Understanding Older Consumers' Usage of Self-Service Banking Technologies: Test of Two Models

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Abstract

Self-service technologies play a major role in enabling consumers to perform service delivery themselves. This requires consumers adopting this service delivery process to modify their behaviour, however some consumers may resist change. Evidence of this is particularly strong in older consumers (plus 50 years of age) where their usage of self-service banking technologies (SSBT's) is considerably lower than for younger consumers. This paper specifically explores the beliefs, attitudes, intentions and usage behaviour of SSBT's by older consumers through the comparison of the suitability, fit and explanatory power of two existing models, namely the Theory of Planned Behaviour (TPB) (Ajzen 1991) and Technology Acceptance Model (TAM) (Davis, Bagozzi & Warshaw 1989). Survey methodology approach using a mailed questionnaire to 600 randomly selected respondents resulted in the return of 208 (35%) usable questionnaires. The use of SSBT's varied across the sample with 19% (40) non-users; 19 % (40) low users (< 50% use); and 62 % (128) moderate to high users (> 60%). The models were tested using AMOS 4.01 (Arbuckle & Wothke 1999), maximum likelihood estimation method. The TAM had a less than acceptable fit resulting in a modified TAM. The Modified TAM when compared with the TPB model had an overall better fit to the data in that all fit statistics were within acceptable limits and similar explanatory power. However, with the addition of two specific belief constructs in the modified TAM, perceived ease of use and perceived usefulness, these constructs provide a richer understanding of the factors that influence attitude (A), behaviour intention (BI) and behaviour (B) of older consumers' usage of SSBT's. Further, the failure of the perceived behavioural control pathway to contribute to the explanation of SSBT behaviour in the TPB model effectively gives the advantage to the Modified TAM. It is primarily for these reasons that the Modified TAM is favoured over the TPB model in this study.

Introduction

Technology is a dominant force in service industries, resulting in an exponential growth in technology applications and technology delivered services. The nature of the customer service encounter in many firms has moved from one where technology has been used to facilitate the service encounter, to where self-service technologies (SST's) enable customers to perform services themselves. This change in service delivery has required consumers to modify their buying behaviour. However some consumers will resist change while others will display a more favourable attitude towards using SST's, that is, they like the new way of service delivery. This positive or negative predisposition towards the new behaviour is based on a belief structure that is influenced by a range of internal and external factors affecting attitude. The belief, attitude and intention models provide a basis for explaining and predicting SST behaviour (Fishbein & Ajzen 1975; Ajzen & Fishbein 1980; Davis, Bagozzi & Warshaw 1989; Ajzen 1991).

Although, understanding the determinants of SST usage from a consumer's view point could be of critical concern to organizations as it will assist in ensuring effective deployment of technology resources for service delivery, over the past decade information technology (IT) usage has been studied primarily from an organizational context (Davis, Bagozzi & Warshaw 1989; Moore & Benbasat 1991; Taylor & Todd 1995). However, only more recently has research emerged on the usage behaviour of SST's from a consumer perspective (Dabholkar 1996; Meuter et al. 2000; Dabholkar & Bagozzi 2002; Walker et al. 2002; Curran, Meuter & Surprenant 2003). This study intends to provide further insight into the relevance of the belief, attitude and intention models in predicting SST usage that previously has only been explored in two studies by Dabholkar.

The usage of SST's is not evenly distributed across the population. For many reasons, older consumers (over the age of 50 years) are the last to use many of the SST's currently available. For example, in the Banking industry many routine services are processed by technology using methods such as EFTPOS, ATM's, phone and Internet Banking. Results reported in Australia by Aveling (1999, p. 24) based on the 1998 Australian Bureau of Statistics indicate that some 30 % of people over 55 years (1.1 million people) are using ATM's; 25% (800,000) are shopping and withdrawing cash via EFTPOS; 15% (530,000) are telephone banking, and a very small group are banking via the internet. Even with a 100% increase in SSBT usage during the period 1998 to 2003, the acceptance rate is lower among older consumers when compared with an 87% usage rate of ATM's by consumers aged 18-24 years.

