

FACTORS INFLUENCING USER ACCEPTANCE OF INTERNET STOCK TRADING IN PENANG

**By
Gopi S/O Muniandy**

Research report submitted in partial fulfillment of the requirements for
the degree of Master of Business Administration

April 2006

ACKNOWLEDGEMENT

I wish to express my heartfelt appreciation to my supervisor, Associate Professor T. Ramayah for his invaluable guidance and encouragement throughout the research and thesis write up. I also wish to accord my appreciation to all respondents who had so kindly responded to this survey. My sincere thanks to all the lectures in the MBA program as well.

Not to forget to thank my family, for their understanding and encouragement during the period of my study.

To all, Thank You

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
ABSTRAK	viii
ABSTRACT	x
Chapter 1: INTRODUCTION	1
1.1 Introduction: Overview of Online Stock Trading	1
1.2 Online Trading in Malaysia	5
1.3 Problem Statement	8
1.4 Research Objectives	8
1.5 Research Question	9
1.6 Significance of Study	9
1.7 Organizations of Remaining Chapters	10
Chapter 2: LITERATURE REVIEW	11
2.0 Theoretical Background and Research Model	11
2.1 Theory of Planned Behavior (TPB) and Integrated Theory of Planned Behavior (ITPB)	23
2.2 Technology Acceptance Model (TAM)	24
2.3 Decomposed Theory of Planned Behavior (DTPB)	25
2.4 Theoretical Framework and Hypotheses	27
2.4.1 <i>Perceived Behavioral Control</i>	28
2.4.1.1 <i>Facilitating Condition</i>	29
2.4.1.2 <i>Perceived Self-Efficacy</i>	31
2.4.2 <i>Subjective Norm</i>	32
2.4.2.1 <i>Social Factors</i>	33
2.4.3 <i>Attitudes</i>	34
2.4.3.1 <i>Perceived Usefulness / Relative Advantage</i>	36
2.4.3.2 <i>Perceived Ease of Use / Complexity</i>	37
2.4.3.3 <i>Perceived Risk</i>	38
2.4.4 <i>Behavior Intention</i>	39
2.4.5 <i>Behavior</i>	40
2.5 Summary	41

Chapter 3: METHODOLOGY	43
3.1 Introduction	43
3.2 Research Design and Procedure	43
3.2.1 <i>Type of Study</i>	43
3.2.2 <i>Nature of Study</i>	44
3.2.3 <i>Unit of Analysis</i>	44
3.2.4 <i>Research Site</i>	44
3.3 Population, Sample Size and Sampling Technique	44
3.4 Variables and Measurement	44
3.4.1 <i>Dependent Variable</i>	45
3.4.1.1 <i>Behavioral Intention</i>	45
3.4.2 <i>Independent Variable</i>	45
3.4.2.1 <i>Attitude Toward Behavior</i>	45
3.4.2.2 <i>Subjective Norm</i>	45
3.4.2.3 <i>Perceived Behavioral Control</i>	46
3.4.2.4 <i>Computer Self-Efficacy</i>	46
3.4.2.5 <i>Facilitating Condition</i>	46
3.4.2.6 <i>Injunctive Norm</i>	47
3.4.2.7 <i>Descriptive Norm</i>	47
3.4.2.8 <i>Perceived Usefulness</i>	47
3.4.2.9 <i>Perceived Ease of Use</i>	48
3.4.2.10 <i>Perceived Risk</i>	48
3.5 Data Collection Method	48
3.6 Questionnaire Design	48
3.7 Data Analysis	49
3.8 Summary	51
Chapter 4: ANALYSIS AND RESULT	52
4.1 Introduction	52
4.2 Sample and Profiles	52
4.3 Goodness of Measure	55
4.3.1 <i>Reliability of Measurement</i>	55
4.3.2 <i>Descriptive Analysis</i>	56
4.4 Hypotheses Testing	58
4.4.1 <i>Correlation Analysis</i>	58
4.4.2 <i>Multiple Regression 1 (Stage 1)</i>	58
4.4.3 <i>Multiple Regression 2 (Stage 2)</i>	61
4.4.4 <i>Multiple Regression 3 (Stage 3)</i>	63
4.4.5 <i>Multiple Regression 4 (Stage 4)</i>	64
4.4.6 <i>Multiple Regression 5 (Stage 5)</i>	66
4.4.7 <i>Multiple Regression 6 (Stage 6)</i>	67
4.4.8 <i>Multiple Regression 7 (Stage 7)</i>	69
4.4.9 <i>Multiple Regression 8 (Stage 8)</i>	69
4.5 Summary of Results	71

Chapter 5: DISCUSSION AND CONCLUSION	74
5.1 Introduction	74
5.2 Recapitulation of the Study	74
5.3 Discussions of Major Findings	75
5.4 Implications	80
5.4.1 <i>Theoretical Implications</i>	80
5.4.2 <i>Managerial Implications</i>	81
5.5 Limitations	82
5.6 Future Research	83
5.7 Conclusion	84
REFERENCES	86
APPENDIX A: QUESTIONNAIRE	97
APPENDIX B: FREQUENCY TABLES	104
APPENDIX C: INTERNET USAGE PROFILE	108
APPENDIX D: RELIABILITY ANALYSIS	109
APPENDIX E: DESCRIPTIVE STATISTICS	123
APPENDIX F: CORRELATION STATISTICS	124
APPENDIX G: MULTIPLE REGRESSION 1 (STAGE 1)	128
APPENDIX H: MULTIPLE REGRESSION 2 (STAGE 2)	133
APPENDIX I: MULTIPLE REGRESSION 3 (STAGE 3)	138
APPENDIX J: MULTIPLE REGRESSION 4 (STAGE 4)	142
APPENDIX K: MULTIPLE REGRESSION 5 (STAGE 5)	146
APPENDIX L: MULTIPLE REGRESSION 6 (STAGE 6)	149
APPENDIX M: MULTIPLE REGRESSION 7 (STAGE 7)	152
APPENDIX N: MULTIPLE REGRESSION 8 (STAGE 8)	155

