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What drives e-service adoption? The case of Internet securities trading in Thailand

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This paper develops a model of electronic service adoption in the context of Internet securities trading. Customer acceptance is an important imperative for web-based service as it influences the service adoption. The two beliefs of the Technology Acceptance Model (TAM) perceived ease of use and perceived usefulness have not fully explained users' acceptance in the context of Internet securities trading. The trust belief and the flow control component of Internet users' behavior are integrated into this study because they are important prerequisites for electronic service adoption. This research aims to further explore and determine these prerequisites. Survey research with securities trading investors reveals five factors of the antecedents of adoption: information quality, ease of use, self control, accessibility, and trust. The trust and self control benefits have a positive impact on the adoption of internet securities trading. Information accessibility is also useful in predicting adoption, but it has a negative impact on adoption. Securities investors have a negative perception of the low speed of the Internet trading network system. Finally, perceived ease of use and information quality has no impact on adoption.

1. Introduction

The web has become a popular channel to which many businesses have migrated in order to provide electronic services to their customers. Many businesses use the web channel to provide better services to their customers. In the view of many customers, web sites provide them better accessibility to needed information (Evan and Wurster 1997). Electronic services can use the web

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channel to provide support to customer, and to make online business transactions (Greaves et al. 1999; Ng et al. 1998). In addition, customers can gain more control and experience through this channel because it allows them to navigate websites to compare information before making purchase decisions (Klein and Quelch 1997; Novak et al. 1999).

Despite the impressive benefits of the web, customers still hesitate to conduct financial transactions via this channel. In contrast to traditional commerce, electronic service via the web channel has some notable barriers. For instance, customers still hesitate to make transactions via the web because they mistrust the system's security (Rotchanakitumnuai and Speece 2004; Sathye 1999). The role of trust is an important factor influencing the success of electronic commerce (e.g. Dwyer et al. 1987; Hoffman et al. 1995; Morgan and Hunt 1994). Service via the web sometimes cannot deliver on the promises and does not build customer trust, for example when there are reliability problems with the system (Gattiker et al. 2000; Jones et al. 2000). This could bring a lowered level of electronic service acceptance via the web channel.

Empirical studies of the Technology Acceptance Model (TAM) have found that information technology usage depends on two beliefs: perceived ease of use and perceived usefulness of the system (Davis 1989; Davis et al. 1992; Mathieson 1991). In this model, perceived ease of use has a positive impact on perceived usefulness, which has a direct impact on attitude towards usage. Further, intention to use is determined by attitudes towards usage and by perceived usefulness. The TAM has been applied to explain an individual's adoption and usage of computer tools and systems such as text editing tools and spreadsheet applications (Chau 1996; Igbaria et al. 1995; Mathieson 1991). This model has not been validated for explaining electronic service acceptance, although there are some studies that have supported the use of TAM in the WWW context (Gefen et al. 2003; Hsu and Chiu 2004; Lederer et al. 2000; Suh and Han 2002). Extending the model to the electronic

service acceptance model constitutes an important research issue due to the characteristics of electronic service (e.g. web design and interface, information format and presentation)

The acceptance of information systems in the web environment is quite different from the traditional information systems acceptance. One critical element to use the web channel to conduct transaction is trust. Web user's trust in using the web channel for financial purposes has a strong impact on adoption (Rotchanakitumnuai and Speece, 2004). Many users do not perceive the web environment secure and reliable enough to transact with electronic service providers (Mcknight et al 2002). Therefore it is essential to be concerned with the antecedents of trust in the electronic service. Furthermore, the psychological impacts of flow on users' experience when involved in web activities are important and can help electronic service providers understanding user's feelings towards the services (Koufaris 2002; Novak et al 2000)

The implementation success of Internet securities trading depends on investors' acceptance of the electronic service system. Understanding the antecedents of electronic service acceptance is important because of their major roles in determining users' usage in the uncertain and risky environment of using the Internet for financial purposes. The empirical studies of user acceptance of electronic services for the high risk securities trading sector are relatively rare. The purpose of this research is to examine factors influencing electronic service adoption. In the Internet securities trading context, these factors are perception about ease of use, usefulness, trust, and self-control attributes specific to the Internet securities trading context. An analysis of the factors driving the adoption of Internet securities trading is conducted to distinguish Internet securities trading users from non-users. Thus, the specific questions this study addressed are:

What are the factors that influence securities investors to adopt electronic service via the web channel?

