical sample sizes are between 113 (mode) and 238 (median).

In the context of the wider IS literature the “TAM++ research” is applied to those studies that extend the original model (Benbasat and Barki 2007:212). Wixom and Todd (2005) identify three primary extensions:

- the introduction of additional factors related to TRA and TPB i.e. subjective norm and perceived behavioural control;
- the addition of key related factors from DoI theory such as trialability, compatibility and observability;
- the examination of external variables that are either antecedent to or proposed as moderators of “perceived usefulness” and “perceived ease of use”.

We find that over half of TAM studies extended the original model with additional variables to account for a consumer rather than an organisational context (Figure 5 and Table 2). Some extensions are theoretically informed for example by including ED constructs such as “trust” and “satisfaction” and website attributes (Table 3). Other extensions are ad hoc and include: situational influences such as access to the Internet at home and at work (McKechnie et al 2006, Hernandez and Mazzon 2007); consumer-related characteristics such as age, gender; and attitudinal predictors such as personal innovativeness (Yiu et al 2007) or product category involvement (McKechnie et al 2006). On average model prediction is accurate in 25% of cases for actual use and 66% of cases for intended use.

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Finally, a citation analysis in 2015, using Google Scholar, shows 13,445 citations of Davis et al (1989) of which 3,410 consider online banking. This level of activity, taken together with the predictive ability that is evident within the audited papers, convinces us that it is firmly established within a range of contexts that if an innovation is useful and easy to use then there is an intention to use (Benbasat and Barki 2007: 213). Next we critically appraise TAM by examining the debates concerning the model and the field of research that uses TAM and its variants and discuss the implications for online banking research.

### **TAM as a Model**

Areas of consideration are the conceptualisation and operationalisation of the model. In terms of its conceptualisation, a scholarly appreciation of the origins of TAM indicates that its appropriateness within a consumer setting is limited. TAM was formulated to account for adoption within an organisational setting and thus there is no consideration of alternative technologies (Lin et al 2005). DoI research shows us, the adoption process differs in contexts where adoption is voluntary and individual. TAM is designed to be parsimonious and focuses on only two attitudinal antecedents. Parsimony is valuable since the role of science is “not to reproduce the reality in all its complexity but only to formulate what is essential for understanding prediction or control” (Kaplan 1998:281). However such simplification is achieved with the sacrifice of richness and practical design guidance (Taylor and Todd 1995, Plouffe et al 2001). As a result researchers have sought to expand the core model, which has demonstrated that TAM is flexible and dynamic (Sharp 2006). However, paradoxically, the addition of numerous variables to TAM weakens its parsimony in terms of its efficiency and ease of implementation.

It is important to remember that “TAM started out as a simplified adaptation of TRA in IT contexts... [and] adding social influences and facilitating conditions to TAM results in a model that is not very different from TPB” (Benbasat and Barki 2007: 213). In addition, the atheoretical inclusion of similar constructs, results in multi-collinearity and the invalid inclusion of predictors (Yousafzai 2012). This paper reports that just over half of those studies that use the TAM framework have extended the model in an attempt to account for the consumer adoption context in online banking research. These approaches add little knowledge to TAM and ignore Davis’ position that both PU and PEOU fully moderate the influence of any external antecedents. Thus we argue that TAM in its original form is not an appropriate model to apply to voluntarily adopted online banking innovation and augmented models have a limited and sometimes erroneous theoretical contribution.

When considering its operationalisation the instructions are clear that TAM measures perceptions after technology trial rather than expectations before innovation use. Thus the determinants of voluntary non-trial cannot be assessed. This means that TAM should not be applied to situations where there is no direct experience of the innovation. Our audit shows that several financial services marketing researchers erroneously have applied TAM in such situations (Wang et al 2003, Pikkarainen et al 2004, Lai and Li 2005, Sukkar and Hasan 2005, Yiu et al 2007). Researchers overcome this difficulty by changing the original item wording and ignoring the foundational premise of the model. For example Cheng et al (2006 :1570 ) ask participants whether they “would find Internet banking useful”. We argue that this is not a valid approach.

### **The Field of TAM Research**

In this section we examine the field of research endeavour rather than the model itself. As early as 2007 in a special issue dedicated to TAM research the Association for Information Systems considered that the field was at “saturation point” (Benbasat and Barki 2007: 213).

