THE ROLE OF TRUST AND RISK IN E-TRADING

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ABSTRACT

This paper presents an extension of the Technology Acceptance Model (TAM), and it is empirically examined in an online financial trading context. The research evaluated the impact of perceived trust and perceived risk on e-investors' intention to use online dealers' and stockbrokers' services. A partial least-squares structural modelling approach was used to evaluate the explanatory power and causal links of the model. Findings indicate that perceived risk is an important barrier in the use of online trading systems. In contrast, perceived trust is crucial for enhancing the use of these systems. These findings contribute to an increased understanding of the factors that promote e-trading acceptance.

KEYWORDS: Online trading, trust, risk, technology acceptance, e-trading.

***JEL* CLASSIFICATION:** G10, L86.

1. INTRODUCTION

The use of online trading has increased the number of discount brokerages because online trading allows many brokers to cut costs further, and part of the savings can be passed on to customers in the form of lower commissions. Online financial trading web sites offer retail investors the ability to trade products in different financial markets without the physical presence of a broker. Direct individual investor participation in financial markets via Internet is not a recent phenomenon; it started in the second half of the 90s and quickly expanded in the last decade. With a few clicks, investors today can buy or sell stocks through online trading accounts with the same ease as they search the Internet or play computer games, thus, they obtain instant order execution, lowest spreads, flexible starting capital and fast deposits. Investors' online access has grown dramatically in the past years. With many brokerage firms now offering on-line trading services, investors have direct access to options, futures, foreign currencies, stocks, and bonds on many financial markets.

In this research, we define online trading as the act of placing buy/sell orders for financial securities and/or currencies with the use of a brokerage's Internet-based proprietary trading platforms. An online trading site is a brokerage house that allows online investors to buy and sell stocks and obtain investment information from its web site.

Davis (1989) and his colleagues (Davis *et al*., 1989) proposed measures of perceived usefulness (PU) and perceived ease of use (PEU) as components of a Technology Acceptance Model (TAM) where behavioural intention to use was used to predict and explain user acceptance. Online trading can be perceived as the investors' adoption of the WWW as a means to invest. Therefore, based on the TAM, e-investors' use of an online trading web site could be explained by the PU and the PEU of the online investments. E-trading involves new risks; therefore PU and PEU may not exactly reflect the behaviour of online trading users. In this context

investors are likely to accept some vulnerability in an online transaction based on their positive expectations regarding an e-broker's future behaviours. This raises two questions: what do online investors gain by investing via the Internet? And what makes them reinvest via the Internet?

In many empirical studies, the TAM has been proven solid in predicting user acceptance of Information Technology (IT), and has been applied widely in understanding the motivational issues in computer and software adoption, as well as usage of Information Systems (IS) (Agarwal & Karahanna, 2000; Gefen & Straub, 1997; Liao & Cheung, 2001; Venkatesh & Davis, 2000). Although the TAM has been broadened and modified extensively, our study is one of the first to extend it within the online trading context.

Therefore, the purpose of this study was to include the influence of perceived trust and perceived risk on the TAM model, analyzing e-investors' behaviour. Specifically, this work proposes that additional variables, such as perceived trust and perceived risk, enhanced our understanding of e-investors' behaviour. Therefore, this paper is one of the first studies to examine the key factors underlying the process of investing using online trading services.

2. THEORETICAL BACKGROUND

2.1. The Technology Acceptance Model (TAM)

The TAM is an adaptation of the Theory of Reasoned Actions (TRA). The TRA is a very general model of behaviour that suggests beliefs influence attitudes, which determine intentions, and that intentions dictate behaviour (Ajzen & Fishbein, 1980). The original TAM suggests that an intention to accept technology is determined directly by attitude, PU, and PEU. Additionally, PU influences behavioural intention indirectly through attitudes, while PEU influences behavioural intention indirectly through both attitudes and PU (Davis *et al*., 1989). PU is defined as "the degree to which a person believes that using a particular system would enhance his/her job performance", and PEU is defined as "the degree to which a person believes that using a particular system would be free of physical and mental effort" (Davis, 1989, p. 320). According to TAM, both PU and ease of use are predicted to influence an individual's intention to use the system. The causal relationships have been validated empirically in many studies of user acceptance (Mathieson, 1991; Taylor & Todd, 1995; Venkatesh, 2000; Venkatesh & Davis, 1996, 2000; Venkatesh & Brown, 2001; Venkatesh *et al*., 2003).

Some empirical studies demonstrated that PU has a consistently strong, positive effect on intention (Chau, 1996; Chau & Hu, 2002), but attitude and PEU were found to have a mixed effect, for example Bhattacherjee (2001b) removed PEU from his model because Karahanna *et al*. (1999) found that when users gain experience with the system, ease of use is displaced by PU. However, Mathieson (1991) and Taylor & Todd (1995), among others, have found support for the positive influence of PEU in intention to use the system.

