Decompose Technology Acceptance Model by Economic Value and Trust Perception to E-Finance Adaption

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A R T I C L E  I N F O

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A B S T R A C T

Among all Electronic Commerce (EC) applications, Internet-based stock trading is ideally one of the finest ways to comprehend the attraction and popularity of EC. The core focus of this study is to extend Technology Acceptance Model by providing economic value (Time saving and Cost reduction) and Trust perception to figure out factors that affect the investor’s intention to adopt online stock trading. The data was gathered from 295 active investors who were aware of online stock trading in Iran. We used Structural Equation Modeling (AMOS) to analyzed hypotheses and the results revealed that Cost Reduction and Trust perceptions have positive effects on investors' intention through attitude. Perceived usefulness and perceived ease of use also were significantly influencing factors of attitude toward online stock trading. Almost 62% of the total variance on the investors’ behavioural intention was explained by independent variables. These findings can facilitate the understanding of the factors and the measures that need to be undertaken in order to enhance the use of e-finance among the investors.

INTRODUCTION

In the last two decades, technology has developed to a great extent resulting in vastly altered business methods. The impact of technology is so great that e-commerce is now considered as the fundamental axis for the economic development of any country. These days, electronic commerce, especially online investment, enjoys top priority in economic organizations. Planning for the utilization of e-commerce is on right on top of their priority list of strategic programs. Information technology has introduced a whole new dimension to invest and transact and thus greatly influenced the money and the capital market in the mid 1990s [1].

Figures like Internet World Stats in 2011 [2] have shown that the increase in the usage of Internet in North America was 110.3% during 2000-2005. During this period the increase in Internet usage was 177.5% in Europe and 218.7% in Asia. According to studies done by Alameh et al., [3], and Abzari [4]; Iran has seen a tremendous rise in Internet usage since 1998.

World Bank, 2008 reveals that Internet users in Iran have increased from 1.1 million to 23.5 million during the period 2001 to 2008. The number of Internet users is pertinent to the numbers of online traders advised by Waleed et al., as Internet users would probably become online traders [5]. Online stock investment got underway in Iran in 1997, with the launching of the first Electronic Ordering System [6]. Iran has taken some essential steps towards electronic trading like renovation of stock trading halls, providing software and hardware requirements, installation of graphic boards, and application of modern systems of trading to develop online stock exchanges. Regardless of all these changes, conventional stock trading still remains the most prevalent mode of trading in the country. In addition, the transaction cost in Iran stock exchange was 0.075 of the total transaction value, out of which 0.05 was deducted as the broker’s commission and 0.025 for the stock exchange for the services shared by the seller and the buyer [7]. World bank reports (2008) and the existing literature reveal that in the year 2004, The United States of America was host to 64% of the total stock exchanges [8] whereas 43% were in South Korea [9], 40% in Singapore [10] and 46% in Hong Kong [11]. Iran’s stock exchange was valued at 45.5 billion dollars and the ratio of the transactions to the Gross Domestic Product

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(GDP) for Iran Stock Exchange was 13% by the end of 2008 [12]. However, online stock investment amounted to only 11 percent of the total investment in stock exchange in Iran [7]. Thus, it was quite evident that Iran had shown significantly low expansion rate in online stock trading when compared to other countries in the region such as Hong Kong, South Korea, Taiwan, Singapore and Thailand.

The key focus of this research is to build an extended model by including factors based on the investor's intention and the technology accepted related to the financial performance of online stock investment. This research may help Iran's stock exchange and may also provide substantial assistance to its economic management to analyze the investors’ reason for resisting new technology and thereby take the necessary steps in order to increase the use of the Internet to use online investment and to make use of such services profitably.

**Literature Review:**

There is a lot of new literature on the investment in stock market, which shows many researches done in the field of both the financial science and information systems. Extensive research has been carried out to identify the factors that affect the decision to adopt information technology. Most of the studies on e-commerce dealt with the sphere of information systems. Due to this, [13, 14] reason, online trading should be analyzed as an information systems phenomenon. In other words the user of this method relates to complicated information systems and examines online stock trading as a finance issue that is subjected to theory usage.