TAM-based research is considered a “logjam” which stifles adoption research and wastes valuable journal space (Straub and Burton-Jones 2007, Hirschheim 2007). Researchers place more importance upon TAM than it warrants (Silva 2007); it has become reified (we might say deified).

The body of TAM++ research is criticised as giving the “illusion of progress in knowledge” which has resulted in a “state of theoretical chaos and confusion” (Benbasat and Barki 2007:211). It is argued that continuing to test and re-test TAM robustness and generalisability within the context of online banking makes a minimal contribution to substantive knowledge (Yousfzai 2012). Evaluation criteria applied elsewhere in services research consider that adding a new variable to a model is not a theoretical contribution unless it “changes our understanding in a significant way about the proven relationships between variables” (Russell-Bennett and Baron 2015). Finally to underscore this point; TAM was introduced as a starting point and not an end in itself and replications with “minor tweaking” do not advance theory and are not desirable (Davis et al 1989, Venkatesh et al 2007:268).

Exemplars of appropriate TAM replication and contextualisation are present and the comprehensiveness of this research supports our assertion that further work will not advance understanding. It is not sufficient to just state that no other research has been performed in this area; the mere existence of a gap is not an argument for undertaking research. Whetten (1989) writes that “applying an old model to a new setting and showing that it works is not instructive”. For an example of replication which involves the systematic testing of theoretically justified moderators we would refer readers to Han-Fen et al (2013) and the testing of mediators by Jackson et al (2013). Both studies are underpinned by strong theory to support the research agenda and make a contribution by testing the relationship directionality and the interlinked nature of processes that were considered discrete.

Context refers to the selection of a particular demographic group, service type, service channel or service industry (Russell-Bennett and Baron 2015). Cross-cultural testing of TAM is a crowded research stream in which it is difficult to make a contribution. As early as 1997, Straub et al (1997) replicate TAM across three different cultural contexts: Japan, Switzerland and the US and find that the model may not predict technology across all cultures. However ten years later Lee et al (2007) find that TAM has cross-cultural validity and has the ability to predict mobile phone adoption in Korea, Hong Kong and Taiwan. Later models such as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al 2003) have proven predictive ability with regards to online banking adoption in different culture contexts. For example, Im et al (2011) find that the UTAUT model predicts online banking adoption using data from Korea and the US. Researchers contemplating a cross-cultural study need to demonstrate both awareness of the extant research and to present an extremely compelling argument as to the theoretical contribution of the chosen context (for example the arguments made by Han-Fen et al 2013 that governed their choice of the Saudi Arabian context).

In summary, TAM has made a valuable contribution but its day is done. Relying upon TAM binds financial services marketing research to an IS theory which is considered tenuous within its own field. We urge our fellow researchers to accept that the research stream is exhausted and to leave behind the “cocoon” that it offers (Benbasat and Barki 2007:213). Gaining confidence to move forward is important to financial services marketing theory development.

## **ONLINE BANKING RESEARCH: WHERE NEXT?**

Our review has revealed a tendency for researchers of online banking adoption to following the well-trodden TAM path and take the easy option of reinforcing previously researched construct relationships rather than address the challenge of formulating,

operationalising and testing fresh theory (Benbasat and Barki 2007). Indeed, in general the field has tended to focus on a limited number of online banking adoption drivers as found in DoI, UI and ED theory, which is a particular concern (Yousafzai 2012). Going forward there is scope to introduce and examine adoption drivers using alternative lenses including, but not limited to: task-technology fit theory (Goodhue and Thompson 1995), engagement theory (Brodie et al 2011), empowerment theory (Harrison and Waite 2015); liminality theory (Brooker and Joppe 2014), domestication theory (Haddon 2006), addiction theory (Turel et al 2011), hedonic theory (Lowry et al 2013), identity signalling theory (Arbore et al 2014) and resistance theory (Laukkanen et al 2008).

