Examining a Technology Acceptance Model of Internet Usage by Academics within Thai Business Schools

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DECLARATION

I, Napaporn Kripanont, declare that the PhD thesis entitled “Examining a Technology Acceptance Model of Internet Usage by Academics within Thai Business Schools” is no more than 100,000 words in length, exclusive of tables, figures, appendices, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Napaporn Kripanont……………………………… Date……………March 2007

ABSTRACT

Information Technology has been a significant research area for some time, but its nature has changed considerably since the Internet became prominent just over a decade ago. Many researchers have studied and proposed theories and models of technology acceptance in order to predict and explain user behaviour with technology to account for rapid change in both technologies and their environments. Each theory or model has been proposed with different sets of determinants and moderators and most of them have been developed in the U.S. It is therefore questioned whether the theories and models of technology acceptance that have been developed, modified, and extended in the U.S. can be used in other countries, especially in Thailand. It is also questioned whether there might be other determinants and moderators that also play important roles in this specific environment.

This thesis (1) reviewed literature in respect of nine prominent theories and models, (2) reviewed previous literature about IT acceptance and usage within four contexts of study, (3) investigated the extent to which academics use and intend to use the Internet in their work, (4) investigated how to motivate academics to make full use of the Internet in their work, (5) investigated to what extent using the Internet helps in improving academics' professional practice, professional development and quality of working life, (6) formulated a research model of technology acceptance regarding Internet usage by Thai academics, and (7) generated and validated the research model that best describes Thai academics' Internet usage behaviour and behaviour intention. These last two objectives represent the main focus of the thesis.

Questionnaire survey method was used to collect primary data from 927 academics within Business Schools in 20 Public Universities in Thailand. The survey yielded 455 usable questionnaires, with a response rate of 49%. Statistical analysis methods and Structural Equation Modelling with AMOS version 6.0 were used to analyse data.

The research model was formulated with five core determinants of usage and up to nine moderators of key relationships. It was then tested and modified, the final modified model evidenced by goodness of fit of the model to the data, explained 31.6% (Square Multiple Correlation) of the variance in usage behaviour in teaching , 42.6% in usage behaviour in other tasks, 55.7% in behaviour intention in teaching and 59.8% in behaviour intention in other tasks.

From the findings, three core determinants: perceived usefulness, perceived ease of use and self-efficacy significantly determined usage behaviour in teaching. Two core determinants: perceived usefulness and self-efficacy significantly determined usage behaviour in other tasks. Finally, usage behaviour significantly influenced behaviour intention. In addition three moderators: age, e-university plan and level of reading and writing, impacted the influence of key determinants toward usage behaviour. Only two moderators: age and research university plan, impacted the influence of usage behaviour toward behaviour intention. The rest including gender, education level, academic position, experience and Thai language usage did not impact the influence of the key determinants toward usage behaviour and did not impact the influence of usage behaviour toward behaviour intention.

Consequently, the final modified research model which is called the "Internet Acceptance Model" or "IAM" has the power to explain and predict user behaviour in a Thai Business Schools environment. A thorough understanding of the model may help practitioners to analyse the reasons for resistance toward the technology and also help them to take efficient measures to improve user acceptance and usage of the technology.

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PUBLICATIONS ASSOCIATED WITH THIS THESIS

Journal Article

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GLOSSARY OF TERMS

Academic A full-time member of the instructional staff of a university and may mean, or be used interchangeably with the word “teacher”, “lecturer”, “instructor”, or “faculty member”.

Academic Work A work that relates to teaching and teaching related tasks within the University such as teaching in classes, providing a personal web-base for facilitating teaching, preparing teaching materials, writing teaching documents or texts. Moreover, academic work also covers research and administration tasks.

Attitude toward Behaviour It is previous attitude of a person toward performing that behaviour. People think about their decisions and the possible outcomes of their actions before making any decision to be involved or not involved in a given behaviour.

Autonomous Universities These universities will be external to the government administrative system but still under the direct supervision of the Minister of Education in Thailand. This means that autonomous universities will have their own system of personnel administration, finance, academic affairs, and general management appropriate to their characteristics and missions. However, these universities will still receive financial support from the government.