**A) Theory of Reasoned Action (TRA):**

The theory of reasoned action was developed by Fishbein and Ajzen [15]. This theory looks at behavior affected by attitudinal and normative influences. Various domains have made use of this theory. As illustrated by this theory, the behavioral intention (BI) ascertains an individual’s specified behavior. An individual’s attitude (At) along with the subjective norm (SN) ascertains the Behavioral intention (BI), see equation (1);

\[
BI = At + SN
\]  

TRA also has been used widely in various studies to facilitate the forecasting of the intention to accept e-finance [16].

**B) Technology Acceptance Model (TAM):**

Technology Acceptance Model (TAM) was used to explain more clearly the behavior when working with computers by Davis in 1989 (Fig 1). The purpose of using his model was to give a better clarification of the factors that lead to the acceptance of computers in general, to give a clear account of the behavior of the users over a wide variety of computing technologies and the population of users. This model is cost effective and acceptable [17]. The TAM model used is actually an extension or modification of the TRA.

TAM’s fundamental philosophy lies on the theory that ‘attitude predicts intentions, and intentions predict behavior’ (Davis, 1989). Davis also went further to state that the behavior of a user of a system is established by his or her intention to use it. This in turn is influenced by his or her attitude which is dominated by two variables, namely;

1. Perceived usefulness of the system.
2. Perceived ease-of-use of the system (PEU).

Perceived usefulness explains the idea of how with the use of a technology, it could assist and develop a person’s performance on jobs. To this effect, some researchers feel that there exists a direct link between the rate of employing an application with its success in helping the job to be performed better [17, 18].

![Fig. 1: Technology acceptance model by Davis.](image-url)

Although perceived ease-of-use (PEU) refers to the evaluation made by the user on whether an application can be used in his or her work, Davis [19] have other opinions. They explained that PEU is in fact the user’s thoughts of how easy it was to use an application while performing his or her work. In certain circumstances, the technology driving the application is just too complex to be adapted even though there are huge benefits. Studies
related to the Technology Acceptance Model (TAM) have been frequently carried out under the field of information systems, Internet adoption, e-finance and e-commerce [18, 20-22].

TAM is one of several models that have been used to predict user acceptance of and intention to use information systems. None of these models though have achieved universal acceptance (see Table 1).

**Table 1: Some review of literature in different technology adoption.**

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Research setting</th>
<th>Constructs</th>
<th>Theory of Using</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Siriluck, 2006)</td>
<td>Thailand</td>
<td>Intention, behavior, attitude, securities, PEU, and PU, Information quality, accessibility.</td>
<td>TAM</td>
<td>Multiple regression</td>
</tr>
<tr>
<td>(Chi-Shang et al., 2007)</td>
<td>Hong Kong</td>
<td>Attitude, PEU, Pressed risk, innovativeness</td>
<td>TAM</td>
<td>T-test &amp; correlation</td>
</tr>
<tr>
<td>Jeanette Taft 2007</td>
<td>USA</td>
<td>Self-efficacy, prior training in electronic banking, perceived ease-of-use and locus of control</td>
<td>TAM, SEM</td>
<td>SEM</td>
</tr>
<tr>
<td>Sohal at al 2003</td>
<td>Malaysian</td>
<td>Ease of use, Internet accessibility, Attitude, computer and Internet access costs, Trust, Security concerns</td>
<td>TAM</td>
<td>SEM</td>
</tr>
<tr>
<td>Vijayasarthi 2004</td>
<td>USA</td>
<td>Usefulness, Compatibility, privacy security, normative, Intention, Attitude and self efficacy</td>
<td>TAM</td>
<td>Multiple regression</td>
</tr>
</tbody>
</table>

C) Propose research model and hypotheses:

The majority of studies on online investor behavior in the last decade have attempted to identify major antecedent factors which play critical roles in determining online consumer behavior. Therefore by reviewing previous studies, two major antecedents to stock investors’ behavior were integrated and added in this research model. These two antecedents are Trust perception, and economic value (Time saving and cost reduction) which have not been identified and empirically examined by various prior studies in stock markets fields (see Fig 2).

