

Factors Affecting the Adoption of Online Banking: An Integration of Technology Acceptance Model and Theory of Planned Behavior

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Abstract: Online banking has emerged as one of the most profitable e-commerce applications over the last decade. This study investigates which factors affect the adoption of online banking in Isfahan Province of Iran. We developed a theoretical model based on the Technology Acceptance Model (TAM) with Theory of Planned Behavior (TPB) model. We designed a questionnaire and used it to survey a randomly selected sample of customers of national bank of Iran. A total of 500 pieces of questionnaire papers are given out to the community randomly. However those questionnaires that not fill in properly and completely have been taken out. Hence, the actual sample used for the study is 349 respondents. We analyzed the data using Structured Equation Modeling (SEM) to evaluate the strength of the hypothesized relationships; the results provide support of the integrated TAM and TPB models and confirm its robustness in predicting customers intention of adoption of online banking. The results indicated that the intention to use online banking is positively affected mainly by perceived behavioral control and perceived usefulness.

Key words: Online banking, technology acceptance model, planned behavior, structural equation modeling, Zahedan, Iran

INTRODUCTION

Among the various ICT applications introduced in the last decade, online banking changed the delivery channels used by the financial services industry. Banks can benefit from much lower operating costs by offering online banking services which require less staff and fewer physical branches. Customers will also benefit from the convenience, speed and round-the-clock availability of online banking services. However, despite the fact that online banking provides many advantages (Kalakota and Whinston, 1997), there are still a large group of customers who refuse to adopt such services (Kuisma *et al.*, 2007; Littler and Melanthiou, 2006). Therefore, understanding the reasons for this resistance would be useful for bank managers in formulating strategies aimed at increasing online banking use. This study aims to investigate the factors influencing the adoption of online banking services.

Literature review: User acceptance or adoption of information technology is defined as the act of receiving information technology use willingly (Saga and Zmud, 1994). The findings from user acceptance research suggest that when users are presented with a new software package, a number of factors influence their decision about how and when they will use it. In the past

two decades several theories have emerged that offer new insights into acceptance of information technology. Among these theories, the Technology Acceptance Model (TAM) has received more attention. Several theories reveal the factors that may affect consumers' willingness to use an online financial service. They consist of The theory of reasoned action (Fishbein and Ajzen, 1975). The theory of planned behavior (Ajzen, 1985); Technology acceptance model (Davis, 1986); decomposed theory of planned behavior (Taylor and Todd, 1995).

Technology Acceptance Model (TAM): Among the various efforts to understand and predict the process of user acceptance or adoption of information systems, the TAM introduced by Davis (1986) is one of the most cited theoretical frameworks. This model hypothesizes that system use is directly determined by behavioral intention to use which is in turn influenced by users attitudes toward using the system and the perceived usefulness of the system. Attitudes and perceived usefulness are also affected by perceived ease of use. Perceived Usefulness (PU) is defined as the extent to which a person believes that using a system will increase his or her job performance. Perceived Ease of Use (PEOU) refers to the degree to which a person believes that using the system will be free of effort (Davis *et al.*, 1989).

Perceived usefulness directly influences intention to use while perceived ease of use has an indirect effect through perceived usefulness and attitude on the behavioral intention. The TAM has been evaluated to be not only a powerful and parsimonious model for representing the determinants of system usage but also a valuable tool for system planning, since the system designers have some degree of control over easiness and usefulness (Taylor and Todd, 1995). Behavioral intention is a measure of the strength of one's willingness to exert effort while performing certain behaviors. Attitude explains a person's favorable or unfavorable assessment regarding the behavior in question.