Behavioural Beliefs It is the likely outcomes of the behaviour and the evaluations of these outcomes. These beliefs produce a favourable or unfavourable attitude toward the behaviour.

Bootstrapping Procedure A versatile method for estimating the sampling distribution of parameter estimates in AMOS.

Bollen-Stine Bootstrap Method The bootstrapping of AMOS incorporates the Bollen-Stine bootstrap Method which is used only for testing *model fit* under non-normality.

Compatibility The degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of the receivers.

Complexity The degree to which an innovation is perceived as relatively difficult to understand and use. The complexity of an innovation is negatively related to its rate of adoption.

Control Beliefs These beliefs indicate whether the person feels in control of the action in question and they give rise to perceived behavioural control.

Cross-Sectional Study A research study for which data are gathered just once (stretched though it may be over a period of days, weeks, or months) to answer the research question.

Culture A collective programming of the mind which distinguishes the members of one group or category of people from another. Culture is also defined as "the complete way of life of a people: the shared attitudes, values, goals, and practices that characterize a group; their customs, art, literature, religion, philosophy, etc.; the pattern of learned and shared behaviour among the members of a group".

Culture Context The macro environment in which the investigated user acceptance behaviour may occur and the specific organisation is located.

Content Validity An aspect of validity assessing the correspondence between the individual items and the concept through ratings by expert judges, and pre-tests with multiple sub-populations or other means.

Construct Reliability An aspect of reliability measuring the internal consistency of a set of measures rather than the reliability of a single variable.

Construct Validity An aspect of validity testing how well the results obtained from the use of the measure fit the theories around which the test was designed. In other words, construct validity testified that the instrument did tap the concept as theorised.

Convergent Validity It is synonymous with criterion validity and with correlational analysis, and is one way of establishing construct validity.

Dependent Variable It is a variable of primary interest to the study, also known as the criterion variable.

Discriminant Validity It is another way of testing construct validity. A measure has discriminant validity when it has a low correlation with measures of dissimilar concepts. In other words, discriminant validity reflects the extent to which the constructs in a model are different.

Endogenous Latent Construct A latent, multi-item equivalents to a dependent variable. It is a construct that is affected by other constructs in the model.

Exogenous Latent Construct A latent, multi-item equivalent of an independent variable. It is a construct that is not affected by any other construct in the model.

E-university Plan The acknowledgement of academics toward e-university plan (plan of the University to become an e-university in the future) may positively affect Internet usage of academics because they may prepare themselves for the future by changing their behaviour so as to increase the utilisation of the new communication technology (e.g. the Internet) compared with academics who did not acknowledge this plan. Therefore, the acknowledgement of e-university plan may impact the influence of determinants toward usage behaviour.

Facilitating Conditions The degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system.

Ethics In business research, ethics refers to a code of conduct or expected societal norm of behaviour while conducting research.

Government Officers Since Thai government has a policy to transfer all public universities and institutes to become Autonomous universities. Therefore government officers are those who worked before the policy was inaugurated.

Habit of Reading and Writing Since the national culture of Thai people tends to exhibit habits of not much reading and writing. This habit of Thai people sometimes does not encourage or support using the Internet. When someone uses the Internet it is essential to put effort especially into reading the information or occasionally writing (keying), for example when using email. Therefore, academic perception of whether their level of reading and writing are obstacles or not in using the Internet may impact on the influence of determinants toward usage behaviour.

Independent Variable A variable that influences the dependent or criterion variable and accounts for (or explains) its variance.

Individual Context Those essential characteristics of individual users that are related to technology usage. An individual may exhibit characteristics completely different from others in other organisations of from different cultures.

Information Technology Computer technology, both hardware and software, for processing and storing information, as well as communication technology including networking and telecommunications for transmitting information.

Generalisability The probability that the results of the research findings apply to other subjects, other groups, other settings and other conditions.

Longitudinal Study A research study for which data are gathered at several points in time to answer a research question.

Parsimony (Measure of Parsimony) A model high in parsimony (simplicity) is a model with relatively few parameters and relatively many degrees of freedom. On the other hand, a model with many parameters and few degrees of freedom is said to be complex or lacking in parsimony.