C, A) Perceived Usefulness (PUS):

Perceived Usefulness, is explained as “the degree to which an individual believes subjectively that using a particular IT would enhance his or her job performance” [19]. In the case of online stock trading, usefulness is termed as the extent to which an individual can make use of the Internet technology to his advantage to trade online over traditional stock investment [23, 24]. It has been observed that researchers comprehensively studied usefulness. It was established that perceived usefulness is direct and indirect significant in affecting attitude towards online investment in stock exchange [25, 26]. Thus, the first hypotheses proposed:

**H1a:** The usefulness of using online stock trading will positively affect attitude towards online stock investment.

**H2:** The investors’ perceived usefulness of online stock trading would have a positive effect on the investors’ intention to adopt online stock investment.

C, B) Trust perception (TP):

Trust is a person’s compliance to place himself/herself at risk in the hands of another person rooted in the conviction that the other person would sincerely do his/her work without his or her supervision [27, 28]. The concept of trust has been constantly debated as a fundamental factor in online finance investment [29]. Trust is considered to be one of the most vital components in electronic commerce as online transactions involve a high degree of risk and uncertainty. Additional research conducted, revealed that significant and positive relation between trust and the confidentiality of trading service which established the value of business deals between buyers and sellers, and also individual found out opportunity for numerous business actions [30, 31].

**H3:** Trust perceptions positively affect investors’ attitudes leading to adopt online stock investment.

C, C) Economic Value in TAM(EV):

According to Williamson’s, Transaction Cost Theory [32] transaction comprises of three dimensions of uncertainty, asset specificity, and frequency while human behavior is bounded by rationality and opportunism. Accordingly, opportunism increases transaction costs in the presence of uncertainty and asset specificity. Multiple previous research that has been carried out based on the two variables of cost reduction and time saving that point to the assumption that they could be major determinants to online trading [33, 34]. However, other contrary studies failed to reveal a positive relationship between cost reduction and time saving with positive impacts on online consumers’ intentions directly [35]. Consequently, this study attempts to study the multiple effects of cost reduction and time saving which are important economic values of e-finance on other major antecedents in the TAM-based model. To this effect, some researchers found that lower transaction costs and saving time had positive effects on online consumer behavior in terms of satisfaction [33].

Thus, these controversial findings point out that some factors other than cost reduction or time saving may play more important roles in determining online consumer behavior and therefore there was a need to conduct investigation based on economic value along with other identified antecedents together in one research model. So the following hypotheses are proposed:
H4a: Cost reduction positively influences attitude toward online stock investment.
H4b: Time saving positively influences attitude toward online stock investment.

C, D) Attitude towards online stock investment (At):
The attitude is the only common variable among all the theories namely; TRA and TAM. It is the variable that estimates the behavioral intention directly and the actual behavior indirectly [15, 17, 36]. According to Fishbein et al., an attitude represents “a person’s general feeling of favorableness or unfavourableness towards some stimulus object” [15].

Other studies have also provided significant proof of the effect of investors’ attitude towards intention of online investment [9, 37, 38]. Therefore, the next hypothesis studies the attitude towards online stock investment to test if the result would be a viable factor as well as being consistent with the literature for investors’ intention. For this reason, the next suggested hypothesis is:

H5: Investors Attitude to use Internet stock investment positively influence to intentional accepting of online investment in Stock Market.

C, E) Attitude as a Mediator:
In this study, attitude was termed to be the mediator due to the direct and the indirect relationship between the PUS and the behavioral intention. Attitude may be considered as a mediator to the extent to which it carries the influence of independent variables to intention. Cheng, Lam, and Hsu [39] found that attitude serves as mediating variables in various relationships between past behavior and customer intention.

Research conducted in the past revealed that the relation among two variables namely perceived usefulness and intention behavior, and the behavioral intention to make use of electronic learning and practice review system and competency management is mediated by attitude [40]. Therefore, the next suggested hypothesis is:

H6. Attitude toward online stock investment is mediation factor between perceived usefulness and investors’ intention to adopt online stock.

Fig. 2: The proposed research model.