LIST OF TABLES

<u>Table</u>	<u>Description</u>	<u>Page</u>
Table 1.1	Commissions and Level of Service for Different Groups of Brokers	4
Table 1.2	Commissions by Web-Based Brokers	5
Table 2.1	Technology Acceptance Studies in Malaysia	12
Table 4.1	Profile of the Respondents	53
Table 4.2	Internet Usage Profile	54
Table 4.3	Cronbach's Alpha Score	55
Table 4.4	Overall Descriptive Statistics of the Study Variables	57
Table 4.5	Result of Multiple Regression 1 (Stage 1)	60
Table 4.6	Result of Multiple Regression 2 (Stage 2)	62
Table 4.7	Result of Multiple Regression 3 (Stage 3)	63
Table 4.8	Result of Multiple Regression 4 (Stage 4)	65
Table 4.9	Result of Multiple Regression 5 (Stage 5)	67
Table 4.10	Result of Multiple Regression 6 (Stage 6)	68
Table 4.11	Result of Multiple Regression 7 (Stage 7)	69
Table 4.12	Result of Multiple Regression 8 (Stage 8)	70
Table 4.13	Results of the Tested Hypotheses	71

LIST OF FIGURES

<u>Figure</u>	<u>Description</u>	<u>Page</u>
Figure 1.1	Order Flow Diagram for Online Stock Trading Source: Bursa Malaysia	7
Figure 1.2	Internet Stock Trading in Malaysia Source: CIMB (i-Trade)	7
Figure 2.1	Theory of Planned Behavior Source: Ajzen (1985, 1991, 2002)	23
Figure 2.2	Integrated Theory of Planned Behavior Source: Chau and Hu (2002)	24
Figure 2.3	Technology Acceptance Model Source: Davis et al (1989)	25
Figure 2.4	Decomposed Theory of Planned Behavior Source: Taylor and Todd (1995)	26
Figure 2.5	Research Model Integrated Decomposed Theory of Planned Behavior Based: Decomposed Theory of Planned Behavior	27
Figure 4.1	Result of Multiple Regression 1 (Stage 1)	60
Figure 4.2	Result of Multiple Regression 2 (Stage 2)	62
Figure 4.3	Result of Multiple Regression 3 (Stage 3)	64
Figure 4.4	Result of Multiple Regression 4 (Stage 4)	65
Figure 4.5	Result of Multiple Regression 5 (Stage 5)	67
Figure 4.6	Result of Multiple Regression 6 (Stage 6)	68
Figure 4.7	The Revised Theoretical Framework	73

ABSTRAK

Kajian ini adalah kajian explorasi mengenai penerimaan transaksi saham menggunakan Internet di Pulau Pinang. Dengan berlakunya liberasi yang tidak dapat dielakkan, Internet telah menjadi medium transaksi di dalam semua aspek kehidupan manusia. Kajian ini adalah kajian tentang faktor-faktor yang mempengaruhi keinginan pengguna untuk menggunakan transaksi saham melalui Internet. Model yang digunakan di dalam kajian ini adalah “integrated Decomposed Theory of Planned Behavior (IDTPB)”. Dan sebagai analisis tambahan, perbandingan telah dibuat antara model yang di kaji dengan model keinginan lain (TAM, TPB, DTPB dan ITPB). Kertas soal selidik yang berstruktur telah digunakan untuk mengumpul data daripada 144 individu. Daripada analisis didapati bahawa sikap, norma subjektif, norma deskriptif, tanggapan kawalan perlakuan dan tanggapan kebergunaan mempunyai kesan positif terhadap keinginan penggunaan. Faktor-faktor huraian, keadaan pelengkap (sumber, teknologi dan latihan dan bantuan tambahan) dan tanggapan kebolehan berkomputer juga mempunyai kesan positif terhadap tanggapan kawalan perlakuan. Norma deskriptif dan norma injunktif juga dikenalpasti mempunyai kesan positif terhadap norma subjektif. Tanggapan kebergunaan dan tanggapan kesenangan untuk menggunakan juga mempunyai kesan positif terhadap sikap. Selain daripada ini kesan positif juga wujud di antara tanggapan kebolehan berkomputer terhadap tanggapan kesenangan untuk menggunakan dan tanggapan kesenangan menggunakan terhadap tanggapan kebergunaan. Akhirnya dengan membandingkan kuasa penjelasan di

antara model-model keinginan (TAM, TPB, DTPB dan ITPB) dengan model yang dikaji, didapati model yang di kaji mempunyai kuasa penjelasan yang lebih baik.

ABSTRACT

This study is an exploratory study on Internet stock trading adoption in Penang. With the unavoidable liberalization, Internet has been used as a medium of transaction in almost all aspect of human lives. The study is investigating the factors that influence the behavior intention of adopting Internet stock trading. The model that was applied in the study is the integrated Decomposed Theory of Planned behavior (IDTPB). And as a further analysis the studied model was compared to other intention based model (TAM, TPB, DTPB and ITPB). Structured questionnaire was used to collect data with 144 respondents participating in the study. The result of analysis showed attitude, subjective norm, perceived behavioral control, descriptive norm and perceived usefulness have a direct significant positive relationship towards behavioral intention. The decomposed variable facilitating condition (resource, technology and training and provision support) and computer self-efficacy were identified to have a direct positive relationship towards perceived behavioral control. Descriptive norm and injunctive norm also identified to have direct positive relationship towards subjective norm. Perceived usefulness and perceived ease of use also have a direct positive relationship towards attitude. Apart from that there is also positive relationship between computer self-efficacy towards perceived ease of use, and perceived ease of use towards perceived usefulness. Finally in comparing the explanatory power of all the intention based model (TAM, TPB, DTPB, and ITPB) with the studied model it is found that the studied model (IDTPB) has a better explanatory power.