In addition, inductive, theory building work is needed to explain adoption of new technology such as social media and apps for financial services marketing. Researchers should draw on the rich and diverse range of epistemology and ontology that present within the marketing discipline. For example, research could be located within the paradigms of Consumer Culture Theory (CCT) (Murray and Ozanne 1991) and Service Dominant Logic (SDL) (Vargo and Lusch 2004). Such work might seek to understand how customers combine technological devices on their consumption journeys within the omni-channel distribution landscape. Work drawing on SDL might examine the manner by which consumers (which might usefully include business consumers) extract value from technological mediated interaction beyond usefulness and satisfaction and beyond the dyadic relationship between provider and consumer to include consumer to consumer interactions. Furthermore, CCT work might critically examine the co-production of financial services experiences to identify the consumption choices made and the social and cultural meanings that are associated with these choices. Such findings could be usefully compared to the policy discourse and legal frameworks at a national level.



Finally it is important to address the field-related methodological issue of common methods bias (Podsakoff et al 2003). This is where variance is attributable to the methods employed rather than constructs being measured. It is clear that costly and time-intensive methods such as experiments and longitudinal studies have been rejected in favour of the survey based approaches (Benbasat and Barki 2007). Future work should seek to draw upon the wide repertoire of research methods within marketing research to readdress the imbalance between qualitative and quantitative techniques and to enrich the quantitative approaches utilised. The abundance of cross-sectional work should be balanced with longitudinal work that examines post-adoption behaviour and channel discontinuance. In addition, there is scope to develop and test new methods particularly visual data methods which are entirely absent within the adoption studies examined in this paper. Such work might not only gather primary data of technology use but might also analyse secondary data of images of technology use found within organisational and consumer-generated media.

To conclude, this paper has provided an audit of ten years of online banking adoption research using three theoretical bases to show how current understanding of online banking adoption has been developed. It then scrutinises studies that have used TAM and summarises criticisms of the model and the field of research that draws on the model. This paper provides a robust rebuttal of TAM, in the hope that researchers will use these arguments to provide support for fresh research perspectives on innovation adoption. There is a brave new world of financial services technology research awaiting us in which we can test alternative theory, build new theory and apply a range of data collection techniques. It is with eager expectation that we wait for the results to be published over the next 20 years of the JFSM!

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Table 1 Coding Criteria

Theoretical Base	Coding Criteria
Diffusion of Innovation.	Study aims to describe the external and internal factors that explain adoption or non-adoption of online banking. For example research might focus on identifying key attributes of online banking and the characteristics of adopters that are viewed as most important in securing adoption.
User-Intention.	The research aims to identify how one or several attitudes towards online banking determine the intention to adopt or to continue use.
Expectancy-Disconfirmation.	The research aims to identify the attributes of a bank web site that result in either user satisfaction or perceptions of quality. The research study may then extend its findings to measure intention to adopt but the initial and primary focus is on innovation attribute-level measurement.

**Table 2 Online Banking Studies Using TAM**

Study	Sample	#	Pop.	Predictive Ability (R <sup>2</sup> )	External Variables	Additional Belief Factors	Factors from Related Models
Chau & Lai 2003	Convenience	167	Students	Att = 55%	Task Familiarity →U Alliance Services →U	Accessibility →EoU Personalisation →U	N
Cheng et al 2006	Random	212	Business Bankers	Not given	N	Security→Int	N
Erikson et al 2005	Stratified random	1831	Online Bankers	Not given	N	Trust→U Trust→EoU	N
Guriting & Ndubisi 2006	Branch intercept	133	Internet Users	Use = 44%	Computing Experience NS	N	Computer Self-Efficacy →U Computer Self-Efficacy →E-U
Hernandez & Mazzon 2007	Branch intercept	150 150	Online Bankers Internet Non-Users	Int = 60%	Home PC NS Education→Int Age NS Gender NS Income NS	Relative Advantage→Int Visibility NS Result Demonstrability→Int Compatibility→Int Triability→Int Image→Int	Subjective Norm→Int  Perceived Behavioural Control→Int
Jenhangir & Begum 2008	Not Given	227	Online Bankers	Not given	N	Security → Att Security → Use	N
Mckechnie et al 2006	Stratified random	150 150	Online Bankers Telephone Bankers	Use=40%	Age→ NS Gender→ NS Income→ NS Purchase Experience→ EoU Purchase Experience→ U Purchase Experience→ Insecurity Emotions Purchase Experience→ Use Home internet → EoU Work internet NS Product involvement→ EoU	Positive Emotions→ Use Insecurity Emotions - NS	N
Ndubisi 2007	Branch intercept	133	Internet Users	Int = 46%	N	Reliability NS	Computer Self-Efficacy interacts with U and EoU
Pikkarainen et al 2004	Convenience	268	Adults	Use=12%	Age - NS Gender - NS Income →Use Information →Use	Enjoyment - NS Security → Use	N
Suh & Han 2002	Convenience	845	Online Bankers	Att= 65% Int = 75% Use = 3%	N	Trust → Att Trust → Int	N
Sukkar & Hasan 2005	Convenience	52	Students	Not given	Culture→ EoU Culture→ U Feedback→ EoU Feedback→ U	Trust in bank→U Trust in bank→EoU Trust in channel→U Trust in channel→EoU Convenience→ EoU Convenience→ U Efficiency→ EoU Efficiency→ U Security→ EoU	N
Wang et al 2003	Convenience	123	Bank Customers	Int = 62%	N	Credibility →Int	Computer Self-Efficacy →U Computer Self-Efficacy →E-U Computer Self-Efficacy→U Credibility
Yiu et al 2007	Random	150	PC Owners	Not given	Gender →Use Age →Use Education →Use Income →Use Personal Innovativeness→Use	Risk→Use	N