Methodology:
The technique of Structural Equation Modeling, (SEM) was the primary technique used for the purpose of this study. Self-reports was considered as the most suitable data collection method for research, testing TAM [41]. For the purpose of this research, the questionnaire was used as an instrument for data collection from 385 who were awarded of Internet stock trading among the actual investors based on the existing list of stock exchange on Iran in 2011. From the total number of 385 questionnaires submitted either through Internet or in person, 318 questionnaires were returned with a response rate of 82%.

A) Data screening:
A survey was conducted starting from April till the end of June 2011. In all of these questionnaires that were collected, 8 questionnaires were eliminated as the respondents were not aware of trading stock investment and the questionnaires that had more than three missing values for a specific construct were eliminated. As a result of the missing data analysis, there were another twelve questionnaires that were eliminated. Based on Mahalanobis distance (d-squared) measures we dropped three items of outliers that the level of d-squared/degree of freedom value exceeding 2.5 [42]. After all the eliminations, 295 questionnaires were used for data
According to conventions suggested by SEM researchers [43], the skewness score of all variables was within the normal range (i.e., between -2 and +2) and it was revealed that the kurtosis scores of all distributions were within the normal range between -7 and +7 [43, 44]. Thus all data were normal in this study. The Composite Reliability (CR) as an alternative Cronbach’s alpha is computed by almost all SEM and Amos software. A value of 0.70 or higher is an acceptable value in terms of composite reliability [45]. All the values shown in (Appendix A) are above 0.70 and the average figure for these values is 0.88. Therefore, the measurement instrument of this study is reliable.

B) Measurement Model Fit:

Kline (1998) suggests at least 3 goodness of- fit measures, like: chi-square, (GFI, NFI or CFI), NNFI and SRMR are needed to declare the model as being fit. Hair et al., 1998 recommend at least 3 goodness of- fit measurers such as: Chi-square, GFI, CFI, and RMSEA. The suggested approval of goodness- of-fit to a model needs that the GFI, AGFI, NFI and CFI values should be greater than or equal to 0.90. An acceptable value of RMSEA ranges from 0.03 to 0.08.

Analysis and Results:

Among the participants, 81% of the respondents were male and the balance 19% were females. With respect to the age group of the participants, 44% of the respondents were between the age of 20-39 years (young investors) and the balance 56% of the respondents were over 40 years of age (older investors). 65% of the respondents had higher academic education (Bachelors degree or over) and the balance 35% of the respondents had either a Diploma or High School education. After analyzing the data collected about the experience of online stock trading investor, the results revealed that only 8% had over 3 years of experience in trading stock over the Internet. 34.2% of the respondents had an online stock trading experience between 1 to 3 years and the balance 57.5% had only 1 year of online stock trading experience.

Before evaluating the fit of the structure model, it was necessary to define a measurement model to verify that the 38 measurement variables written to reflect the eleven unobserved constructs. The results of initial estimation of the total measurement model for the construct showed a perfect fit (chi-square = 169.584, p-value = .061, Relative chi-square=1.491, GFI=.919, CFI=.923, IFI=.934 and RMSEA=.046). Thus the model shows that all of the factor loadings are more than .5 and at least all fit indices are acceptable.

After confirming the measurement model, the structural model was then examined. Based on the CFA described in the section 2.6 a total of 38 observed indicators were considered in the model, in other words the structure model for this study is total disaggregation model. The final results of structure model suggested that the model is a perfect fit (chi-square=486.471, p-value=.000, Relative chi-square=1.370, GFI=.895, CFI=.949, IFI=.954 and RMSEA=.036). Table 1 reveals a summary of the hypothesis tested for online stock trading. The overall variance demonstrated for investors behavioral intention was 41%. This indicated that the model had the ability to foresee and demonstrate the investors’ behavioral intentions in this study.

According to Hair et al., [42] if the direct relationship is reduced but it is still significant when mediator is included as an additional predictor, then partial mediation is supported. In the case of direct model, Beta size of PUS relationship with Intention was .48 and this relationship in mediation model was reduced but remained significant (.26), therefore attitude has all the requirements to perform a partial mediation role in the relationship between perceived usefulness and investors’ intention.