Additional variables were included to increase the explanatory power of the model. For example, subjective norms, job relevance, and result demonstrability have significant effects on PU (Venkatesh & Davis, 2000), Computer self-efficacy (Compeau & Higgins, 1995), Internet self-efficacy (Eastin & LaRose, 2000; Hsu & Chiu, 2004; Igbaria & Iivari, 1995; Joo *et al*., 2000), subjective norm (Bhattacherjee, 2000; Taylor & Todd, 1995; Venkatesh & Davis, 2000) or playfulness (Liu & Arnett, 2000; Moon & Kim, 2001).

In the online banking context, Lai & Li (2005) determined that Internet banking was not affected by factors such as gender, age, and that IT competence subgroups supported the validity of the TAM instrument for evaluating Internet Banking acceptance.

Bhattacherjee (2000) reported that subjective norm was an important predictor of electronic brokerages and that behavioural control has minimal impact on e-commerce acceptance, but did not include perceived trust or perceived risk in his model.

2.2. Perceived Trust

Previous literature on trust has found the concept of trust particularly difficult to quantify by a single definition, but it can be defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer *et al*., 1995, p. 712).

Trust is a set of beliefs that other people would fulfil their expected commitments under conditions of vulnerability and interdependence (Rousseau *et al*., 1998). According to Mayer *et al*. (1995), trusting beliefs have their own set of determinants; these are ability, integrity, and benevolence. They described trust as the willingness to depend on or become vulnerable to the other party when one cannot control the other party's actions.

McKnight *et al*. (2002) further studied the relationship between ability, integrity, benevolence and trusting beliefs to describe important beliefs or perceptions one presumes about the other party. In their study, trust in the vendor was defined as a multi-dimensional construct with two inter-related components, trusting beliefs and trusting intentions defined as willingness to depend. Some researchers have suggested that trust is a relevant factor in the decision of online consumers whether to reveal their personal information to another party (Hoffman *et al*., 1999).

Trust is necessary in online trading because making investments over the Internet implies many uncertainties, but if the individual trusts, he/she can feel safe, secure, and comfortable; this has been shown in many studies (McKnight *et al*., 2002; Jarvenpaa *et al*., 1999; McKnight & Chervany, 2002). Empirical research has shown that trust in e-commerce vendors increases people's intention to use the vendors' web site. For example, Bhattacherjee (2002) found that trust has a positive effect on an individual's willingness to conduct transactions with an online vendor.

2.3. Perceived Risk

Risk is defined as a consumer's perceptions of the uncertainty and adverse consequences of engaging in an activity (Dowling & Staelin, 1994). Bauer (1967) defined perceived risk as "a combination of uncertainty plus seriousness of outcome involved", and therefore includes the subjective probability of loss and the severity of the negative impact. Prior studies have shown that online customers can perceive risks in many purchase situations because they must send personal and financial information, thus, privacy and security concerns are involved in these transactions. Privacy risk includes subjects' concern for the theft of their private information, or simply its misuse by the company collecting it (Featherman & Pavlou, 2003). The risk includes the possibility of loss of money and loss of privacy. Further, the loss of personal property or identity is a threat that online users feel when they use Internet for financial transactions. Because of this, we argue that using Internet for online investing has similar aspects to that perception of risk.

McKnight *et al*. (2002) stated that consumers often hesitate to transact with Web-based vendors because of uncertainty about vendor behaviour or the perceived risk of having personal information stolen by hackers, thus,

in online services users feel less risk when they perceive a high level of security. Forsythe & Shi (2003) found that perceived risk was an important determinant in barriers to online shopping.

In particular, perceived risk is one of the major problems with e-business, for there are still bugs and security gaps found on the Internet, thus, consumer's perceived risk negatively influenced consumer's online buying attitude, and later affected online purchase behaviour (Cho, 2004; Jarvenpaa & Toad, 1996). Liu & Wei (2003) added perceived risk to the TAM to explain and analyze shopper's behaviour in online contexts with the aim of examining whether innovativeness compatibility could reduce consumer's perceived risk. The behaviour towards significantly innovative services, and the influence of perceived risk in this context, is relatively unexplored (Littler & Melanthiou, 2006).

3. THE PROPOSED MODEL AND RESEARCH HYPOTHESES

The research model underlying the present study is presented in Fig. 1. The model was based on TAM constructs and is augmented by perceived risk and perceived trust. As Fig. 1 illustrates, perceived risk is posited to have direct effects on PEU, PU, and intentions to use. Similarly, perceived risk is influenced by perceived trust. Additionally, consistent with the TAM, PEU and PU are posited to have direct effects on behavioural intention, and PEU is posited to have a direct impact on PU.