What are the key factors driving adoption of Internet

securities trading among users and non-users⁹

2. Theoretical background

The widely used theoretical model for explaining information technology usage is the Technology Acceptance Model (TAM) (Davis 1989). TAM posits two specific beliefs: perceived ease of use and perceived usefulness. These two beliefs can predict attitude towards usage that then can determine intention to use. Perceived ease of use is the degree to which a user believes that the amount of effort needed to use a particular technology is free or low (e.g. easy to learn, easy to understand). Perceived usefulness is the degree to which a user believes that a particular system can improve his or her work performance (e.g. increase productivity, work faster). Perceived ease of use has been found to have an impact on perceived usefulness (Davis 1989).

Prior researchers have validated TAM using different applications including word processing, spreadsheets, e-mail, voice mail, and intranet systems (Adams et al. 1992, Chau 1996, Horton et al. 2001, Igbaria et al. 1995, Mathieson 1991, Straub et al. 1995). Some studies have assessed TAM using the web as the context of study. The TAM has been tested as a model for explaining WWW usage. Lederer et al. (2000), for example, ran an exploratory investigation into the antecedents of perceived ease of use and perceived usefulness. Ease of understanding and ease of finding have an influence on perceived ease of use. Other studies suggested key ease of use problems such as speed of download, page organization, navigation and interface, language, and aesthetic design (Pitkow and Kehol 1996).

In the web context, electronic service usefulness may derive from the information quality provided to the web users. Information quality can be determined by several characteristics, such as accuracy, up-to-date ness, and relevance (Edmunds and Morris 2000; Huang 2000). Information quality should also support

analysis and assist users to make decisions (Anthony 1965, Lederer et al. 2001). In addition, the Internet channel provides information accessibility benefits that enable users to access service provider's websites more easily and efficiently (Daugherty et al. 1995).

The researcher considers the online investor as both a transaction maker and a computer user. The construct of flow theory is integrated into the research framework as it can measure the psychological impacts of user's perception on the total involvement of the activities via the web. Recently, the flow theory has been used to investigate in the context of the web. Novak et al. (1999) indicated that enjoyment can be an important determinant of customers' adoption of electronic commerce. Additionally, perceived control is defined as the level of one's control over the environment and one's action. The web environment provides an online customer experience to web users. It has been suggested that users of technology-based services prefer self-service systems which allow them to indulge (Holbrook and Hirschman 1992). In other words, online customers have more freedom and are able to have self-control over the process in the web by themselves. For instance, some online merchants get customers to participate in the entire purchase experience by involving them in determining their own service or product specification (Ford et al. 2001). Moreover, an individual to be in flow can create concentration (Koufaris 2002). Concentration has been found to have a positive impact on user's experience of web usage (Novak et al. 1999).

Opportunities of web technology could still be restricted if there is a lack of customer trust in the web system. Trust building is a crucial element in the social exchange process. Trust in web technology is one of the most important barrier issues for customers, as reported in prior research (Farhoomand et al. 2000, Lee and Turban 2001, McKnight et al. 2002, Rotchanakitumnuai and Speece 2004). Trustworthiness of electronic commerce can be derived from two perspectives : trust in the service provider and trust in the web system.

The three main attributes that have been found to create trust in the service provider are benevolence, integrity and ability of the service provider (Mayer et al. 1995, Mcknight and Chervany 2002, Lee and Turban 2001). Benevolence is the perception of the trusting party that the trusted party desires to do good things rather than maximize profit. Integrity means the trusting party believes that the trusted party will be honest and make an acceptable set of policies. Customers do not want their information to be used in an inappropriate manner or misused by others over the Internet (Stewart and Sagars 2002). Privacy is one major concern of customers who adopt web technology. Privacy depends on the service provider policy, such as a requirement that the customer has to give consent to allow their personal information to be revealed. Finally, ability consists of the skills and competencies of the trustees to do what needs to be done successfully. In this study it relates to the competencies of the electronic service provider of the Internet service.