Table 3 TAM Combined with Other Adoption Models.

<b>Combination</b>	<b>No</b>	<b>Studies</b>
TAM + Trust	3	Suh and Han (2002), Suh and Han (2003), Eriksson et al (2005)
TAM + Satisfaction	1	Liao and Cheung (2008)
TAM + DoI	4	Tan and Teo (2000), Awamleh and Fernandes (2006), Gerrard et al (2006), Yiu et al (2007)
TAM + Service Quality	1	Liao and Cheung (2002)
DoI + TPB	1	Liao et al (1999)
DoI + TAM + TPB +TRA	1	Hernandez and Mazzon (2007)

Figure 1 Adoption Theories within Online Banking Research 1998-2008

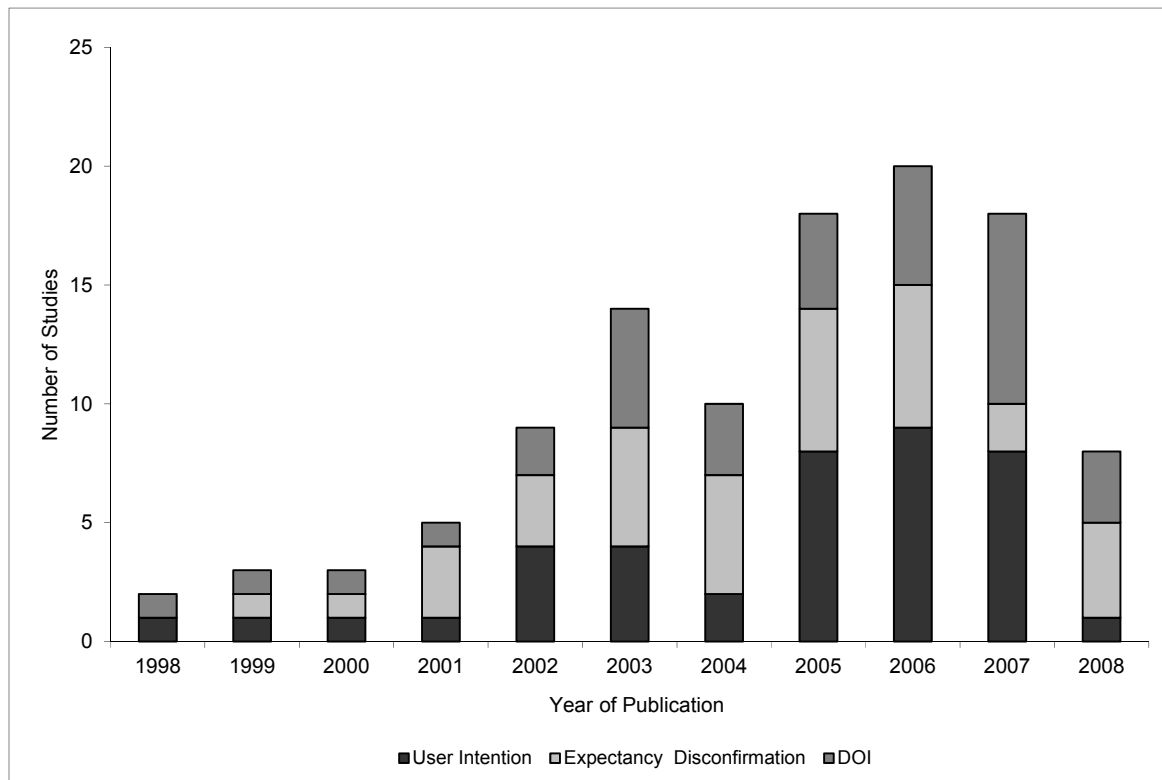




Figure 2 Research Strategy by Year of Publication

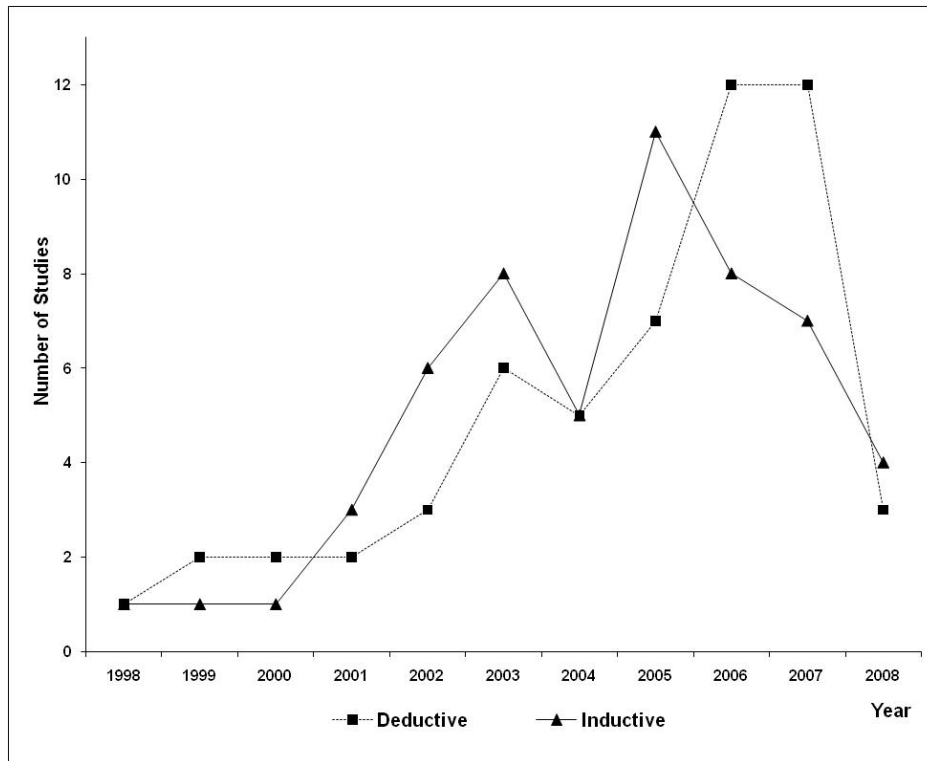


Figure 3 Sampling Technique by Sampling Frame

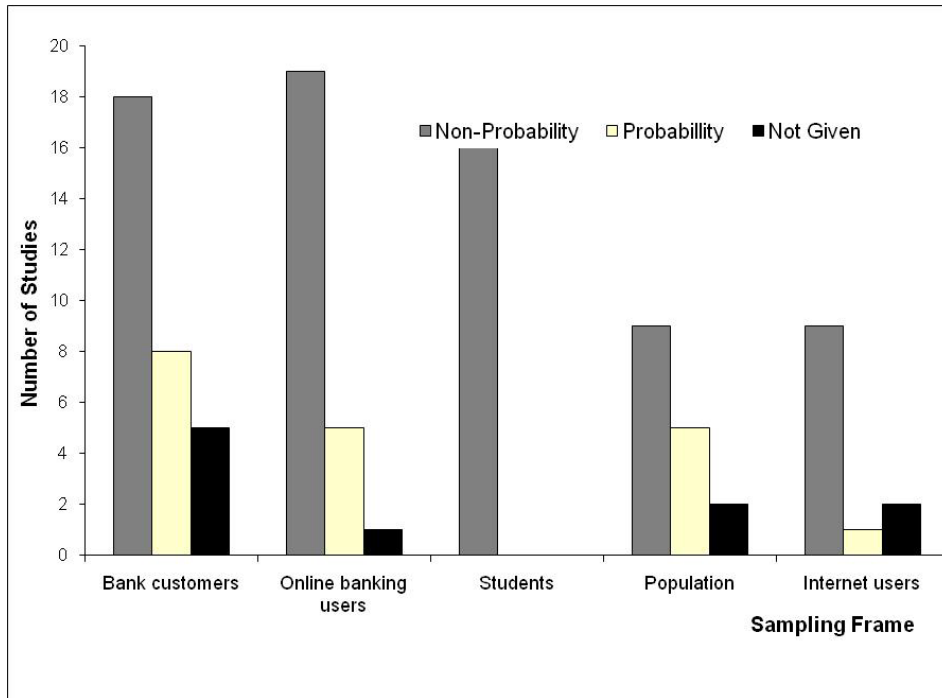