Chapter 1

INTRODUCTION

1.1 Introduction: Overview of Online Stock Trading

Internet, the new medium that has emerged as a result of convergence between telecommunication and computers, is revolutionizing the way business is done and is making inroads into every conceivable area of business activity. The potential of Internet is no longer a matter of debate. Every known forecast has been proven wrong, with actual advantages far exceeding the disadvantages. Dubbed as “Golden Age of the Internet” (Farrell, 1999). Internet has changed the way we view the world. The way we live, work and perceive has increased in velocity and volume with the emergence of the Internet. Political and social borders have been breached and Internet is not just the exclusivity of the know-how or the brains of the society.

The advent of Internet, has radically transformed the offering of online financial services by the banks and financial firms. The natural extension of e-commerce in the securities market is Internet based stock trading and securities services and it has made a great impact on the securities trading business. Issuers of securities, intermediaries, service providers and investors are increasingly selling and dealing or providing securities services on the Internet. Investors would now be able to acquire or sell shares or stocks from anywhere by just using Internet-based order submission protocols. Real-time stock prices and monitoring, portfolio management, various kind of financial planning and information and open for 24 hours a day are just a few offerings that can be accessed by using a Web-based interface.

When K. Aufhauser & Co. executed with little excitement from the public the first stock trade over the Internet (Gasparino & Buckman, 1999), online stock trading was regarded as a curiosity or a small niche by most of the traditional firms in the Wall Street when it appeared in 1994. Far from the curiosity or small niche, it has led to the revolutionizing of securities-market. A new generation of investors has emerged from the revolution attracted by the surging of Internet, low cost trade, higher service quality, prompt information and the power having control of their financial fate, took to cyberspace to buy and sell stocks.


Brokerages offering online stock trading facility are one of few businesses that have gained many new customers during the dot-com expansion. “Day Trader” (Coyner, 2000) as they are called, turns out to be housewives, student and people working in large corporations who have Internet readily available are the biggest customers of online stock trading. With additional convenience and instantaneous transactions offered through net trading, privacy and absence of middlemen between the investors and the stock exchange, it is predicted that the online stock trading would scale even higher in the future.

With the increased offering of various financial products from brokerages firm and financial houses, the brokers has been classified into various groups according to the offering, services and price per trades. There are typically three groups: ***Full service brokers, discount brokers, and deep-discount brokers.*** (Source: Chapter 2, Finance 350, University of Kentucky - Gatton College of Business and Economics)

- (a) **Full service investment brokers** provide many services, including investment advice, research services, account management, and personal service. This type of brokerage will actually give investors advice as to what type of stocks, bonds, and commodities to buy, when to buy and when to sell. A full service broker may offer financial planning, tax shelters or advise of new stock issues. They can even buy and sell on the investors behalf. Commission will be higher than a discount broker. In addition to telephone and web access, investors can usually visit full service brokerage offices. Full service brokers charge the highest fees.
- (b) **Discount brokers** typically provide more services than the deep discount brokers but fewer than the full service brokers. The discount stockbroker executes stock trades, at the customer's direction, at a commission rate that is lower than the full service stockbroker. On-line stockbrokers are discount brokers, but many now offer "full service". The trader is responsible for his/ her own transactions. Sometimes called a "silent" broker service, this service will answer questions about transactions, and advise on the actual order, but not on which stock to buy or when. Discount brokers also provide telephone and on-line trading.
- (c) A **deep-discount broker** provides minimal services, normally just account maintenance and order execution (buying and selling). Investors usually contact the deep discount broker on the telephone or over the web. The brokerage commissions are lowest for deep discount brokers.

Table 1.1

Commissions and Level of Service for Different Groups of Brokers

# of shares (\$50/share)	Commissions			Level of Service
	200	500	1000	
<i>Full-Service Brokers</i> A.G. Edwards Merrill Lynch	\$150	\$200	\$300	<i>Provides extensive investment advice</i> 
<i>Discount Brokers</i> Charles Schwab Fidelity Brokerage	\$100	\$125	\$150	
<i>Deep-Discount Brokers</i> Olde Discount Quick & Reilly	\$50	\$75	\$100	
				<i>Maintains account and executes buy/sell orders only</i>

Source: Chapter 2, Finance 350, University of Kentucky - Gatton College of Business and Economics

With increased competition, the lines are beginning to blur between the three types of brokers. Discount and deep discount brokers are beginning to offer more services and full service brokers are offering discounts for some types of accounts.

Online Brokers

The most dramatic change in the brokerage industry is the growth of online or web-based brokers. With online brokers you place orders over the Internet using a web browser (Netscape or Internet Explorer). Online trading in the current time has been growing exponentially. The commissions are usually much lower, sometimes as low as \$7 (USD) per trade. Online brokers are able to charge less because it is less expensive and more efficient to handle orders electronically. Services provided vary, usually related to cost, from "no-frills" to many services, including: research, account

management, banking services, credit cards, etc. Online brokerages will probably become the dominant form of trading because of the low commissions and convenience.

Table 1.2

Commissions by Web-Based Brokers

<i>Broker</i>		<i>Commission for Simple Trade</i>
Charles Schwab	http://www.schwab.com	\$29.95, up to 1000 shares
Fidelity Investments	http://www.fidelity.com	\$25, up to 1000 shares
CSFBdirect	http://www.csfbdirect.com	\$20, up to 1000 shares
E*Trade	http://www.etrade.com	\$19.99, up to 5000 shares
TD Waterhouse	http://www.tdwaterhouse.com	\$17.95, up to 5000 shares
Ameritrade	http://www.ameritrade.com	\$10.99, no share limits
Scottrade	http://www.scottrade.com	\$7, market orders

Source: Chapter 2, Finance 350, University of Kentucky - Gatton College of Business and Economics

1.2 Online Stock Trading In Malaysia

Online stock trading was embraced in Malaysia on 1995, whereby the Kuala Lumpur Stock Exchange (KLSE) or currently known as Bursa Malaysia launched the Electronic Client Ordering System (ECOS). ECOS is an electronic means for stock broking firms to route orders from clients through proprietary or open system to the Malaysian stock exchange. A proprietary system is a system whereby the users can dial up into the stockbroker's intranet to convey the transactions that need to be done. However the concept of online trading was not well received as there were only few stock broking firms that offered online trading services. As for some firms, they have upgraded their proprietary to Internet links so as to provide investors with the ability

to check their investments through their personal computers or a WAP enabled handheld.