Distrust of the web system is one major factor that online customers frequently mentioned as a cause of unwillingness to use the web for commercial purpose (Black et al. 2001, Madu and Madu 2002, Rotchanakitumnuai and Speece 2004). Distrust of the web system is related to security, and system failure and reliability ((Daniel and Storey 1997, Mols 1998, de Ruyter et al. 2001, Walker et al. 2002). Customers are concerned about the consequences of making transactions via the web channel. Westland (2002) found that transaction risk arises when online markets fail to reliably assure that electronic service will be delivered with adequate quality.

3. Research Methodology

A survey research approach is used to measure the antecedents of the constructs in the proposed model: perceived ease of use, perceived usefulness, and trust. The research questionnaire is divided into three sections, the first of which investigated the various types of services which Internet trading users used in Internet

trading. This list of services used questions on a simple checklist scale. In section two, twenty three statements were used to measure investors' perception of ease of use, usefulness, and trust in Internet trading. The items are measured by a Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The last section requests general information about respondent demographics.

The initial list of items was discussed with three experts, including two Internet trading managers, and one academic in the field of Internet commerce to verify that each item represented the concept it was supposed to measure. Items about which the experts did not agree were reworded or eliminated. A small-sample pretest interview among securities investors was conducted with 30 investors to check the reliability of the items.

Respondents were selected by judgment sampling from the securities investors from the securities brokers of The Stock Exchange of Thailand during the first quarter of 2005. The target respondent for this study is composed by the Internet securities trading users and non-users. They would have the capability and the volume which would make it feasible to be Internet securities trading if they chose to do so. Therefore, they would have perceptions about the Internet usage and the traditional interpersonal service provided by brokerage firms. For instance, the non-user respondents should join the Internet securities trading training course or they have experience in using Internet channels to search for securities trading information. A total of 500 questionnaires have been sent to twenty brokerage firms. Consequently, 208 questionnaires of Internet trading users and 234 questionnaires of non-Internet trading users were responded, for a total number of 442 respondents, equivalent to a response rate of 88.4% (Table I).

Table I shows that about 53 percent of the respondents are Internet trading users and about 47 percent are non-users. The respondents consist more of men than women. 78 percent of the respondents are less than 40 years old, and about 95 percent has university education.

Table I Respondent profile of securities investors

Characteristics	N	%
Type		
Internet users	208	47.1
Non Internet users	234	52.9
Age		
< 25	56	12.7
25-30	123	27.9
31-40	167	37.9
41-50	70	15.9
51-60	21	4.8
> 60	4	9
Gender		
Male	264	61.8
Female	163	38.2
Education		
Less than bachelor	20	4.6
Bachelor	235	53.7
Graduate	168	38.4
PhD	15	3.4

4. Results

Exploratory factor analysis was used to measure the antecedents of the dimensionality of securities investor perceptions. A principal component factor analysis with Varimax rotation was undertaken for twenty three items, and a five-factor solution was found, which explained the 66 per cent of variation in the items (Table II). The result shows the five-factor's structure: information quality, trust, ease of use, self control, and accessibility.

Table II Dimensions impact Internet securities trading adoption

Items/Factors	Factor loading		
Factor 1 : Information quality			
Internet securities trading system provides thorough information.	.784		
Internet securities trading system provides information for making decisions during trading hours.	.730		
Internet securities trading system provides relevant information	.691		
Internet securities trading system provides accurate information.	.676		
Internet securities trading system provides up-to-date information.	.665		
Internet securities trading system provides analysis data of the listed companies that can assist your trading decision	.639		
Factor 2 : Trust			
Internet securities trading system is secure.	.804		
The broker that provides Internet securities trading service keeps the best practice of privacy policy of investor information.	.779		
Internet securities trading system is reliable and can transmit the transaction accurately.	.755		
The broker that provides Internet securities trading service has the ability to assist investors to solve the online problems.	.704		
The broker that provides Internet securities trading service has the ability to manage Internet securities trading system efficiently.	.644		
The broker that provides Internet securities trading service is honest to investors.	.586		