The objective of this paper is to provide an understanding and predict the beliefs, attitudes, and intentions of older consumers towards SST's, specifically within the context of the banking industry where usage of self-service banking technologies (SSBT's) by older consumers is low when compared with the rest of the population. Acknowledging that the Seniors market is not homogeneous in its behaviour patterns, as has been demonstrated in other Australian studies (Wei, Ruys & Muller 1999), there is a need to investigate the usage of SSBT's by older consumers in a more rigorous scientific manner. This paper specifically explores the beliefs, attitudes, intention and usage behaviour of SSBT's by older consumers through the use of two existing models. The two models, namely the Theory of Planned Behaviour (TPB) (Ajzen 1991) and Technology Acceptance Model (TAM) (Davis, Bagozzi & Warshaw 1989) are compared in terms of the extent to which each model can be used to explain intention to use and usage behaviour of SSBT's by older consumers. Structural equation modeling was used to choose between these models and to suggest refinements that are not presently featured in either model. In the next section the two theoretical models are examined in the context of this study. This is followed by an overview of the empirical study designed to test the models. In the final sections the findings are presented, including a comparison of the models, discussion of results, refinement of the models, limitations of the study and some directions for future research.

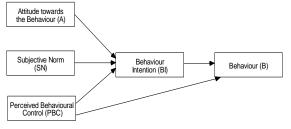### Theoretical Models Of Self-Service Technology Usage

A variety of theoretical perspectives have grounded our understanding of the determinants of usage. The Theory of Reasoned Action (TRA) (Fishbein & Ajzen 1975; Ajzen & Fishbein 1980) emerged from social psychology as an intention model that formed the theoretical foundation for research on the determinants of user behaviour. This model was limited in its explanatory power and Ajzen (1991) extended the model to the Theory of Planned Behaviour (TPB) including perceived behaviour control that accounts for internal and external constraints on behaviour. A further adaptation of TRA, the Technology Acceptance Model (TAM) was introduced by Davis, Bagozzi and Warshaw (1989) to specifically explain computer usage behaviour within an
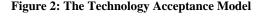
organizational context. These latter two models form the theoretical basis of this research and will now be briefly explained.
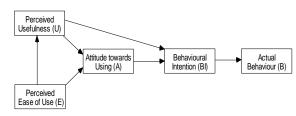
The Theory of Planned Behaviour is based on the proposition that an individual's behaviour (B) is a direct function of behaviour intention (BI) and perceived behavioural control (PBC). Behaviour intention (BI) in turn is formed by one's attitude (A) which reflects positive and negative feelings about performing the specific behaviour; subjective norm (SN) which reflects 'the person's perception that most people who are important to them think they should or should not perform the behaviour' (Fishbein & Ajzen 1975, p. 302); and perceived behavioural control (PBC) as define above ((Ajzen 1991). This specific relationship is depicted in Figure 1.

The determinants of behaviour intention are each based on an underlying belief structure. More specifically, a person's attitude (A) towards a behaviour is determined by his or her salient beliefs (b_i) about the consequence of the behaviour multiplied by an evaluation of the desirability of the outcome for each belief (e_i) ($A = \sum b_i e_i$). Subjective norm (SN) is determined by multiplying an individual's normative belief (n_i), that is, perceived expectations of important individuals or groups, and motivation to comply (m_i) with these expectations (SN = $\sum n_i m_i$) (Fishbein & Ajzen 1975). The final determinant of behaviour intention is perceived behavioural control (PBC) that refers to a person's perception of the ease or difficulty of performing the behaviour and is based on two components. Control belief (c_i) refers to those internal and external factors that may impede performance and this first component is measured by self-efficacy, an individual's assessment of his or her ability to perform the behaviour. Perceived power (p_i) is the second component that reflects factors that may facilitate or inhibit performance of the behaviour. (Bandura 1977; Ajzen 1991) (PBC = $\sum c_i p_i$).

Figure 1: The Theory of Planned Behaviour

Source: Ajzen 1991, p. 182

Figure 2: The Technology Acceptance Model

Source: Davis, Bagozzi and Warshaw 1989, p. 985

Based on the approach taken by Ajzen (1991) to measure the determinants of intention (A, SN, PBC), unidimensional constructs are created. These factors are expected to vary in importance, with previous research indicating that attitude (A) has a stronger influence on intention (BI) than perceived behavioural control (PBC) (Moore, G C & Benbasat 1995; Taylor & Todd 1995). A similar relationship is expected in this study as older consumers have high volitional control and can decide to select the self-service banking method they feel is within their ability. Further, research indicates that subjective norm (SN) have a small or insignificant influence on intention (Davis, Bagozzi & Warshaw 1989). Due to the personal nature of banking it is expected that older consumers will not be influenced by 'significant others' and thus the path from subjective norm (SN) to intention (BI) will not be significant. Finally, based on previous research findings, it is expected that behavour intention (BI) or the motivation to use SSBT's will be a stronger predictor of behaviour (B) than perceived behavioural control (PBC) or the individual's ability to use SSBT's (Ajzen 1991), as behaviour is under volitional control.