Methods The various means or techniques or procedures used to gather and analyse data related to some research question or hypothesis.

Methodology The strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes.

Moderating Variable The moderator or the moderating variable is one that has a strong contingent effect on the independent variable and dependent variable relationship. That is, the presence of a third variable (the moderating variable) modifies the original relationship between the independent and the dependent variables.

Moderating Hypotheses The hypotheses that will be tested for moderators .

Multicollinearity When the dependent variables are highly correlated this is referred to as multicollinearity.

Non-Government Officers Thai government has a policy to transfer all public universities and institutes to become Autonomous universities. So non-government officers are those new staff who began work in the Universities after the policy was inaugurated.

Normative Beliefs The perceived behavioural expectations of such important referent individuals or groups as the person's spouse, family, friends, and teacher, doctor, supervisor, and co-workers, depending on the population and behaviour studied. These beliefs result in perceived social pressure or subjective norm.

Observability The degree to which the results of an innovation are visible to others.

Organisational Context The specific environment where the individual works and the investigated technology acceptance takes place.

Perceived Behavioural Control It refers to people's perceptions of their ability to perform a given behaviour and it influences intentions.

Perceived Ease of Use The degree to which a person believes that using a particular system would be free of effort.

Perceived Usefulness The degree to which a person believes that using a particular system would enhance his or her job performance.

Pilot Study The study conducts to detect weaknesses in design and instrumentation and to provide proxy data for selection.

Population The entire group of people that the researcher wishes to investigate. In this research it is academics within Business Schools in the Thai Public University Sector who have already had experience in using the Internet.

Pre-testing A trial run with a group of respondents for the purpose of detecting problems in the questionnaire instructions or design, whether the respondents have any difficulty understanding the questionnaire or whether there are any ambiguous or biased questions.

Questionnaire A pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives.

Relative Advantage The degree to which an innovation is perceived as being better than the idea it supersedes, the degree of relative advantage is often expressed in economic profitability but the relative advantage dimension may be measured in other ways (e.g. social).

Reliability The extent to which research findings would be the same if the research were to be repeated at a later date, or with a different sample of subjects.

Research University Plan The acknowledgment of academics toward the research university plan may impact on the influence of determinants on usage behaviour compared to acdemics who have not acknowledged this plan. Academics who have acknowleded this plan might prepare themselves for the future, for example by trying to use communication technologies (e.g. the Internet) to search for information for their research. On the other hand, academics who have not acknowledged this plan may concentrate only on teaching and not pay any attention to research.

Sample A sample is a subset of the population, comprising some members selected from the population.

Self-Efficacy An individual's self-confidence in his/her ability to perform a behaviour.

Square Multiple Correlation It is used to measure the construct reliability. The square multiple correlation (SMC) is referred to an item reliability coefficient. It is the correlation between a single indicator variable and the construct it measures. In other words, SMC is the proportion of its variance that is accounted for by its predictors.

Social Influence The degree to which an individual perceives that other important persons believe he or she should use the system.

Structural Equation Modelling A multivariate technique combine aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts-factors with multiple variables) to estimate a series of interrelated dependence relationships simultaneously.

Subjective Norm The social pressure exerted on the person or the decision maker to perform the behaviour. It refers to an individual's perception about what other people think of his or her behaviour in question.

Technology Context It is the end-user computing technologies under investigation, such as any IT innovations, information system applications, and communications technology.

Thai Language The first or national language of the Thai people and it is one of the layers of culture and it is different to the main Internet language which is normally English. Moreover, databases developed in the Thai language are still not sufficient to support the demands of the Thai people especially in higher education.

Theoretical Framework A collection of theories and models from the literature which underpins a positivistic research study. It is a conceptual model of how the researcher theorises or makes logical sense of the relationships among the several factors that have been identified as important to the problem. The theoretical framework may be referred to as a conceptual framework or as the research model. These three terms are used interchangeably in this research.

The Internet A publicly available computer network consisting of a worldwide network of computer networks that use the TCP/IP network protocols to facilitate data transmission and exchange, its synonyms are cyberspace and Net.

Trialability The degree to which an innovation may be experimented with on a limited basis.

Validity The extent to which the data collected truly reflects the phenomenon being studied.