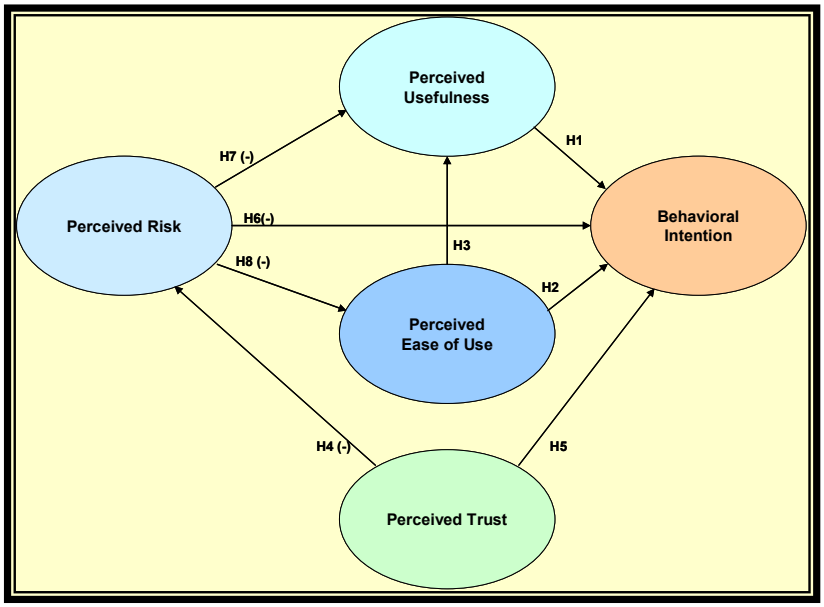

Figure 1. Research model.

- **Perceived usefulness and perceived ease of use**

Many empirical studies on the TAM have provided evidence of the significant effect of PU on usage intention (Agarwal & Prasad, 1999; Davis *et al*., 1989; Hu *et al*., 1999; Venkatesh, 1999, 2000; Venkatesh & Davis, 1996, 2000; Venkatesh & Morris, 2000). Most studies on technology acceptance showed that PEU directly influenced PU and intentions to use (Davis, 1989; Chen *et al*., 2002; Davis *et al*., 1989). Some researchers examining the TAM in e-services have shown a positive relationship between PEU and PU, and PU and usage intentions (Gefen *et al*., 2003; Vijayasarathy, 2004).

In the Internet banking context, prior studies showed significant effects influencing behavioural intention from PU and ease of use (Luarn & Lin, 2005; Wang *et al*., 2003). However, other researchers found that PEU did not have a direct impact on intention to use, only an indirect effect through PU (Cheng *et al*., 2006; Pikkarainen *et al*., 2004), thus, further research is needed. Therefore:

H1. Perceived usefulness positively affects intention to use online trading services.

H2. Perceived ease of use positively affects intention to use online trading services.

H3. Perceived ease of use positively affects perceived usefulness.

- **Perceived trust**

Perceived trust is one of the most important factors in determining the intention to use online services (Gefen, 2000; Gefen *et al*., 2003). Gefen (2000) showed that familiarity with an Internet vendor and trust in the vendor influenced the customers' intentions to request information about books and finally their intentions to purchase them. Gefen *et al*. (2003) demonstrated that trust was an important determinant in explaining users' acceptance of online shopping.

Chen & Barnes (2007) found that different levels of trust propensity moderate perceptions toward the web site, including PU, and online initial trust had a positive impact on purchase intention. Gefen & Straub (2004) validated a four-dimensional scale of trust in the context of e-products and e-services. They showed that e-trust was an important determinant of online purchase intentions. Similarly, (Kim *et al*., 2008) demonstrated that as trust increases, consumers are likely to perceive less risk than if trust were not present. Further, the results of the study showed that Internet consumers' trust had a strong impact on their purchasing decisions. This is consistent with prior studies in which online trust reduces the levels of perceived risk related to an electronic commerce transaction (Koufaris & Hampton-Sosa, 2004; Pavlou, 2003). Therefore:

H4. Perceived trust negatively affects perceived risk.

H5. Perceived trust positively affects intention to use online trading services.

- **Perceived risk**

It has been shown in many domains that risk has a negative effect on behavioural intention to use an IS (e.g. Huang & Chuang, 2007). This relationship has been validated in the e-commerce context. McKnight *et al*. (2002) found that perceived Internet risk negatively affects consumer intentions to transact with a web-based vendor. Kim *et al*. (2008) argued that trust is relevant in situations where one must assume risk and have incomplete control over the outcome, and they showed that perceived risk negatively affects online purchase intentions. Feelings of perceived risk, like misuse of personal and financial details or losing money, remain significant barriers to online shopping (Forsythe & Shi, 2003; Liao & Cheung, 2001; Salisbury *et al*., 2001). In the study of Featherman & Pavlou (2003), perceived risk was found to exert a strong inhibiting influence on PU and PEU. Therefore:

H6. Perceived risk negatively affects intention to use online trading services.