Theory of Planned Behavior (TPB): The Theory of Planned Behavior (TPB) suggests that a central factor in human behavior is behavioral intention which is affected by attitude toward behavior, subjective norm and perceived behavioral control (Ajzen, 1985, 1991, 2002). Subjective Norm (SN) expresses the perceived organizational or social pressure of a person who intends to perform the behavior in question. In other words, the subjective norm is relative to normative beliefs about the expectations of other people. Perceived Behavioral Control (PBC) reflects a person's perception of the ease or difficulty of implementing the behavior in question. It concerns beliefs about the presence of control factors that may facilitate or hinder their performing the behavior. Numerous studies demonstrated the applicability of TPB to various content domains (Ajzen, 2001). Also the ability of TPB in providing a very useful theoretical framework for understanding and predicting the acceptance of new information technology is demonstrated. Abundant empirical evidence suggests that TPB effectively explains

individual intentions and behavior in adopting new information technologies. Such evidence includes the acceptance of telemedicine technology by physicians. The widespread adoption of virtual banking (Liao *et al.*, 1999). Computer resource center adoption and usage (Taylor and Todd, 1995). IT adoption in work settings (Venkatesh *et al.*, 2000). Acceptance of electronic brokerage services (Bhattacharjee, 2000) and others.

Research model and hypothesis

Research model: In this study we integrate TAM and TPB for the research framework that will prepare a comprehensive model in order to examine the consumers intentions towards and adoption of online banking. There are 6 constructs in the model which includes perceived ease of use, subjective norm and perceived behavioral control as independent variables, perceived usefulness and attitude as intervening variables and intention to use as the dependent variable. We will test the strength of the hypothesized relationships embedded in the theoretical model and the robustness of the model in predicting customers intention to adopt online banking in Isfahan province of Iran. The theoretical model is graphically shown in Fig. 1.

The development of hypotheses: Based on the theoretical model developed this study proposes the following hypotheses with regard to the adopt of online banking.

Perceived ease of use: A considerable of prior studies supported the significant effect of perceived ease of use on behavioral intention, either directly or indirectly through perceived usefulness and attitude (Davis *et al.*, 1989; Jackson *et al.*, 1997; Venkatesh, 1999).