Wireless Fidelity A set of standards for wireless local area networks (WLAN) and provides wireless access to the Internet.

LIST OF ABBREVIATIONS

AGFI	Adjusted Goodness-Of-Fit Index
AM	Alternative Model
AMOS	Analysis of Moment Structures
ARPA	Advanced Research Projects Agency
ATB	Attitude Toward Behaviour
BI	Behaviour Intention
BITEACH	Behaviour Intention in Teaching
BIOTASK	Behaviour Intention in Other Tasks
CFI	Comparative Fit Index.
C-TAM-TPB	Combined TAM and TPB (Augmented TAM)
DF	Degree of Freedom
DTPB	Decomposed Theory of Planned Behaviour
EM	Expectation Maximisation
FC	Facilitating Conditions
GFI	Goodness- of- Fit Index
IT	Information Technology
ICT	Information and Communication Technology
IDT	Innovations Diffusion Theory
IAM	Internet Acceptance Model
IETF	Internet Engineering Task Force
IRC	Internet Relay Chat
LANs	Local Area Networks
ML	Maximum likelihood
MG	Model generating
MAR	Missing At Random
MCAR	Missing Completely At Random
MM	Motivational Model
MPCU	Model of PC utilization
N	Population
n	Sample Size

NSF	National Science Foundation
NECTEC	National Electronics and Computer Technology Centre
NFI	Normed Fit Index
OTASK	Usage Behaviour in Other Tasks
PBC	Perceived Behaviour Control
PEOU	Perceived Ease Of Use
PU	Perceived Usefulness
PD	Professional Development
PP	Professional Practices
RFCs	Requests for Comments Documents
RMSEA	Root Mean Square Error of Approximation
SC	Strictly Confirmatory
SCT	Social Cognitive Theory
SE	Self-efficacy
SI	Social Influence
SMC	Squared Multiple Correlations
SEM	Structural Equation Modelling
SN	Subjective Norms
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TEACH	Usage Behaviour in Teaching
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour
TCP/IP	Transmission Control Protocol/Internet Protocol
TLI	Tucker-Lewis coefficient Index
ULS	Unweighted Least Squares
UTAUT	Unified Theory of Acceptance and Use of Technology
WANs	Wide Area Networks
WWW	World Wide Web

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Among millions of people one may not have known so many people in one's life. A few people that we have met are family, relatives, friends and other important people. It is always my belief that being in company with the "Wiseman" who has good merit is a blessing for one's life. We will never forget that once in our life we have a good chance to meet these "Wise Beings". Sometimes the words "Thank you very much" are not enough for their kindness in trying to help one pass the obstacles to the goal that one wants to achieve.

Studying for a PhD is like a long journey in sailing a ship across the ocean. It was necessary to put much of your effort, concentration, endurance and patience until the end of your journey; sometimes you do not know when! Even though we intended to cross the ocean, during this long journey anything could happen and may affect your determination. Without help and support from many people around you it may not be possible to finish your journey, your ship may become a wreck and sink to the bottom of the ocean. I would like to acknowledge these people, who I met as the "Wise Beings", who not only have they high knowledge but also have given their good merits to other people that related to them.

I have always been very grateful when I remembered a story about one who has the "Great Spirit" with strong determination, great patience, great loving, great compassion, great generosity, and great willingness to help people that one associated with. I would like to tell this story which is the best story for me in motivating me in many respects in viewing and living with people around me.

A long time ago in the past, somewhere in the thick forest, raining and a heavy storm caused trouble to a squirrel family. Three children were separated from their father and were swept away into the sea. With his great love, he intended to take his babies back by draining the sea water out to find his children. He ran to the beach and used his tail to absorb the sea water and run back to the land, shaking his tail to get rid of the water. He did this thousands of times until seven days passed. He was so tried and could hardly move, but he still intended to continue helping his children.

At that time, the greatest angel in heaven felt disturbed by sensing the hardening of his comfortable seat. It became hard and did not ease to sit. It was a sign of a good living creature that was in trouble. The greatest angel looked upon the human world and saw the father squirrel. He managed to face the father squirrel and said “You are very stupid to do this because the sea never gets dry thus you could not help your children anyway.” The father squirrel replied “You are the one that is so stupid not me” “I don’t want to waste my time to talk with you – go away”. The greatest angel knew that he could never change the squirrel’s mind so he decided to help by taking three children from the sea alive and gave them to their father!