H7. Perceived risk negatively affects perceived usefulness.

H8. Perceived risk negatively affects perceived ease of use.

4. EMPIRICAL METHODOLOGY

A survey was employed in this study to test the hypotheses discussed in the previous sections, the data collection method used and the items selected for each of the constructs are presented in the following sections.

• Data collection

A sample of 180 undergraduate students in a medium-sized Spanish university was used as subjects in our study. They were enrolled in an advanced Financial Markets course in which the use of online trading systems was necessary for successful completion. Subjects were asked to work with two major online trading systems (www.igmarkets.es and www.renta4.com) for a period of one month. Prior to this study, the majority of the students recruited had knowledge of the Stock Exchange due to their curriculum. The two online trading companies offer demo web-based accounts with a virtual budget of 100,000 € and 10,000 € respectively. With these budgets, each student individually buys and sells stocks, bonds, indexes, options, futures or foreign currencies during the specified period, thus, it was an excellent way to evaluate the online trading system. The questionnaire was pre-tested on 10 IT and business experts. A number of suggestions were obtained on how to improve the questionnaire. The questionnaires were given to the students and were collected immediately after they were completed in the last session of the course. One hundred and three subjects voluntarily completed the survey.

• Measures

All the items used in this survey have been validated in previous studies. Each item of the questionnaire was measured on a 7-point Liker scale with the end points of "strongly agree (7)" and "strongly disagree (1)". Usefulness, ease of use and behavioural intentions were tested with items developed by Davis & Mathieson after being reworded. Scales of perceived trust were adapted from McKnight *et al*. (2002), Jarvenpaa *et al*. (2000) and Koufaris & Hampton-Sosa (2004). Perceived risk was measured by the items derived from Featherman and Pavlou (2003). Items measuring continuance intention were adapted from prior work by Mathieson (1991) and Bhattacherjee (2001a).

5. DATA ANALYSIS

The reliability of each variable was assessed using the measure of composite reliability and Cronbach's alpha. As shown in Table 1, the composite reliability and alpha scores for each variable are above 0.7, which demonstrates acceptable reliability (Nunally, 1978).

To test for the reliability and validity of the constructs, the factor loadings for each variable were examined first. All items load onto their respective constructs (Fornell & Larcker, 1981). Nunnally (1978) recommends that this measure be greater than 0.70. The factor loadings from the final partial least squares (PLS) measurement model are reported in Table 2. Second, validity was assessed by examining the average variance extracted (AVE) statistics. Table 2 shows that the AVE for each variable is 0.50 and above, which demonstrates adequate convergent validity (Chin, 1998; Hair *et al*., 1998).

	AVE	Composite Reliability	Cronbach's Alpha
Behavioural intentions	0.74	0.90	0.83
PEU	0.69	0.73	0.71
PU	0.65	0.85	0.76
P. RISK	0.79	0.92	0.87
P. TRUST	0.67	0.84	0.75

Table 1. AVE and Reliability

Behavioural intention	
I will use the online trading systems on a regular basis in the future.	0.90
I will frequently use the online trading systems in the future.	0.91
I will strongly recommend others to use.	0.77
Perceived Ease of Use	
Learning to use online trading systems is easy for me.	0.88
It would be easy for me to become skilful at using online trading systems.	0.73
My interactions with the online trading systems are clear and understandable.	0.84
Perceived Usefulness	
I would find online trading systems useful in conducting my securities transactions.	0.79
Using online trading systems would make it easier for me to conduct securities transactions.	0.84
Using online trading systems enable me to accomplish securities transactions more quickly.	0.78
Using online trading would improve my performance in conducting securities transactions.	0.83
Perceived Risk	
If I used the online trading systems to invest, I would feel more worried than using other investing channels.	0.83
If I used the online trading systems to invest, I would feel insecure.	0.92
If I used the online trading systems to invest, I would feel a lot of uncertainty.	0.92
Perceived Trust	
The online trading systems are trustworthy.	0.75
The online trading systems have a good reputation as financial dealer and stockbroker.	0.89
The online trading systems are competent and effective as financial dealer and stockbroker.	0.79
I do not doubt the honesty of the online trading systems.	0.76

Table 2. Outer Loadings.

Discriminant validity was assessed via comparisons of the square roots of the AVE values with the correlations between the latent constructs (Table 3). Fornell & Larcker (1981) assert that average variance shared between a construct and its measures (square root of the AVE) should be greater than the variance shared between the constructs and other constructs in the model (i.e. the diagonal square root AVE should be greater than the off-diagonal elements in the corresponding rows and columns).