Online stock trading in Malaysia is not an open a system as that which is being practiced in foreign countries or as a matter of fact of that which is being used in Singapore. Online stock trading in Malaysia can only be done through remisiers. Remisiers are licensed representatives comprising paid representatives or commissioned ones. Unlike in most of the countries that provides online stock trading, in Malaysia orders that are keyed in are not conveyed directly to the exchanges but goes through broker's front-end (BFE) system.

Orders that are sent to a broker through online will be routed to the KLSE System on Computerized Order Routing and Execution (WinSCORE) through the BFE system. It is at the SCORE where the orders will be matched. If the bid and ask price are in the right amount the orders will be matched, and the delivery of both the payment and securities will be cleared through the Security Clearing Automated Network Systems (SCANS). The order flow diagram of online stock trading in Malaysia is presented in Figure 1.1 and 1.2.

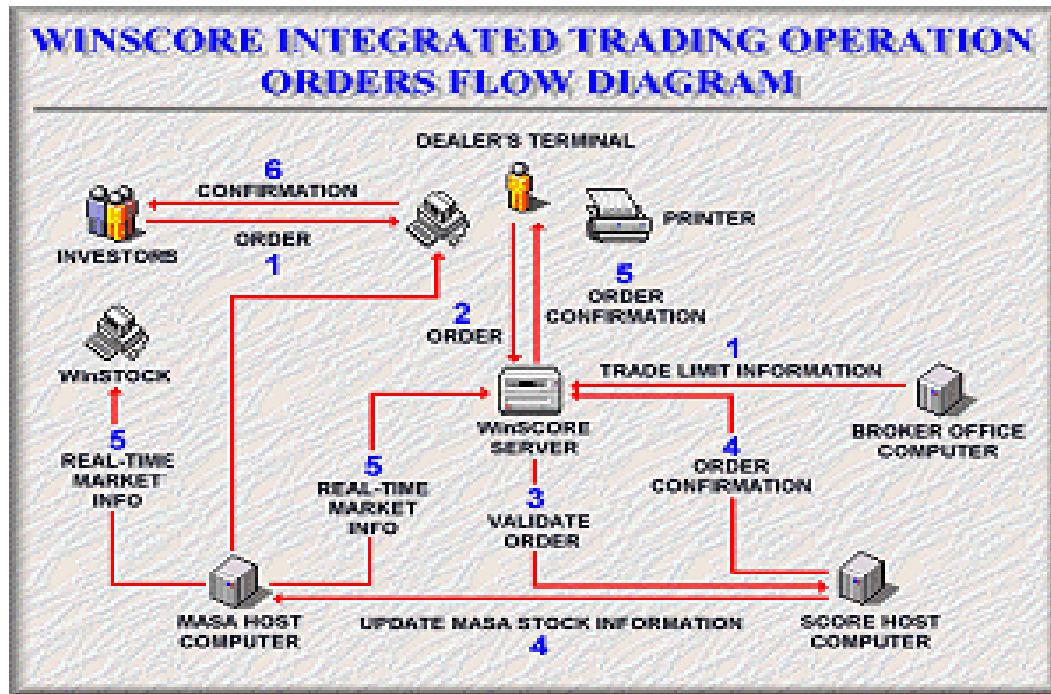


Figure 1.1. Order Flow Diagram for Online Stock Trading
Source: Bursa Malaysia

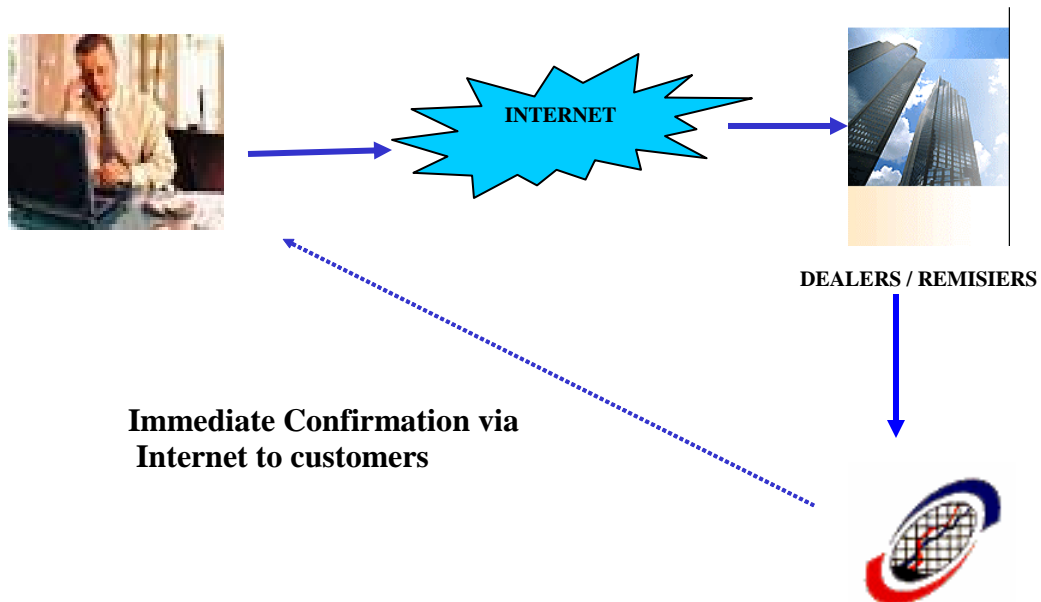


Figure 1.2. Internet Stock Trading in Malaysia
Source: CIMB (i-Trade)

1.3 Problem Statement

With the availability of online stock trading in Malaysia for the past 10 years, it has not yet to take off in a big way among local retail investors. In a recent report (Sani, 2005), only two percent of the total retail securities trading in Malaysian Stock Exchange comes through the Internet. This is a poor comparison with other countries in the Asia Pacific region as South Korea and Japan where the Internet stock trading constitutes of around 80 percent of the total retail securities. Even comparing to our closest neighbors like Singapore and Hong Kong whose total turnover on the respective stock exchange done through online is around eight to ten percent.