The Technology Acceptance Model (TAM) (Davis, Bagozzi & Warshaw 1989) is the second model in this study and it introduces two specific beliefs that are relevant for technology usage, namely perceived usefulness (U) and perceived ease of use (E). Similar to the TPB model, actual behaviour (usage of SSBT's) is determined by behaviour intention (BI), however behaviour intention is jointly determined by the individual's attitude towards using SSBT's (A) and perceived usefulness (U). Finally, perceived ease of use (E) is a direct determinant of attitude (A) and perceived usefulness (U). This model is presented in Figure 2.

Despite their similarity, TAM and TPB are different in several important aspects. The Technology Acceptance Model was adapted from the Theory of Reasoned Action and does not incorporate constructs that were introduced when the TRA was updated to the TPB. One such construct was self-efficacy. We do believe that self-efficacy is an important construct and that in future research that it should be tested in the TAM model. Subjective norm is omitted from the TAM model due to its uncertain theoretical and psychometric status (Davis, Bagozzi & Warshaw 1989). Further differences are that perceived usefulness and perceived ease of use are postulated *a priori* and that they are treated as two distinct constructs influencing attitude towards using (A). This disaggregated approach enables further relationships to be examined. (c.f., Davis, Bagozzi and Warshaw 1989)

Previous research findings in the organizational context have shown that perceived usefulness (U) is a stronger predictor of behaviour intention (BI) than attitude (A). This direct effect is due to individuals forming intentions towards technology based largely on cognitive appraisal of how it will improve their performance and thus rewards (Davis, Bagozzi & Warshaw 1989). It is proposed here that attitude towards SSBT's will have a stronger influence on BI than U, as performance for using SSBT's by older consumers is not directly rewarded. Perceived ease of use (E) is also expected to be a stronger determinant of attitude towards SSBT's than U.

Research Study

The testing of the two models outlined above was conducted using data collected from older consumers (over 50 years of age) who were randomly selected from a large Queensland Seniors database. Survey methodology approach using a mailed questionnaire to 600 selected respondents resulted in the return of 208 (35%) usable questionnaires. Based on the type of information that was required to test the two models, the wide dispersion of respondents across Queensland, and confidentiality and privacy issues a mail self-administered questionnaire was most appropriate. The questionnaire used in the survey was developed following a series of indepth interviews and focus groups with representatives from the population of interest. The aim was to develop scales that could tap the constructs contained in both the TAM and TPB model. Rigorous development and testing of the measurement scales followed the approach outlined by Netemeyer, Bearden & Sharma (2003).

Table 1: Summary of Measurement Scales

Measure	Items	Mean	Standard Deviation	Reliability[d]
Behavioural (B)	1[a]	4.6	1.88	-
Behavioural Intention (BI)	3	3.85	1.51	.97
Attitude towards Usage (A)	4	3.18	1.42	.97
Subjective Norms (SN) ($n_i m_i$)	1[b]	7.81	6.20	.97
Self-efficacy (PBC)	6	3.76	.99	.85
Perceived Usefulness (U)	6	3.03	1.15	.92
Perceived Ease of Use (E)	7	3.13	.82	.75

a.   6 point likely scale 1- extremely unlikely; 6 – extremely likely

Findings And Discussion

The use of SSBT's varied across the sample with 19% (40) non-users; 19 % (40) low users (< 50% use) and 62 % (128) moderate to high users (> 60%). Use of individual SSBT's varied with respondents (208) reporting the following: EFTPOS, 56%; ATM, 67%; telephone banking, 41%; internet banking, 15%; and face-to-face 94%. Usage rate of SSBT's was higher than expected. Respondents ranged in age from 52 to 88 years with 36% (75) of the respondents male and 64% (133) female. Only 16% were employed full time. Respondents highest education achieved ranged from primary to postgraduate and a wide range of occupations were reported.

Table 2: Fit Indices and Explanatory Power for TAM, TPB and modified TAM.