The research model was tested using PLS, a structural equation modelling methodology. To test the significance of path and to generate t-statistic and standard errors (Chin, 1998), a bootstrapping procedure was employed with a sample size of 500.

	1	2	3	4	5
1. Behavioural intentions	**0.86**				
2. PEU	0.35	**0.83**			
3. PU	0.34	0.36	**0.81**		
4. P. RISK	-0.26	-0.04	-0.27	**0.89**	
5. P. TRUST	0.49	0.41	0.39	-0.34	**0.82**

Table 3. Discriminant validity[1].

The path coefficients for the research model are presented in Figure 2. Most of the paths were significant in the expected direction. Exceptions were paths connecting perceived risk with PEU and PEU with behavioural intentions. Results indicated that PU was associated with intentions, thus, Hypothesis 1 was supported. PEU was positive related to PU but did not influence intentions. Therefore, Hypotheses 2 and 3 were supported and rejected respectively. Consistent with Hypotheses 4 and 5, perceived trust was positively related to perceived risk and behavioural intentions. Also, Hypotheses 6 and 7 were supported, confirming the hypothesised effect of perceived risk on PU and behavioural intentions respectively. Contrary to our predictions, the path between perceived risk and ease of use was not significant, thus, Hypothesis 8 was rejected. The percentage of variance explained (R^2) of behavioural intention was 34%, 11% of perceived risk and 15% of PU.

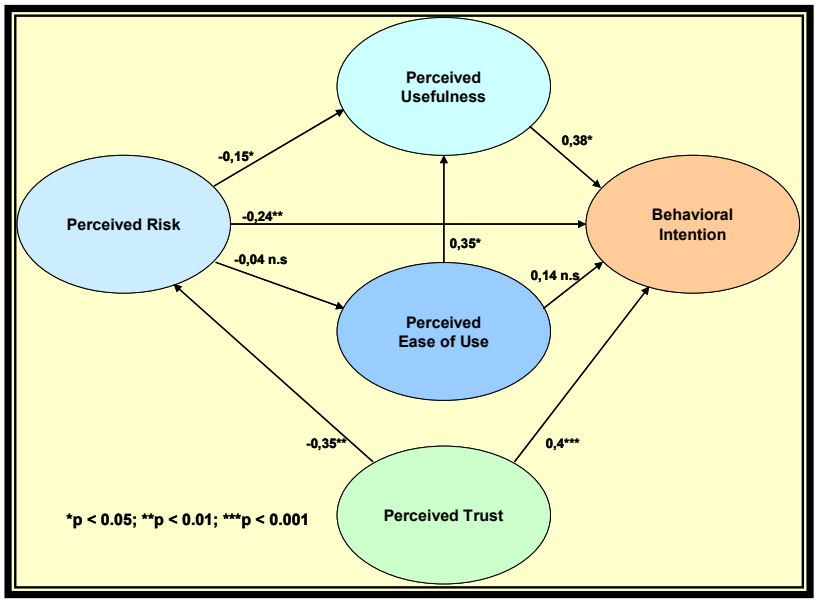

Figure 2. Results of the research model.

[1] Diagonal elements in bold (the square root of AVE).

6. DISCUSSION AND CONCLUSIONS

The goal of the present study was to test empirically an extended TAM model using perceived trust and perceived risk as additional variables. The results of the empirical analysis provide strong support for the proposed model.

PU was found to have a significant effect on intentions to use. Therefore, e-investors with strong beliefs in the effectiveness of their securities transactions through online trading systems are more likely to perceive the relative advantages or usefulness that the online dealers and stockbrokers provide in comparison with other traditional and online investment channels. PEU influences PU, thus, e-investors associate an easy to learn online trading system to more relative advantages when conducting their online transactions. Those systems with friendly interfaces promote the development of positive beliefs about the efficient service or reliable information provided by the electronic brokerage firm, and it will in turn affect the e-investors' intentions to use the online dealers and stockbroker services. In contrast, online trading systems with a modern interface or friendly screens do not increase e-investors' intentions to conduct online securities transactions. This lack of influence is consistent with prior studies in web services (Chan & Lu, 2004; Cheng *et al*., 2006; Pikkarainen *et al*., 2004).

Perceptions of risk associated with investment behaviour on the Internet do not influence ease of use. Consequently, e-investors can identify the online trading system as user-friendly even though the signs of risk associated to virtual transactions might still be present. Therefore, online trading systems seem to be usable and navigable even when e-investors perceive uncertainties arising from the online environment. Furthermore, online dealer and stockbroker web sites may be understood and easily used by e-investors even if the nature of the e-services arouses concern. Along this line, Featherman & Pavlou (2003) showed that ease of use did not influence perceived risk. Therefore, this study contributes by clarifying the inexistent or weak relationship between these constructs in the online context. Since perceived risk was an important antecedent of PU, e-investors that recognize online trading systems as risky to use may also tend to believe there will be fewer useful consequences in using it. Thus, they tend to identify their securities transactions as less effective.