1.4 Research Objectives

The study focuses on two main areas as follows

1. To examine the factors that are affecting investor's intention to use online stock trading.
2. To evaluate which intention based model (i) Technology Acceptance Model (TAM), (ii) Theory of Planned Behavior (TPB) and the Decomposed Theory of Planned Behavior (DTPB), (iii) Integrated Theory of Planned Behavior (ITPB) and (iv) Integrated Decomposed Theory of Planned Behavior (IDTPB), better explains in understanding intention to use IT innovation by investors.

1.5 Research Question

The study attempts to answer the following questions:

- (1) What are the factors that influence and affect investor's intention to use online stock trading?
- (2) Among the intention-based model (i) Technology Acceptance Model (TAM), (ii) Theory of Planned Behavior (TPB) and the Decomposed Theory of Planned Behavior (DTPB), (iii) Integrated Theory of Planned Behavior (ITPB) and (iv) Integrated Decomposed Theory of Planned Behavior (IDTPB), which model better explains explains in understanding intention to use IT innovation by investors.?

1.6 Significance of Study

Today with the exponential advancement of technology, IT has become the driving force that influences the structure and strategies that are being employed by organizations. Importance of speed and convenience by consumers has made organizations to make various online offerings such as online share trading. With the increase in online offerings, the need to predict behavioral intentions of consumers has also increased .

This study will provide clues and information on factors that are influence and affect investor's intent to use online stock trading. In addition the result of the study could serve as a guideline by online stock broking organizations in understanding the factors and program that need to be instilled to increase online stock trading among current retail investors and future investors.

1.7 Organizations of Remaining Chapters

This thesis comprise of five chapters. We started with the chapter's introduction. Chapter 2 encompasses the review of literature, the development of theoretical framework and hypothesis. Methodology of research will be covered in chapter 3. Chapter 4 presents the result of the statistical data analysis. And finally chapter 5 will present the research findings discussion, and the implication of the study, in addition limitations of the study and suggestions for the future research are also provided.

Chapter 2

LITERATURE REVIEW

2.0 Theoretical background and research model

The theoretical model that is employed in this research is based on Theory of Planned Behavior (TPB) (Ajzen, 1991), Technology Acceptance Model (TAM) (Davis, 1986, 1989, 1993; Davis et al., 1989) and the Decomposed Theory of Planned Behavior (DTPB) (Taylor & Todd, 1995). This study is established in answering two issues; first, what are the factors that effect investor's intention to use the internet as a medium for stock trading and secondly, between TAM, TPB, DTPB, integrated TPB (ITPB) and the studied model of integrated DTPB (IDTPB), which model does better explain the intention to use of Internet as a medium in stock trading.

Before starting of with the literature review, the table below presents the technology acceptance studies that has been conducted in Malaysia. From the table, there are few studies done in comparing the predictive power of competing model. Especially there is lack of studies done on comparing the IDTPB with other intention based model (TAM, TRA, TPB, DTPB and ITPB). There is also lack of studies in Malaysia conducted using DTPB and lack of studies as well on Internet stock trading. This research indicates the originality of the model of study and the topic of research.

Table 2.1

Technology Acceptance Studies in Malaysia

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Zain, Che Rose, Adbullah & Masrom (2003)	Malaysia	Manufacturing firms in Malaysia	TAM	Structural equation modeling techniques.	Actual system or technology usage had the strongest direct effect on organizational agility. Perceived usefulness and perceived ease of use of IT influenced organizational agility indirectly through actual systems or technology use and attitudes towards using the technology.
Guriting & Ndubisi. (2006)	Malaysia	Banks in Malaysia Borneo.	TAM	Factor analysis, reliability and validity assessment.	Perceived usefulness and perceived ease of use are strong determinants of behavioural intention to adopt online banking. Also an indirect effect of computer self-efficacy and prior general computing experience on behavioural intention through perceived usefulness and perceived ease of use.
Ndubisi, Gupta & Ndubisi. (2005)	Malaysia	Malaysian entrepreneur	TAM	Pearson correlation between alternative dimensions of perceived quality, factor analysis, reliability and validity assessment.	Perceived usefulness has strong influence on entrepreneurs' system usage. Perceived ease of use has no direct relationship with usage, but only an indirect relationship via perceived usefulness. Innovativeness moderates the relationship between ease of use and usefulness; perseverance and flexibility moderate the impact of perceived usefulness on usage.

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Ndubisi & Jantan (2003)	Malaysia	Malaysian small and medium firms	TAM.	Factor analysis, reliability and Hierarchical multiple regression model.	Positive relationship between computing skill and technical backing on one hand and IS usage directly, and indirectly via perceived usefulness and ease of use on the other. Usage is influenced directly by usefulness and indirectly (via usefulness) by ease of use.
Ndubisi & Chukwunonso (2004)	Malaysia	Students	Comparing TAM and TPB	Multiple Regression Analysis and Reliability.	Both TAM and TPB predict e-learning adoption intention well, although the predictive power of TAM is more robust than TPB
Ndubisi & Sinti. (2006)	Malaysia	Bank customer in Malaysia.	Research framework links attitudinal constructs such as importance of IB to customers' banking needs, compatibility, complexity, trialability, and risk to Internet banking adoption.	Pearson correlation between alternative dimensions of perceived quality, factor analysis, reliability and validity assessment.	The attitudinal factors play a significant role in Internet banking adoption. Utilitarian orientation of the Web site rather than hedonic orientation has significant influence on adoption.
Jantan, Ramayah & Wah (2001)	Malaysia	SMI	TAM	Multiple Regression Analysis	Perceived ease of use and perceived usefulness have positive direct influence on system acceptance. Perceived usefulness was also found to have intervening effect on perceived ease of use and system acceptance; management support was found to be a determinant and have positive direct influence on both perceived ease of use and perceived usefulness; and external computing support was found to have a positive direct influence on perceive ease of use only