Items/Factors	Factor loading				
Factor 3 : Ease of use					
Internet securities trading system uses understandable terms					.841
Internet securities trading system is designed to use easily					.733
Each page of Internet securities trading system is easy to read					.698
Each page of Internet securities trading system can be linked to search for other information					.669
Internet securities trading system allows easy return to previous or go to next page.					.663
Factor 4 : Self control					
Internet securities trading system can make me enjoy being in control of my own trading activity.					.773
Internet securities trading system can make me focus on my own trading activity.					.769
Internet securities trading system can make me have freedom that I can control my own trading activity					.693
Factor 5 : Accessibility					
Internet securities trading system can be accessed from any location					.800
Internet securities trading system can be accessed at any time.					.748
Internet securities trading system can be downloaded easily					.525
Eigenvalues	9.298	1.948	1.491	1.354	1.086
% variance	16.81	35.88	13.720	10.73	8.834
Cumulative variance	16.81	32.69	46.41	57.15	65.98
Cronbrach's Alpha	.874	.872	.851	.807	.746

These results show the key elements driving the adoption of Internet securities trading. However, not all investors use the Internet securities trading services, so it is useful to briefly examine whether these factors have any substantial impact on adoption between users and non-users. Therefore, the researcher sought to investigate the impact of these factors on securities investor's adoption. To confirm which dimensions drive or inhibit investor's adoption, discriminant analysis was conducted using the five-factor scores to distinguish Internet securities trading users from non-users. As shown in Table III, the discriminant function was significant. The results showed that the trust factor had the largest magnitude coefficient (.772), and also the largest correlation with the discriminant function, which is perhaps the best way to decide relative importance (Hair et al., 1995). The self control factor was also fairly strong with a discriminant coefficient 0.494. The results show that trust and the self control benefit are the most crucial positive elements for predicting adoption. In contrast, the accessibility factor apparently inhibits adoption. The results show that accessibility had a high negative impact on adoption (discriminant coefficient = -.418). Finally, the discriminant function was able to correctly predict users and non-users of Internet securities trading about 60 percent of the time overall. About 60 percent of original grouped cases were correctly classified (Table IV).

Table III Standardized discriminant function and correlation coefficient

Discriminating variables	Discriminant function coefficients	Correlation coefficients
Information quality factor score	.034	.033
Trust factor score	.772	.760
Ease of use factor score	-.073	-.071
Self control factor score	.494	.480
Accessibility factor score	.418	-.405
Wilk's Lambda = .963 Chi-square = 15.67 df = 5 Sig. = .008		

Note : Dependent variable is Internet securities trading user or non-user.

Table IV Classification results

Type	Predicted Group Membership				Total
	Non-users		Users		
	N	%	N	%	
Non-users	130	57.8	95	42.2	225
Users	78	39.2	121	60.8	199

Note : 60.6% of original grouped cases correctly classified

5. Discussion

This research provides an understanding of the antecedents of electronic service adoption. The ease of use factor of Internet securities trading systems consists of using understandable terms, appropriate design, readable text layout, links to clarifying information, and comfortable navigation. The ease of use antecedents supports the findings of prior TAM research (such as Lederer et al. 2000). The findings about the antecedents of usefulness are consistent with prior work about the usefulness of electronic services.

in which information quality (e.g. accuracy, upto-dateness, relevance, decision support) and accessibility (financial transactions over the Internet anytime and anywhere) are considered components of the benefit dimensions. However, investors perceive quite a difficulty in downloading the Internet securities trading system. This is contrary to some of the discussion in the literature about ease of use of WWW, but seems to be consistent with the problem of low access and download speed of the electronic service website. This problem can irritate investors and then lower the accessibility benefit of using the Internet channel for commercial purposes.

Trust is the critical issue to distinguish between Internet securities trading adopters and nonadopters. Customers who distrust the technology, security, privacy, or ability of Internet service providers are less likely to adopt Internet securities trading systems. This is also consistent with the orientation toward interpersonal relationships in Thailand and other Asian countries - interpersonal relationships are primarily about trust building. Moreover, the critical aspect of enhancing trust is ensuring Internet security features on the Internet securities trading website.