The findings indicate that perceived risk is an important barrier to the adoption of online trading systems and is consistent with prior research in e-services (Cho, 2004; McKnight *et al*., 2002; Jarvenpaa & Toad, 1996). E-investors are concerned by risk in the online context; they tend to feel uncertainty regarding possible negative outcomes of using online trading systems (e.g. potential loss of control over financial information when this information is sent through the system), and this negatively affects their beliefs in the effectiveness and usefulness of the system, and it also negatively affects intentions to use online dealers and stockbroker services. Investors' tendency to use new investment channels, such as online trading systems, is strongly and negatively affected when some aspect of risk is integrated into the relationship, hence their expectations of losses should be soothed or else the online trading system will be rejected.

Trust affects the intention to invest using an online trading system, but it also directly influences the perceived risk of the transaction. Since, trust is one of the most significant beliefs in determining investors' acceptance of online trading systems, e-investors need to trust the online trading systems, presuming that online dealers and stockbrokers will act as expected by providing a reliable service. In line with Corritore *et al*. (2003), e-investors' degree of trust is reflected in a positive expectation that their vulnerabilities will not be exploited, which in turn will help them to engage in online securities transactions. In the absence of face-to-face interactions, online dealers and stockbrokers need to be trusted by, for example, making contractual statements available for their

customers in which they should pre-specify potential risks and how these risks will be countered by the online company. Thus, by providing incentives for trust, risk indication will be reduced.

In line with other researchers (Gefen, 2002; Jarvenpaa *et al*., 2000; Kim *et al*., 2008), trust in the online trading system was found to be negatively related to the perceived risk of the transaction. Therefore, in this context the belief that the online dealers and stockbrokers can be trusted may reduce the e-investors' risk perceptions, thus this specific belief acts as a risk-reducing issue, replacing uncertain encounters with positive and desirable transactions. Other researchers have demonstrated that trust can be increased through security features (Furnell & Karweni, 1999; Gefen, 2000; Lee & Turban, 2002; Wang *et al*., 1998) or web interface design (Harridge-March, 2006; Wang & Emurian, 2005). Additionally, security features may act as a guarantee of trust in all transactions, and this can lead to a perception of reduced risk situations (Campbell & Goodstein, 2001).

In practice, our research shows that online dealers and stockbrokers should pay more attention to the importance of trust as a means of creating the adequate climate for conducting securities transactions. Trust can be considered the main mechanism for increasing e-investors' intentions to invest using online trading systems by reducing perceived risk and by improving investment intentions.

Some limitations may affect these results. First, the different dimensions of trust - benevolence, integrity and ability - were not incorporated in our model. The influence of these dimensions on other constructs should be carefully studied in future research. Second, there is still a need to find additional variables that can improve a higher R^2, for example familiarity, loyalty or information quality among others.

REFERENCES

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly: Management Information Systems, 24* (4), 665-94.

Agarwal, R. & Prasad, J. (1999). Are individual differences germane to the acceptance of new information technologies? *Decision Sciences, 30* (2), 361-90.

Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Bauer, R. A. (1967). *Consumer behavior as risk taking*. In D. F. Cox, (Ed.) *Risk taking and information handling in consumer behaviour* (pp.23-33). Boston, MA: Boston University Press.

Bhattacherjee, A. (2000). Acceptance of Internet applications services: the case of electronic brokerages. IEEE transactions on systems, Man, and Cybernetics – Part A: *Systems and Humans, 30*, 411-420.

Bhattacherjee, A. (2001a). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision Support Systems, 32* (2), 201-14.

Bhattacherjee, A. (2001b). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly: Management Information Systems, 25* (3), 351-70.

Bhattacherjee, A. (2002). Individual trust in online firms: Scale development and initial test. *Journal of Management Information Systems, 19* (1), 211-41.

Campbell, M. C. & Goodstein, R. C. (2001). The moderating effect of perceived risk on consumers' evaluations of product incongruity: Preference for the norm. *Journal of Consumer Research, 28* (3), 439-49.

Chan, S. & Lu, M. (2004). Understanding internet banking adoption and use behavior: A Hong Kong perspective. *Journal of Global Information Management, 12* (3), 21-43.

Chau, Pyk. (1996). An empirical assessment of a modified technology acceptance model. *Journal of Management Information Systems, 13* (2), 185-204.

Chau, Pyk. & Hu, PJ. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: An empirical test of competing theories. *Information & Management, 39* (4), 297-311.

Chen, L., Gillenson, M. L. & Sherrell, D. L. (2002). Enticing online consumers: An extended technology acceptance perspective. *Information & Management, 39* (8), 705-19.