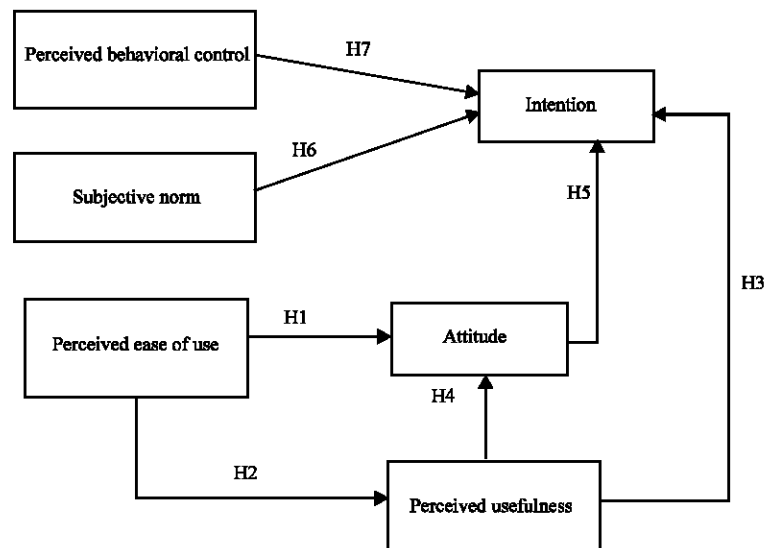


Fig. 1: The research model

Table 1: Summary of research hypotheses

Hypothesis	Supporting studies
Hypothesis 1 Perceived ease of use → Attitude	Davis (1989), Taylor and Todd (1995) and Cheng <i>et al.</i> (2006)
Hypothesis 2 Perceived ease of use → Perceived usefulness	Davis (1989), Taylor and Todd (1995) and Cheng <i>et al.</i> (2006)
Hypothesis 3 Perceived usefulness → Intention	Davis (1989), Taylor and Todd (1995) and Cheng <i>et al.</i> (2006)
Hypothesis 4 Perceived usefulness → Attitude	Davis (1989), Taylor and Todd (1995) and Cheng <i>et al.</i> (2006)
Hypothesis 5 Attitude → Intention	Davis (1989), Taylor and Todd (1995) and Cheng <i>et al.</i> (2006)
Hypothesis 6 Subjective norm → Intention	Ajzen (1991, 2001), Liao <i>et al.</i> (1999), Chau and Hu (2002), Taylor and Todd (1995), Bhattacharjee (2000) and Mathieson (1991)
Hypothesis 7 Perceived behavioral control → Intention	Ajzen (1991, 2001), Liao <i>et al.</i> (1999), Chau and Hu (2002), Taylor and Todd (1995), Bhattacharjee (2000) and Mathieson (1991)

This study seeks to revalidate such relationships in the context of online banking.

Hypothesis 1: Perceived ease of use will have a positive effect on attitudes towards the use of online banking.

Hypothesis 2: Perceived ease of use will have a positive effect on perceived usefulness of online banking.

Perceived usefulness: There is also extensive empirical evidence that supports the significant effect of perceived usefulness on behavioral intention (Davis *et al.*, 1989; Jackson *et al.*, 1997; Venkatesh, 1999). Based on prior research, this study hypothesized the following.

Hypothesis 3: Perceived usefulness will have a positive effect on behavioral intention to use online banking.

Hypothesis 4: Perceived usefulness will have a positive effect on attitudes towards the use of online banking.

Attitude

Hypothesis 5: Attitude will have a positive effect on behavioral intention to use online banking.

Subjective Norm (SN)

Hypothesis 6: Subjective norm will have a positive effect on behavioral intention to use online banking.

Perceived Behavioral Control (PBC)

Hypothesis 7: Perceived behavior control will have a positive effect on behavioral intention to use online banking. Hypotheses and their supporting studies are shown in Table 1.

MATERIALS AND METHODS

Data collection: In order to collect online banking users information, it first required the permission of national bank of Iran in Isfahan to express the need for the

Table 2: Research variables and measurements

Construct	Source
Subjective norms	Taylor and Todd (1995) and Wu and Chen (2005)
Perceived behavioral control	Taylor and Todd (1995) and Wu and Chen (2005)
Intention perceived usefulness	Taylor and Todd (1995) and Cheng <i>et al.</i> (2006) Davis (1989) and Cheng <i>et al.</i> (2006)
Perceived ease of use	Davis (1989) and Cheng <i>et al.</i> (2006)
Attitude	Taylor and Todd (1995), Davis (1989) and Cheng <i>et al.</i> (2006)

information research purposes. Research questionnaire has been distributed between customers of national bank of Iran in Isfahan Province. A total of 500 pieces of questionnaire papers are given out to the community randomly. However those questionnaires that not fill in properly and completely have been taken out. Hence, the actual sample used for the study is 349 respondents.

Instrument development and pre-test: A paper-based questionnaire as the instrument for the survey and it was in Persian. The questionnaire consisted of two sections. The first section had questions intended to collect respondent's demographic profile.

The second section solicited responses about the variables of interest in this study: perceived usefulness, perceived ease of use, attitude, subjective norm, perceived behavioral control and intention to use.

Regarding instrument construction the items used to operationalize the constructs of each investigated variables were mostly adopted from relevant previous studies with necessary validation and wording changes (Table 2). All items were measured using a 5-point Likert-type scale with anchors ranging from strongly disagree to strongly agree. The items used to measure each variable are listed in the Appendix A. Moreover, the final questionnaire was validated by two professional translators to ensure that no syntax or semantic biases occurred during the translation from English to Persian.

Furthermore to ensure validity and reliability this study first pre-tested the questionnaire by having three professors and users review it. Once the final survey was administered analysis of the responses of thirty random respondents. Regarding reliability the survey had strong internal consistency with all multiple-item constructs achieving Cronbach's alpha of 0.80 or higher.