The self control benefit does influence adoption. Internet securities trading can create personal experience of using the Internet channel for trading. In an offline trading system, investors normally order their securities transactions with the market personnel of the brokerage firm who sometimes are busy and can create an emotional response to the movement of the security's price. Further, it implies that current investors are well educated and are already computer users. They may prefer to have personal control of the processes and to make their own decisions, not influenced by the marketing personnel's suggestions.

The research result of a negative impact of accessibility on adoption was somewhat surprising. A possible reason for this result could be the low speed of the Internet securities trading system. Specific to this context, the fast movement of securities prices is crucial to achieving a gain or loss for investors. The low speed of the

Internet securities trading system or even the investors' network system can create barriers to adoption due to concerns about the financial benefits and real-time data provided via the web.

6. Implications and Conclusion

Trust plays an important role in increasing the Internet securities trading adoption. In the initial phase, building trust in the Internet securities trading system is a key determinant for electronic service acceptance. To expand the Internet securities trading market among securities investors, the SET and the brokerage firms need to overcome doubts about security and reliability, and improve the capability of the Internet securities trading system. All investors, even users, believe that problems may occur, so it is the ability of the Internet securities trading service provider to solve the problems immediately. In traditional trading systems, securities investors normally have interpersonal interactions with marketing staff of the brokerage firms. Apparently, the interpersonal interaction remains important in building trust, especially when customers face electronic service problems. Thus, the Internet securities trading service channel must be well integrated into the traditional channels to improve customer service. Electronic service providers currently cannot shift customers to the web as an alternative to the interpersonal service, but they have to provide well trained broker personnel to advise customers and handle electronic transaction problems efficiently with strong customer orientations.

Further, the strength of the self-control benefit can also improve adoption of the electronic service. This implies that some investors are more independent to make risky financial transactions by themselves, without following others' advice. To provide an electronic quality system, electronic service providers of securities trading need to improve website design, accessibility and quality of the electronic service, as reputation and site quality perception are essential for trust building, which enables more adoption. In

addition, special incentive offers (e.g. lower commission fee as provided currently) from Internet securities trading may help investors to feel the worth of using electronic service via the Internet channel, or may build higher customer attitudes towards usage.

One important finding is that most investors who are already using the service will use the Internet securities trading system even more in the following year (about 81%; see Table V)

Table V Future usage of Internet securities trading

Respondents	N	%
Users		
- Use more	163	81.1%
- Use less because it's not good	4	2.0%
- Plan to use this year	34	16.9%
Non-users		
- Plan to use this year	182	85.8%
- No plan to use this year	30	14.2%

Conversely, most non-user customers intend to use other channels for securities trading and have no plans to adopt Internet securities trading. Customers seem to have differing views about technology; therefore service providers have to put special effort into understanding the segmentation in attitudes toward technology in their markets as they implement new services. The exact strategy to take should be based on the analysis of target investors' perception. The initial primary market for Internet securities trading services comprises current users that are satisfied with the electronic service, and will continue to use the service in the future. Analyzing these issues can assist brokerage firms in selecting appropriate strategies for implementing electronic service more successfully. For instance, one segment of customers perceives the Internet securities trading system as a very useful service delivery channel

which they intend to continuously use in the future. These customers consider technology to be very useful for meeting some of their needs, so it was easy to get them to adopt it, and they will likely continue using it. Many users seem to be essentially still in trial stage, using the Internet to gain experience while they evaluate how useful it will be to them in the future, and how much their own customers will want to be able to conduct financial transactions with them through the Internet. This implies that electronic service providers should devote attention to how they design and develop the system to enhance trust and good experience in using the system. Moreover, in order to be successful in gaining more trials from non-user investors, brokerage firms also need to be concerned about the system's weaknesses and their negative impact on the perception of electronic services. They need to be able to demonstrate that major barriers have already been eliminated. Consequently, customer support with free or low cost training to use new technology is also crucial at the early stage of electronic service implementation.

The limitations of this research represent opportunities for future research. There is still quite a lot of work that needs to be done to better understand customer response to web-based service channels. First, the results were based on the Internet securities trading context, other contexts should be examined to generalize the results. Additional research should be done to address other issues, such as the impact of individual difference on electronic service adoption as well as quality and assurance of electronic financial services.

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