Chen, Y. & Barnes, S. (2007). Initial trust and online buyer behaviour. *Industrial Management and Data Systems, 107* (1), 21-36.

Cheng, Tce., Lam, Dyc. & Yeung, Acl. (2006). Adoption of internet banking: An empirical study in hong kong. *Decision Support Systems, 42* (3), 1558-72.

Chin, W. W. (1998). *The partial least squares approach to structural equation modelling*. In G. A. Marcoulides, (Ed.), *Modern methods for business research* (pp. 295-336). Mahwah, NJ.: Lawrence Erlbaum Associates.

Cho, J. (2004). Likelihood to abort an online transaction: Influences from cognitive evaluations, attitudes, and behavioral variables. *Information & Management, 41* (7), 827-38.

Compeau, D. R. & Higgins, C. A. (1995). Computer self-efficacy: development of a measure and initial test. *MIS Quarterly: Management Information Systems, 19* (2), 189-211.

Corritore, C. L., Kracher, B. & Wiedenbeck, S. (2003). On-line trust: Concepts, evolving themes, a model. *International Journal of Human Computer Studies, 58* (6), 737-58.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems, 13* (3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35* (8), 982-1003.

Dowling, G. R. & Staelin, R. (1994). A model of perceived risk and intended risk-handling activity. *Journal of Consumer Research: An Interdisciplinary Quarterly, 21* (1), 119-34.

Eastin, M. A., Larose, R. L. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer Mediated Communication, 6* (1). Available from: http://www.ascusc.org/jcmc/vol6/issue1/eastin.html

Featherman, M. S. & Pavlou, P. A. (2003). Predicting e-services adoption: A perceived risk facets perspective. *International Journal of Human Computer Studies, 59* (4), 451-74.

Fornell, C. & Larcker, D. F. (1981). Evaluating structural equation models with unobservable and measurement error. *Journal of Marketing Research, 18*, 39-50.

Forsythe, S. M. & Shi, B. (2003). Consumer patronage and risk perceptions in internet shopping. *Journal of Business Research, 56* (11), 867-75.

Furnell, S. M. & Karweni, T. (1999). Security implications of electronic commerce: A survey of consumers and businesses. *Internet Research, 9* (5), 372-82.

Gefen, D., & Straub, D. W. (1997). Gender differences in the perception and use of e-mail: An extension to the technology acceptance model. *MIS Quarterly: Management Information Systems, 21* (4), 389-400.

Gefen, D. & Straub, D. W. (2004). Consumer trust in B2C e-commerce and the importance of social presence: Experiments in e-products and e-services. *Omega, 32* (6), 407-24.

Gefen, D., Karahanna, E. & Straub, D. W. (2003). Trust and tam in online shopping: An integrated model. *MIS Quarterly: Management Information Systems, 27* (1), 51-90.

Gefen, D. (2000). E-commerce: The role of familiarity and trust. *Omega, 28* (6), 725-37.

Gefen, D. (2002). Customer loyalty in e-commerce. *Journal of the Association for Information Systems, 3*, 27-51.

Hair, J. F., Anderson, R. E., Tatham, R. L. & Black, W. C. (1998). *Multivariate data analysis*. Upper Saddle River: Prentice Hall.

Harridge-March, S. (2006). Can the building of trust overcome consumer perceived risk online? *Marketing Intelligence and Planning, 24* (7), 746-61.

Harrison Mcknight, D., Choudhury, V. & Kacmar, C. (2002). The impact of initial consumer trust on intentions to transact with a web site: A trust building model. *The Journal of Strategic Information Systems, 11* (3-4), 297-323.

hoffman, d. l., novak, t. p. & peralta, m. (1999). Building consumer trust online. *Communications of the ACM, 42* (4), 80-5.

Hsu, M. & Chiu, C. (2004). Internet self-efficacy and electronic service acceptance. *Decision Support Systems, 38* (3), 369-81.

Hu, P. J., Chau, Pyk., Liu Sheng, O. R. & Tam, K. Y. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems, 16* (2), 91-112.

Huang, E. & Chuang, M. H. (2007). Extending the theory of planned behaviour as a model to explain post-merger employee behaviour of IS use. *Computers in Human Behavior, 23* (1), 240-57.

Igbaria, M. & Iivari. J. (1995). The effects of self-efficacy on computer usage. *Omega, 23* (6), 587-605.

Jarvenpaa, S. L, & Toad, P. A. (1996). Consumer reactions to electronic shopping on the world wide web. *International Journal of Electronic Commerce, 1* (2), 59-88.

Jarvenpaa, S. L., Tractinsky, N., Saarinen, L. & Vitale, M. (1999). Consumer trust in an internet store: A cross-cultural validation. *Journal of Computer-Mediated Communication, 5* (2).