Discussion:

The results reveal that perceived usefulness (β = .32; P < 0.05) positively affects the attitude towards online stock investment. The impact of perceived usefulness on the investors’ attitude has also been found in other studies [24, 25- 46]. The findings suggest that stock exchange need to make it more convenient to use Internet stock investment. It sees that PUS has the indirect effect on intention through attitude and also has a direct effect on intention. To describe it in other words, this study also established that perceived usefulness had significant direct effects on investors intention to adopt online stock investment in the purpose model (β = .24; P < 0.05), than H1a,b were supported in this study.

As stated in the hypothesis, the perception of trust (β= 0.43, p < 0.001) had a significant impact on the investors attitude to use online stock investment. There were great theoretical and practical consequences due to
the attitude that was affected by trust. There is a need to instill a greater level of trust among the investors before they can start using the internet for the purpose of online trading.

The results of this study support hypotheses that cost reduction (β = 0.33, P < 0.05) has a positive significant effect on attitude toward online stock investment. At the early stage of e-commerce, cost reduction was one of the major drivers for customers to go shopping online.[35] This conclusion is still valid today. On the contrary of the prior research, the findings did not support the positive effect of time saving on attitude toward purchasing [47]. The results of this study didn’t support hypothesis 4a that Time saving (β = 0.010, P > 0.05) has a significant effect on attitude toward online stock investment, consequently, this hypothesis was rejected. We believed, there are two possible explanations to such inconsistent findings in this research. First of all, most of the respondents in this study were young (0.62) and secondly, majority of investors using internet stock investment were using this technology for less than a year (0.57). In other words the participants in the study did not actually perceive time saving from their past online experiences, or at least they didn’t think they went online because online investment would save time or didn’t feel that time would be saved when they use Internet investment.

As expected, attitude (β = 0.47, p< 0.001) was found to have a significant positive effect on the intention to adopt online stock investment. This finding was consistent with other studies in the e-commerce and e-finance fields; [27, 48, 49]. The significant results suggest a positive evaluation of Internet stock investment by investors and in turn will lead to their intention to adopt the Internet technology.

Thus this study found that, attitude toward online stock investment was a partial mediator between perceived usefulness and investors’ intention in order to adopt online stock investment. Consequently, hypothesis H6 was strongly supported. This scientific finding reveals the importance of attitude and perceived usefulness in this research.

A) Implication:
The research results have some implications for both practical and researchers and are stated below:

1. Research implications:
This research has many academic implications with respect to making use of the Internet technology to trade stock. First of all: the proposed model of this study will provide insights for investors to adopt and introduce new services (online stock investment). This research introduces a novel application of the extended TAM models to predict online stock investment adoption. By:
- Adjusting two modified constructs (Trust perception and Economic Value)
- Adjusting and modified relations between some variables (PU-IB).
- This new relation has created Attitude variable to be Mediation in purpose model.

However these finding would also provide a clear insight of relevant aspects about investors’ intention, and important factors affecting online stock investment.

2. Implications for practice
A general guideline is provided to the investors and the stock exchange vendors about how they can better their online investment performance. With the help of this research, consumers who are using the Internet technology are in a better position to comprehend more accurately about the aspects of their behavior. In addition they can also identify the factors that have an impact on their online decision making process. Findings would offer a more comprehensive understanding of online stock investment for investors, e-commerce managers, and financial market.

Conclusion:
The main objective of this study is to identify the factors that are involved in influencing intention on using Internet stock investment. There have been various models that have been developed and proposed in order to enhance the understanding of this issue. The approach adopted by TAM provides a comprehensive set of antecedents that can explain the intention to adopt a certain technology (i.e., Internet stock investment) in a precise manner. This enhances the practical contributions of the study. From the finding it has been identified that a key finding of this research was the predicated power of perceived usefulness that explained intention direct and indirect by attitude. The significant roles of trust perception and economic value in this research confirm that the TAM can be successfully applied to domain of online stock investment adoption. Almost 62% of the total variance on the investors’ behavioural intention was explained by independent variables in this research.

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