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Ramayah, Noor, Nasurdin & Choo (2002)	Malaysia	Credit card holders	MAA	Discriminant analysis.	Acceptance level, credit limit, interest free repayment period, ancillary functions, handling of cardholders' complaints, bank image, and bank advertising were found to be the most important attributes that influenced cardholders' attitudes in distinguishing active from inactive cardholders
Ramayah, Jantan, Noor, Razak & Ling (2003)	Malaysia	Individuals.	TAM	Multiple Regression Analysis. Hierarchical multiple regression model. Non-Parametric Tests	Security, availability of infrastructure and complexity of technology were main concerns reported by the respondents which is hindering the migration from traditional banking to Internet banking. In terms of external variables only prior experience and external pressure has been found influencing the intention to use. Perceived ease of use and perceived usefulness has been found to be significantly related to intention and perceived usefulness has been found to be a better predictor of intention to use compared to ease of use.
Ramayah, Nasurdin, Noor & Hasan (2003)	Malaysia	Students	TRA	Multiple regression analysis and Discriminant analysis.	Intention influenced by attitude toward the behavior and the subjective social norms

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Ramayah, Zainuddin & Youn (2003)	Malaysia	Individuals who work in the organizations	TAM.	Multiple regression analysis. Correlation analysis	Perceived usefulness has direct effect on Internet usage. Computer experience and organizational support have direct impact on self-efficacy and Internet usage. Organizational support has direct impact on perceived usefulness. Self-efficacy has direct impact on perceived usefulness and perceived ease of use of Internet usage. Perceived usefulness was found to partially mediate the relationship between computer experience and organizational support with internet usage
Ramayah, Dahlan, Teck & Aafaqi (2003)	Malaysia	Individuals who has Internet access	Perceived Web Security, Perceived Privacy Loss, Perceived Usefulness and Perceived Ease of Use towards Intention	Factor analysis, Reliability and Multiple regression analysis	Perceived Web security, perceived usefulness and perceived ease of use have direct positive effects on Web-based online transaction intent. Whereas, perceived privacy loss and perceived unauthorized tracking have direct negative impact
Ramayah, Aafaqi & Ignatius. (2004)	Malaysia	Students.	An augmented TAM was used as research model and self-efficacy was incorporated in the research model as an external variable affecting PU and PEU	Factor analysis, and Multiple regression analysis	Self-efficacy, perceived ease of use and perceived usefulness have direct significant impact on e-library usage. Perceived ease of use fully mediates self-efficacy when explaining e-library usage and perceived usefulness fully mediates perceived ease of use when predicting e-library usage.

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Ramayah, Nasurdin, Noor & Sin (2004)	Malaysia	Pregnant women	TRA	Reliability, Multiple regression and Discriminant analysis.	Subjective norm component had a higher predictive power than the attitudinal component. Parents or relatives and doctors were found to be more influential. Intention to choose an infant formula was also influenced by family income. For premium infant formula, brand trusted, closest to breast milk and nutrients content were identified as the dominant attributes. In contrast, availability, affordable, and nutrients content were identified as the prime beliefs in evaluating economic infant formula.
Ramayah & Ignatius (2005)	Malaysia	Internet users	Relationship of Perceived usefulness, Perceived Ease of Use and Perceived Enjoyment towards Intention	Factor analysis, Reliability and Correlation analysis.	Perceived ease of use and perceived enjoyment were positively related to intention to shop online
Ramayah, Ling, Suki & Ibrahim (2005)	Malaysia	MBA students	TAM 2	Reliability, Correlation and Multiple regression analysis.	Perceived ease of use and perceived usefulness are the significant drivers of intention to use the online bill payment system. Subjective norm, image, result demonstrability and perceived ease of use were also found to be the key determinants of perceived usefulness whereas perceived risk was found to be negatively related to usefulness..

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Ramayah (2005)	Malaysia	MBA students	Relationship of Interface characteristic, Organizational context, and Individual Differences towards Perceived Ease of USE	Correlation and Multiple regression analysis	Interface characteristics such as terminology, screen design, and, navigation were the most influential predictors of ease of use, followed by organizational context, relevance of the system and accessibility. Individual differences such as computer self efficacy, computer experience were not significant with only domain knowledge, being a predictor of ease of use.
Ramayah, Aafaqi & Ignatius (2005)	Malaysia	Students	TAM	Multiple Regression Analysis	Usefulness and ease of use of the course website exerts significant impact on the usage of the website by the students. Perceived ease of use influenced perceived usefulness of the course website and perceived usefulness also partially mediated the impact of perceived ease of use on usage. In the case of mandated use such as this, perceived ease of use was more influential in determining usage as compared with perceived usefulness.
Ramayah, Jantan, Mohamad & Ma'aruf (2002)	Malaysia	Bank Customers	TAM	Factor Analysis and Hierarchical multiple regression analysis.	TAM model is more useful in predicting intention to use among users. Intention to use can be explained by perceived usefulness and perceived ease of use

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Ma'ruf, Mohamad & Ramayah (2003)	Malaysia	Internet users from Malaysia, Indonesia and Singapore.	Comparison between TAM (perceived ease of use, perceived usefulness and attitude) and TPB (attitude, subjective norm and perceived risk)	Factor analysis, Reliability and Hierarchical multiple regression analysis.	TPB is better than TAM in explaining behavioral intention to purchase. The integrated TAM and TPB, results that perceived risk is the primary determinant of behavioral intention to purchase, with subjective norm as the significant secondary determinant, followed by attitude towards purchase, perceived usefulness, and perceived ease of use.
Aafaqi, Jantan & Ramayah (2003)	Malaysia	Students	TAM	Multiple Regression Analysis, Correlation Analysis and Z-statistics	TAM constructs changes over time.
Ramayah, Ignatius & Aafaqi (2004)	Malaysia	Student	TAM	Factor analysis, Reliability and Multiple regression analysis.	Perceived ease of use (PEU) influences the perceived usefulness (PU) with PU more significant when students engage in basic tasks whereas PEU was more influential when the students engage in advanced tasks
Ramayah, Aafaqi, Ignatius & Leen (2004)	Malaysia	Students	TAM.	Factor analysis, and Multiple regression analysis.	The results of the study suggest perceived ease of use and perceived usefulness are positively related to e-library usage. The results also indicate that perceived usefulness fully mediates perceived ease of use when predicting e-library usage