Jarvenpaa, S. L., Tractinsky, N. & Vitale, M. (2000). Consumer trust in an Internet store. *Information Technology & Management, 1*, 45-71.

Joo, Y. J., Bong, M. & Choi, H. J. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in Web-based instruction. *Educational Technology, Research and Development, 48* (2), 5-17.

Karahanna, E., Straub, D. W. & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly: Management Information Systems, 23* (2), 183-213.

Kim, D. J., Ferrin, D. L. & Rao, H. R. (2008). A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. *Decision Support Systems, 44* (2), 544-64.

Koufaris, M. & Hampton-Sosa. W. (2004). The development of initial trust in an online company by new customers. *Information & Management, 41* (3), 377-97.

Lai, V. S. & Li, H. (2005). Technology acceptance model for internet banking: An invariance analysis. *Information & Management, 42* (2), 373-86.

Lee, M. K. O. & Turban, E. (2002). A trust model for consumer internet shopping. *International Journal of Electronic Commerce, 6* (1), 75-91.

Liao, Z., & Cheung, M. T. (2001). Internet-based e-shopping and consumer attitudes: An empirical study. *Information & Management, 38* (5), 299-306.

Littler, D. & Melanthiou, D. (2006). Consumer perceptions of risk and uncertainty and the implications for behaviour towards innovative retail services: The case of internet banking. *Journal of Retailing and Consumer Services, 13* (6), 431-43.

Liu, C. & Arnett. K. P. (2000). Exploring the factors associated with web site success in the context of electronic commerce. *Information & Management, 38* (1), 23-33.

Liu, X. & Wei, K. K. (2003). An empirical study of product differences in consumers' E-commerce adoption behavior. *Electronic Commerce Research and Applications, 2* (3), 229-39.

Luarn, P. & Lin, H. (2005). Toward an understanding of the behavioral intention to use mobile banking. *Comput Hum Behav, 21* (6), 873-91.

Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research, 2* (3), 173-191.

Mayer, R. C., Davis, J. H. & Schoorman, F. D. (1995). An integrative model of organizational trust. *The Academy of Management Review, 20* (3), 709-34.

Mcknight, D. H. & Chervany. N. L. (2001). What trust means in E-commerce customer relationships: An interdisciplinary conceptual typology. *Int J Electron Commerce, 6* (2), 35-59.

Moon, J. & Kim, Y. (2001). Extending the TAM for a world-wide-web context. *Information & Management, 38* (4), 217-30.

Nunally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

Pavlou, P. A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *Int J Electron Commerce, 7* (3), 101-34.

Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. & Pahnila, S. (2004). Consumer acceptance of online banking: An extension of the technology acceptance model. *Internet Research, 14* (3), 224-35.

Rousseau, D. M., Sitkin, S. B., Burt, R. S. & Camerer, C. (1998). Not so different after all: a cross discipline view of trust. *Academy of management Review, 23* (3), 393-404.

Salisbury, W. D., Pearson, R. A., Pearson, A. W. & Miller, D. W. (2001). Perceived security and World Wide Web purchase intention. *Industrial Management & Data Systems, 101* (4), 165–176.

Taylor, S. & Todd, P. (1995). Assessing IT usage: The role of prior experience. *MIS Quarterly: Management Information Systems, 19* (4), 561-70.

Venkatesh, V. (1999). Creation of favorable user perceptions: Exploring the role of intrinsic motivation. *MIS Quarterly: Management Information Systems, 23* (2), 239-60.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research, 11* (4), 342-65.

Venkatesh, V. & Brown, S. A. (2001). A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges. *MIS Quarterly: Management Information Systems, 25* (1), 71-98.

Venkatesh, V. & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test. *Decision Sciences, 27* (3), 451-181.

Venkatesh, V., & Davis, F. D. (2000). Theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46* (2), 186-204.

Venkatesh, V. & Morris, M. G. (2000). Why don't men ever stop to ask for directions? gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly: Management Information Systems, 24* (1), 115-36.

Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems, 27* (3), 425-78.

Vijayasarathy, L. R. (2004). Predicting consumer intentions to use on-line shopping: The case for an augmented technology acceptance model. *Information & Management, 41* (6), 747-62.

Wang, H., Lee, M. K. O. & Wang, C. (1998). Consumer privacy concerns about internet marketing. *Communications of the ACM, 41* (3), 63-70.

Wang, Y., Lin, H. & Tang, T. (2003). Determinants of user acceptance of internet banking: An empirical study. *International Journal of Service Industry Management, 14* (5), 501-19.

Wang, Y. D. & Emurian, H. H. (2005). An overview of online trust: Concepts, elements, and implications. *Computers in Human Behavior, 21* (1), 105-25.