RESULTS AND DISCUSSION

Descriptive statistics: Participants in the study were composed of 79.1% male and 20.9% female. Majority of the respondents were between 27 and 35 years old which was 41.8% of the total respondents. Majority of the respondents were college or university graduates (51%). Addition, when the survey was conducted, 65.6% of participants had medium computer usage skill. About 77.3% of the respondents had medium or easy access to internet and 52.4% of the respondent had medium Internet usage skill while 77.7% had used the Internet for >3 h in each week.

Structural model results: This study used the Structural Equation Modeling (SEM) for hypotheses testing. The first step in model estimation involved examining the model fit results of the hypothesized model. Some common fit indices reported in structural equation modeling are designed to identify model goodness-of-fit. Common criteria for SEM have been previously suggested and the results are shown in Table 3 (Joreskog and Sorbom, 1993). In these results, the structural model presented here indicates adequate fit with the observed data compared with the suggested fit criteria.

Tests of hypotheses: Figure 2 shows results from the path analysis of the combined hypotheses. The first two hypotheses proposed that perceived ease of use would predict attitude toward the use of online banking system (Hypothesis 1) and perceived usefulness of online banking. (Hypothesis 2), both with positive signs. The path for Hypothesis 1 was significant ($\beta = 0.18$, $t = 6.15$) either the path for Hypothesis 2 was significant ($\beta = 0.37$, $t = 4.43$). Thus, Hypothesis 1 and Hypothesis 2 were supported. The 3rd and 4th Hypotheses proposed that perceived usefulness would be a positive predictor of intention (Hypothesis 3) and attitude toward the use of online banking (Hypothesis 4). The path for Hypothesis 3, ($\beta = 0.32$, $t = 2.86$) and the path for Hypothesis 4, ($\beta = 0.43$, $t = 2.73$) were significant. Thus, Hypothesis 3 and Hypothesis 4 were supported. The 5th Hypotheses proposed that attitude toward the use of online banking system would be a positive predictor of intention to use

Table 3: Results of the model goodness-of-fit

Fit index	Recommended criteria	Results in this study
Chi-square/degree of freedom	<3.00	1.870
p-value	>0.05	0.099
GFI (Goodness-of-Fit Index)	>0.90	0.930
AGFI (Adjusted Goodness-of-Fit Index)	>0.90	0.910
CFI (Comparative Fit Index)	>0.90	0.920
RMR (Root Mean squared Residual)	<0.05	0.041
RMSEA (Root Mean Squared Error of Approximation)	<0.05	0.048
NFI (Normative Fit Index)	>0.90	0.92

Table 4: Summary of hypothesis tests

Hypothesis	Support
1: Perceived ease of use → Attitude	Yes
2: Perceived ease of use → Perceived use-fulness	Yes
3: Perceived use-fulness → Intention	Yes
4: Perceived use-fulness → Attitude	Yes
5: Attitude → Intention	Yes
6: Subjective norm → Intention	Yes
7: Perceived behavioral control → Intention	Yes

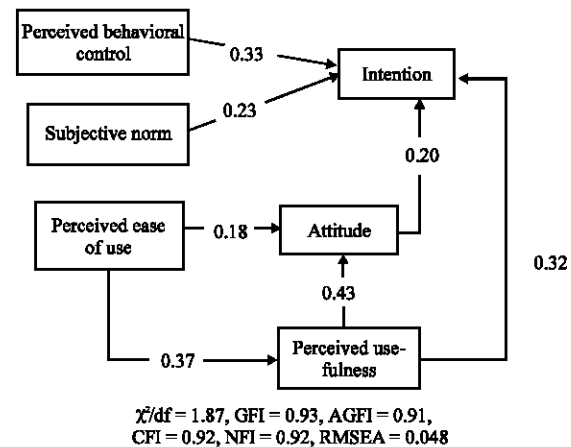


Fig. 2: Results of structural modeling analysis

online banking. The path for this Hypotheses was significant ($\beta = 0.20$, $t = 2.56$). Therefore Hypothesis 5 was supported. The 6th Hypotheses proposed that subjective norms would be a positive predictor of intention to use online banking (Hypothesis 6). The 7th Hypotheses proposed that perceived behavior control would be a positive predictor of intention (Hypothesis 7).