Fit Indices(acceptable level) and R^2	TPB	TAM	Modified TAM
df	2	4	3
CMIN/df (between 1-2)[b]	2.20	3.9	2.40
R.M.S.E.A. (0.05 or less) [b]	0.080	0.119	0.080
C.F.I. (> 0.95) [b]	0.997	0.986	0.995
T.L.I. (> 0.95) [b]	0.983	0.964	0.983
A.G.F.I. (> 0.95) [b]	0.937	0.891	0.929
R^2_B	0.90	0.89	0.90
R^2_{BI}	0.49	0.47	0.47
R^2_A	-	0.57	0.57
R^2_U	-	0.17	0.17

a. $\_^2$ (p> 0.05) for all models
b. (Bentler 1990; Browne & Cudeck 1993; Byrne 2001)

Prior to forming composite scales, the scales for each construct except B and SN were subjected to factor analysis in order to assess construct validity. The scale validation process is not described here. A summary of the characteristics of scales formed from those factors is presented in Table 1. The models were tested using AMOS 4.01 (Arbuckle & Wothke 1999), maximum likelihood estimation method. The fit indices, acceptable level for each fit index and squared multiple correlations (R^2) are provided in Table 2. Findings indicate that the TAM model has a less than acceptable fit (RMSEA 0.119), however the model fit was improved with the addition of a path between perceived ease of use (E) and behaviour (B) resulting in a new model called Modified TAM. Comparing the Modified TAM with the TPB model, the Modified TAM has an overall better fit to the data in that all fit statistics were within acceptable limits (a strict model comparison test between TPB and Modified TAM is not possible) and similar explanatory power. However, with the addition of U and E, these belief constructs provide a richer understanding of the factors that influence A and BI in the modified TAM.

In all models, the paths (standardized regression coefficients) were found to be significant (p< 0.05) except for the path between SN and BI in TPB. As predicted, the strength of relationships in the TAM varied from previous research findings in that perceived ease of use (E) (0.51) was found to be a slightly stronger predictor of attitude (A) then perceived usefulness (U) (0.39) and that A (0.60) had a stronger influence on behaviour intention (BI) than U (0.13). Perceived ease of use (E) (0.41) was also a strong predictor of U and added marginally (0.08) to explaining (B). Behaviour (B) was strongly influenced by BI (0.91). Indirect effects also had a strong influence in the modified TAM. In the TPB model, A (0.55) was a stronger predictor of BI then PBC (0.22), and BI (0.90) strongly influenced B along with a marginal contribution from PBC (0.09).

As TAM was developed and tested in the organizational technology context, this study has provided support for a modified model in an older consumer context. Older consumers who perceive SSBT's as easy to use are more likely to find it useful and thus will have a positive attitude toward using one or more SSBT's. Further, based on the TPB model, older consumers who perceive they have the ability to use SSBT's are more likely to use SSBT's. Therefore, improving older consumer's confidence in their ability to use SSBT's is a strategy financial institutions need to consider.

In summary, the aim of the study was to compare two models, the Theory of Planned Behaviour and the Technology Acceptance Model, in the context of predicting older consumers' use of SSBT's. Both models explained a large proportion of the variance in the dependent variable with a Modified TAM yielding slightly better indices. The failure of the perceived behavioural control variable (PBC) to contribute to the prediction of actual banking behaviour can be explained by the relatively high level of self-efficacy and lack of constraints felt by this sample of older consumer. That is, the mean score on the PBC variable was 3.76 on a 5 point scale (see Table 1). In percentage terms, that translates to a 75% rating. In general, older consumers do not feel that anything is preventing them from using SSBT's.

The failure of the PBC pathway to contribute to the explanation of SSBT behaviour effectively gives the advantage to the Modified TAM, which not only also includes the key attitude → intention linkage but also gives a better account of how attitudes are formed. It is primarily for this reason that the Modified TAM is favoured over the TBP in the present study.

Limitations And Directions For Future Research

A rigorous and systematic approach has been taken to examine two models of SSBT usage. The measurement of A and PBC in the TPB model deviated slightly from the method outlined by Ajzen (1991) with a non-weighted approach being used and also adopting a global measure of attitude instead of specific belief measures. This approach was adopted to allow model comparison. In the modified TAM, perceived usefulness and perceived ease of use are important belief constructs in understanding SSBT usage among older consumers. However, with only 57% of attitude explained, there is a need to explore other factors from the diffusion of innovation (e.g. perceived compatibility, perceived risk) and service encounter (e.g. personal contact, technology discomfort, distrust) literature to improve our understanding of A and BI. Finally, as usage behaviour of SSBT's varies across the older population, an understanding of the factors influencing A and BI should be investigated using multiple group analyses.

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