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Eri & Ramayah (2005)	Malaysia	Students	TAM	Reliability and Multiple regression analysis	PEU is positively related to PU. PEU and PU were positively related to attitude with PU being more dominant. Attitude was also positively related to intention to shop online. Attitude was found to fully mediate the relationship between PU and intention but only partially mediating the relationship between PEU and intention.
Ramayah & Suki. (2005)	Malaysia	Students	Integration of TAM and TPB	Factor analysis, Reliability, Correlation and Multiple regression analysis.	The findings indicate that the TRA and TAM are valid models in the prediction on the intention to shop online. Attitude, subjective norm, perceived usefulness and perceived ease of use were found to be positively related to intention with attitude being the more influential predictor. TRA was found to have a slightly better predictive as compared to the TAM
May (2005)	Malaysia	Individuals	Comparison between TAM, TPB, and TRA	Factor analysis, Reliability, Correlation and Multiple regression analysis.	TRA has better explanatory power than TAM and TPB. Attitude, subjective norm, perceived behavioral control, perceived usefulness and perceived ease of use have direct positive effect on intention.

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Ndubisi. (1998)	Malaysia	Top Management of Organization	Relationship of Attitude towards adoption of teleworking moderated by availability of IT infrastructure , Need for teleworking in job performance, Nature of work, organization design, management style, transportation factors, present usage and workforce limitation.	Multiple Regression Analysis, Reliability, One-way Anova, and T-Test	Attitude has a direct relation towards Adoption, moderator by availability of IT infrastructure, Frequent usage, Need for teleworking and level of physical presence demanded by job
Basyir (2000)	Malaysia	Internet users.	TAM with prior experience, shopping orientation and demographic as external factors.	Multiple Regression Analysis and Reliability	Perceived usefulness has strong influence on intention to shop online. Perceived ease of use, direct shopping preference and prior web experience have significant impact on perceived usefulness and intention. Prior web experience has a direct relation towards perceived ease of use.
Youn (2001)	Malaysia	Individuals	TAM with computer experience, self-efficacy and organizational support as external factors.	Reliability, Correlation and Multiple regression analysis.	Perceived usefulness has strong influence on usage. Computer experience and organization support has direct impact on self-efficacy. Perceived ease of use has direct relationship with usage. Organization support has a direct impact on perceived usefulness.
Beng (2001)	Malaysia	Individuals	TRA	Multiple Regression Analysis, Reliability and Discriminant Analysis	Close friend factor of normative belief to be more influential toward intention. Convenience, trusted operator and flexible game and risk of attitudinal belief to be influential towards intention

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Leong (2001)	Malaysia	Individuals	TAM with Information quality, Response time and system accesability as external variable	Reliability, Correlation, T-Test and Multiple regression analysis.	Perceived usefulness has a direct relationship towards intention more compared to perceived enjoyment. Perceived ease of use has a direct relationship towards perceived usefulness and perceived enjoyment. Also information quality is important determinant Internet usage intention.
Ling (2002)	Malaysia	Individuals	TAM with prior experience, volume transaction, training and external pressure as external variable	Non-Parametric test, Reliability and Multiple regression analysis.	Perceived usefulness and perceived ease of use has a direct impact on intention. Prior experience has significant impact on intention. Meanwhile external factors partially mediated by perceived usefulness and perceived ease of use. Prior experience , volume of transaction and external pressure have significant impact on perceived usefulness. And prior experience has significant effect on perceived ease of use.
Aafaqi (2003)	Malaysia	Students	Relationship of sense-making towards TAM	Reliability, T-Test, Non-parametric test, Z-statistics and Hierarchical multiple regression analysis.	Sense-making influence individual construct of TAM. No moderation effect on TAM by sense-making. Sense-making act as an external variable which influence TAM.

Author(s)	Research Setting(s)	Study Sample(s)	Instrument/ Models	Analysis	Factor structure or other key finding(s)
Han (2003)	Malaysia	Individuals	Perceived Innovation Characteristic	Factor analysis, Correlation and Multiple regression analysis.	Relative advantage, compatibility, visibility (attribute of Perceived Innovation Characteristic) that influence adoption intent.
Shuib. (2003)	Malaysia	Internet Users.	TAM with perceived web security and perceived privacy loss moderating relationship between perceived usefulness and perceived ease of use towards intention.	Factor analysis, Reliability and Multiple regression analysis.	Perceived ease of use negatively influence intention. Perceived ease of use has a direct influence on perceived usefulness. Perceived web security and perceived privacy loss moderate the relationship between perceived usefulness and intention.
Karuna (2004)	Malaysia	Individuals	MAA	Reliability and Discriminant analysis.	All the attribute in the study have distinguished active and in active users. Perceived risk, annual fee, convenience and marketing and promotion were important attributes that distinguished active and inactive users. And attitude has significant effect on usage.
Lee (2004)	Malaysia	Individuals	TPB with decomposing of attitude into usefulness, ease of use, compatibility , privacy and security.	Reliability and Multiple regression model.	Usefulness, ease of use, compatibility and security has a direct impact on attitude. And attitude, normative belief and self-efficacy has direct significant relationship towards intention
Eri (2004)	Malaysia	Degree holders	TPB	Reliability, Correlation, Multiple Regression Analysis and Hierarchical multiple regression analysis	Triability, result demonstrability, normative belief, cost and ease of use has a significant impact on intention. Attitude and normative belief and control belief also has a direct impact on intention

2.1 Theory of Planned Behavior (TPB) and Integrated Theory of Planned Behavior (ITPB)

The TPB (Ajzen, 1991) was established to answer the limitation of Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). TPB deals with behavior where individual have incomplete faculty of using one's will or situation in where they have incomplete control of their behavior (Ajzen, 1985, 1991, 2002). An extension of TRA, TPB is the function of attitude towards the behavior, social factor called subjective norm and the degree of perceived behavioral control (Ajzen, 1985, 1991, 2002). Perceived behavioral control is the additional construct that was added to solve the limitations in TRA (Ajzen, 1985, 1991, 2002). The TPB model developed by Ajzen (1985) is shown in Figure 2.1.