The path for Hypothesis 6, ($\beta = 0.23$, $t = 7.61$) and the path for Hypothesis 7, ($\beta = 0.33$, $t = 10.81$) were significant. Thus, Hypothesis 6 and Hypothesis 7 were supported. Summarized results for the hypothesis tests are shown in Table 4. In addition to the tests of hypotheses, direct and indirect effects of each variable are shown in Table 5. The results of this study provide support for the research model shown in Fig. 1 and for the hypotheses regarding the directional linkage among the model's variables. Results show that the intention to use online banking is primarily and positively affected by perceived behavioral control ($\beta = 0.33$) and less so

Table 5: Direct, indirect and total effects

Variables	Effect on								
	Perceived usefulness			Attitude			Intention		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Perceived ease of use	0.37	-	0.37	0.18	0.16	0.34	-	0.190	0.19
Perceived usefulness	-	-	-	0.43	-	0.43	0.32	0.086	0.41
Attitude	-	-	-	-	-	-	0.20	-	0.20
Subjective norm	-	-	-	-	-	-	0.23	-	0.23
Perceived behavioral control	-	-	-	-	-	-	0.33	-	0.33

by Perceived usefulness ($\beta = 0.32$), subjective norms ($\beta = 0.23$) and attitude ($\beta = 0.20$). This implies that the perceived behavioral control is the most important predictor of the intention to use online banking. Perceived usefulness also has a significant impact ($\beta = 0.32$) and appears to be the second determinant of a consumer's intention to adopt online banking. Moreover, perceived usefulness is predicted jointly by perceived ease of use ($\beta = 0.37$) also perceived usefulness has an indirect influence, via attitude on behavioral intention to use online banking. This result is similar to the finding reported in Taylor and Todd (1995) which indicated that perceived usefulness has both direct and indirect influences on behavioral intentions toward system use.

Perceived ease of use does not have a direct impact on intention to use, although it affects the attitude and perceived usefulness which in turn leads to greater acceptance of online banking. Similar findings were obtained by Pikkarainen *et al.* (2004) and Chan and Ming (2004), who investigated the acceptance of Internet banking in Finland and Hong Kong, respectively. Both studies reached the same conclusion that perceived usefulness is more influential than perceived ease of use in explaining the acceptance of online banking.

As we knew from previous research, perceived usefulness was always an important determinant of attitude in TAM and it may mediate the influence of perceived ease of use on attitude. Indeed, perceived ease of use has long been recognized as a basic requirement for system design (Davis *et al.*, 1989). Another interpretation is that difficulty in using online systems is becoming less of a concern as they are increasingly user-friendly.

In addition, since online systems are more common and standardized nowadays, the public has become increasingly competent in using them. Accordingly, in the planning and development of online banking, software developers should pay attention to practical functions and extend key features that are frequently required (Chen *et al.*, 2007).

Subjective norms also has a significant impact ($\beta = 0.23$) intention to use online banking. Attitude also has a significant impact ($\beta = 0.20$) intention to use online banking. Moreover, attitude is predicted jointly by perceived usefulness ($\beta = 0.43$), perceived ease of use ($\beta = 0.18$).

CONCLUSION

This study was conducted to identify determinants of user adoption of online banking services among citizens of Isfahan Province (Iran). The causal relationships among the variables that determine internet banking services adoption were examined.

The results show that the proposed model has good explanatory power and confirms its robustness in predicting customers intentions to use such services and demonstrated that online banking services adoption can be explained in terms of perceived behavioral control, perceived usefulness, perceived ease of use, subjective norm and attitude.

The underlying framework used in this study is the integrated model of Technology Acceptance Model and Theory of Planned Behavior. The findings generally supported the hypotheses derived from the model as well as earlier empirical studies.

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