Figure 4 Primary Analytical and Sampling Technique

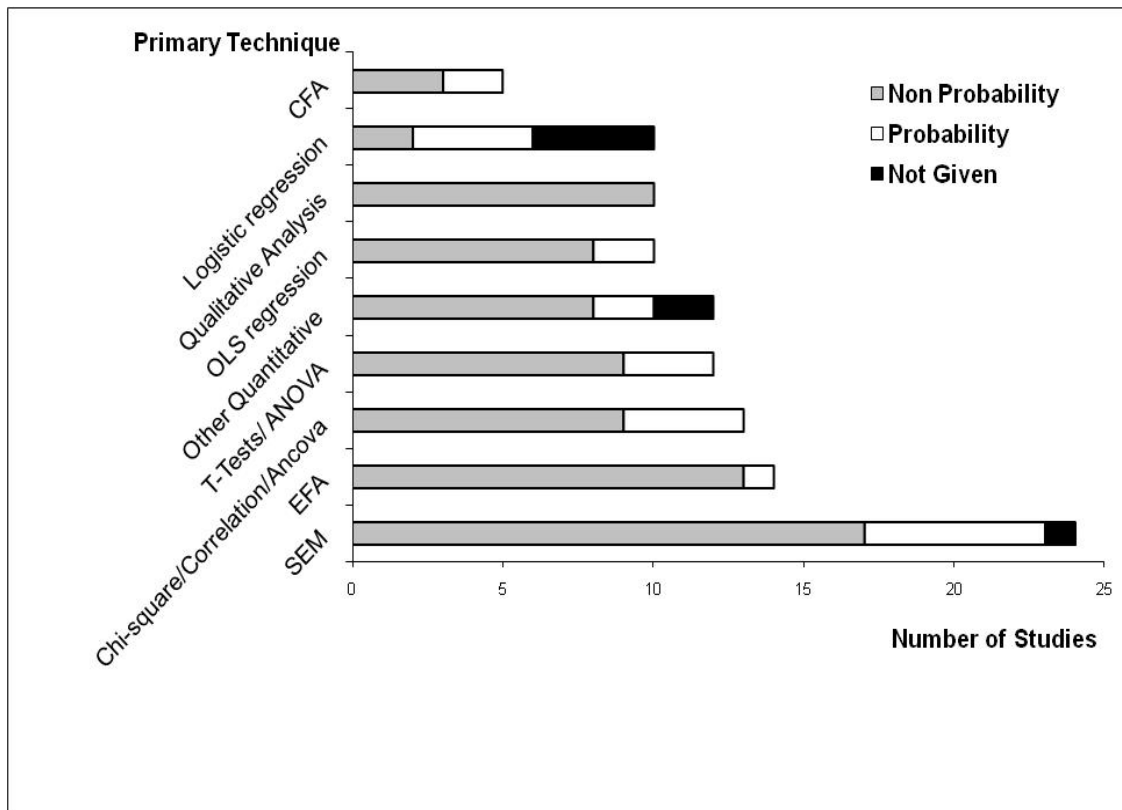
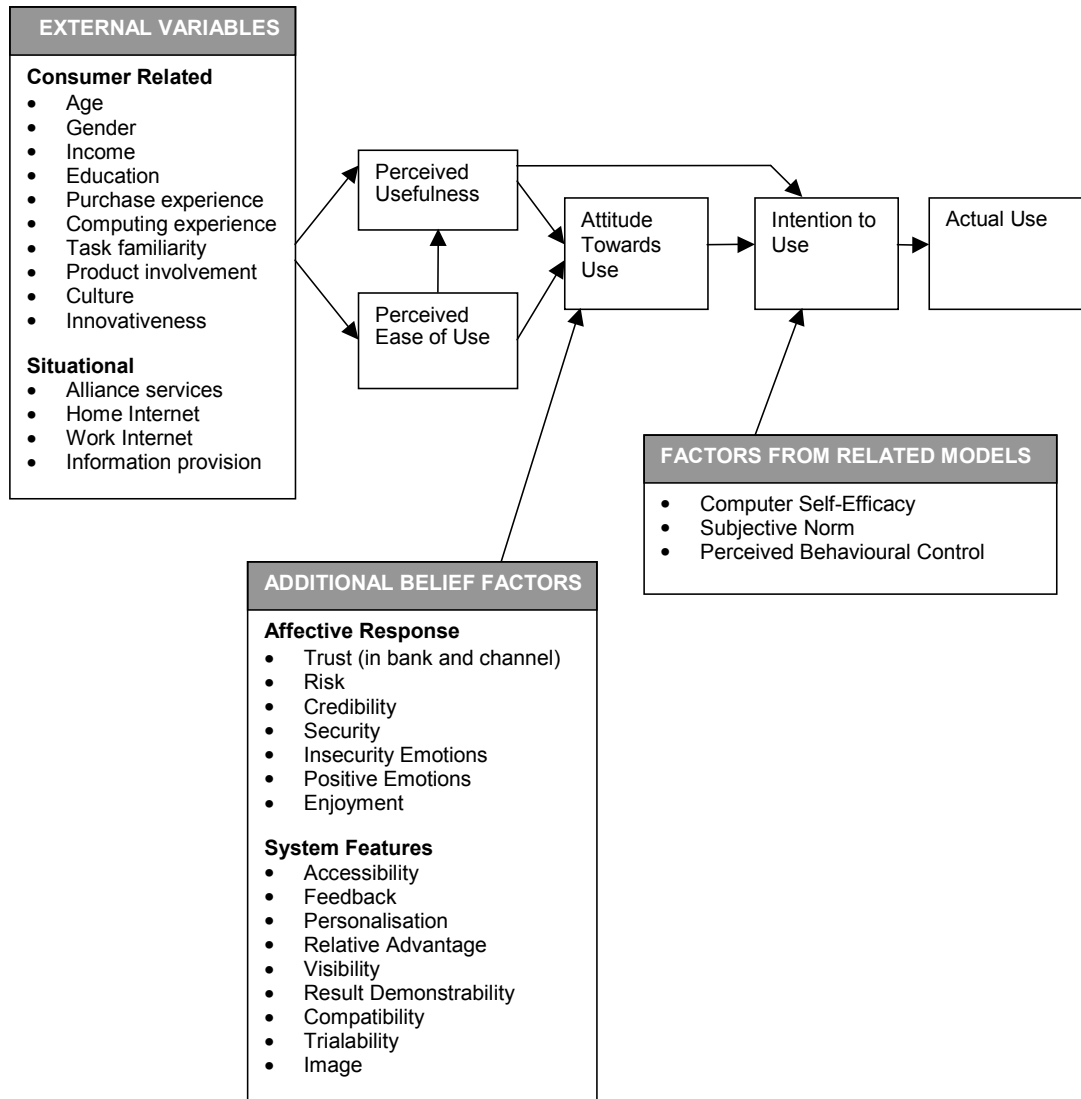


Figure 5 Extension to TAM within Online Banking Research



Adapted from Davis et al (1989) and Wixom and Todd (2005)