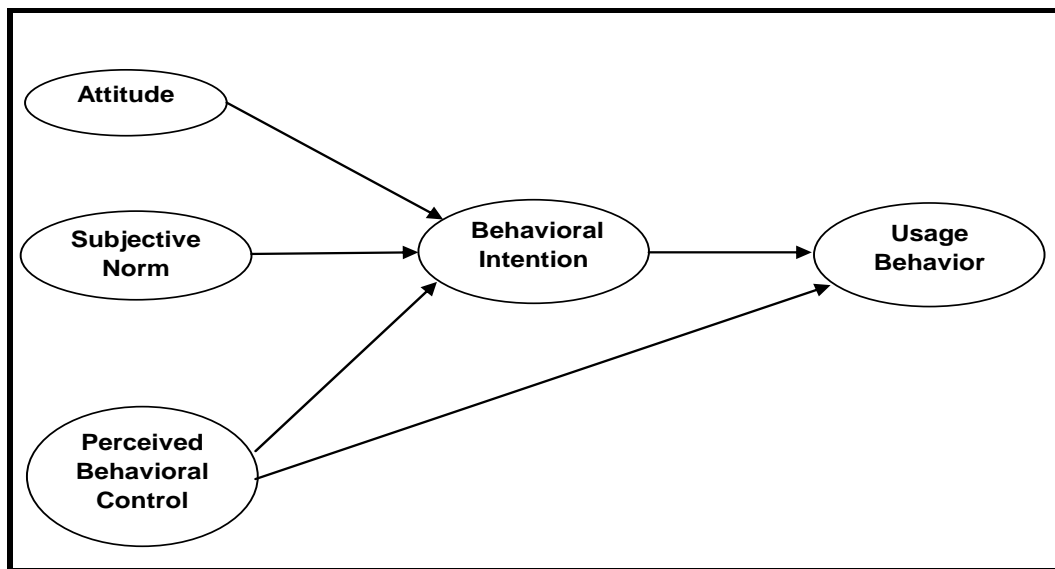


Figure 2.1. Theory of Planned Behavior
Source: Ajzen, 1985, 1991, 2002

The integrated Theory of Planned Behavior (ITPB) (Chau & Hu, 2002) is integration between TAM and the TBP. This model posits that the antecedents of behavior are attitude, subjective norm, perceived behavioral control and perceived usefulness. The ITPB model developed by Chau & Hu (2002) is shown in Figure 2.2.

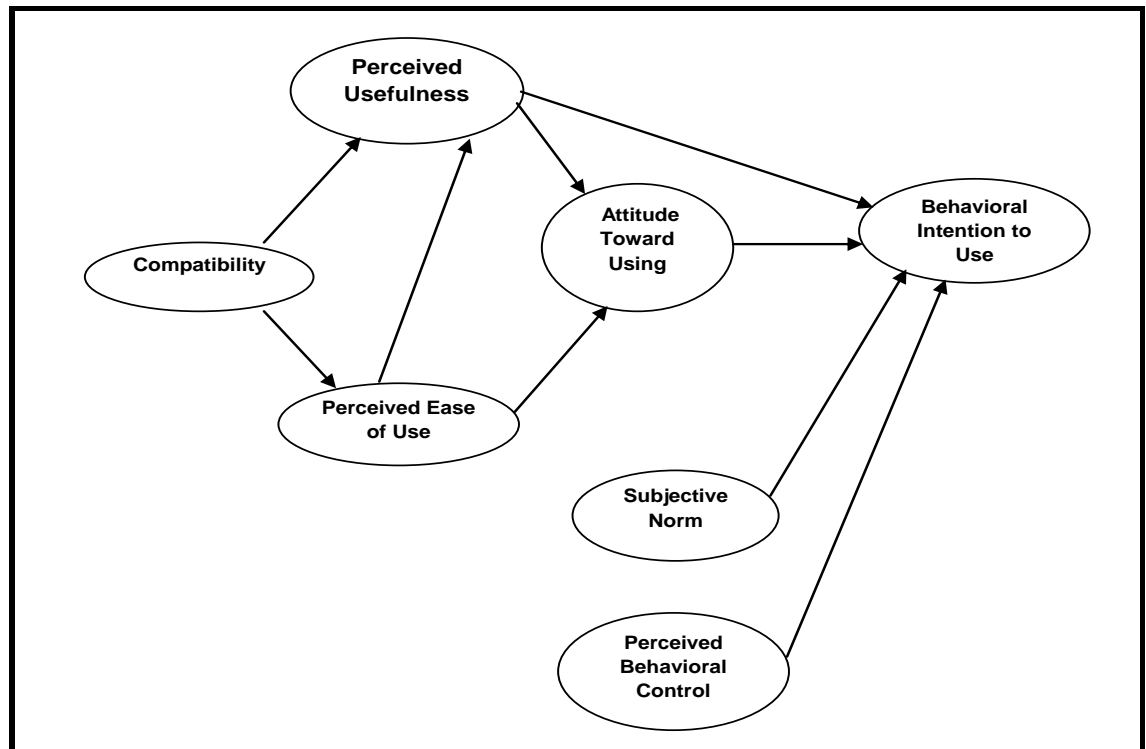


Figure 2.2. Integrated Theory of Planned Behavior
Source: Chau and Hu, 2002

2.2 Technology Acceptance Model (TAM)

TAM introduced by Davis (1986) is an adapted model from TRA (Fishbein & Ajzen, 1975) which postulates the determinants of attitude is based on two beliefs which is perceived usefulness and perceived ease of use (Davis, 1986, 1989; Davis et al., 1989). Subsequently the formation of intention as an antecedent of behavior is a function of perceived usefulness and attitude (Davis, 1986, 1989; Davis et al., 1989).