In the real world, there are a lot of good people who are very kind to other people just like in this story. I would like to express my gratefulness to these people. My thesis would not have been possible without these people.

I would like to give many thanks to all academics in Business Schools in the Thai Public University Sector that kindly participated in the survey and those staff in the secretarial offices that helped me to collect the questionnaires. Without these people, this survey would not have been a success.

I am fortunate to study at Victoria University, not only has it a beautiful name but the University also has academic staff who have beautiful minds to support their students in their study.

First, I would like to give my sincere thanks to Professor Colin Clark - Dean of Faculty of Business and Law, Dr Santina Bertone - Associate Dean of Research and Research Training, and Mr. Con Nikakis - Head of School of Information Systems, for their kind support related to my study. Without direct and indirect support from this management team I would not have been at this stage.

I would like to express my gratitude to Dr Nicholas Billington - Head of Victoria Graduate School of Business who has not only given his support to all students but also helped (together with my principal supervisor) to assign a study room to me when I first came here. He might not know that during my study in that room I could fully concentrate on my work and because of the good environment, my progression was satisfactory (at least from my point of view).

In addition, I often heard many students mentioned his kind support and they all agreed that “Dr Nick” was a very kind professor and always gave a helping hand to students.

I would like to thank Ms. Tina Jeggo who is a student advice officer - research. She is a very kind person. All students in the research room acknowledged her as a highly supportive person. She always helped all students when they needed help. Especially for me when I had any problems she kindly presented her support and helped me pass through these problems.

I owe special gratitude to Dr Stephen Burgess - a senior lecturer in the School of Information Systems. He has not only helped me from the start but also before the submission of my thesis. He spent his time in reading the draft of the thesis and provided valuable comments.

I am deeply blessed in two supervisors I have. Dr Rodney Turner is my co-supervisor. He is a lecturer at the School of Information Systems. He has good experience of many years in Statistics especially in Structural Equation Modelling with AMOS. He utilised his knowledge and experience in helping me pass through the difficulties with this specific statistics. Without his help and support it would not have been possible for me to make it within this period of time. I may stumble along the way with the SEM and AMOS and did not have any self-confidence that what I had done was correct.

Dr Arthur Tatnall is my principal supervisor. He is an associate professor in the School of Information Systems. He is the most important person that helped me to overcome many difficulties during my study. Not only does he have good experience and knowledge in the field of Information Systems but he has also given his kind support and always encouraged me to continue my study any time that I felt a bit down. When there was anything I did not know he has been very willing to help by spending times, efforts, and especially his patience. It is my great honour to be his student. I am extremely grateful to Dr Arthur Tatnall for his great generosity in supporting me in my study.

I remembered a saying that “It is a blessing for anyone who has a teacher that is a person of high intelligence and who is high knowledgeable in various academic aspects”. Because of this I am very proud of my two supervisors since I knew that they both graduated from a good University with a Bachelor degree of Physics. In my opinion Physics is one area that is very difficult to study.

I also must note my appreciation to my best friends - Associate Professor Gallayanee Kitijit, Miss Kesinee Achanapornkul, and Dr Pannakarn Leepaiboon. They had always encouraged me to continue my study whenever I wished to quit. They also were the ones that always said “Be patient a little bit more to do - you are nearly there”.

My mother is always being there whenever I have a problem. She always pushed me to study at this level. Although she is rather old she still works very hard to take care of everything during my absence to study in Australia. However, despite the fact that she wanted me to graduate at this level she always complained to me and requested me to go back because she was very tired of taking care of everything on my behalf.

My dearest father had given great support since I was young. When I was around four years old he asked me whether I wanted to go to school yet. When I said “Yes” within a few days he brought me to the school during the semester after other students had already attended the school for a month (I still remembered that day). During my study in high school, he always bought me many external books in order to help me to practice in many difficult subjects. I remembered one day he gave me a set of maps of the world from the U.S. which showed the geographical appearance of each continent. They were very beautiful in colour and I could view and touch where there was a mountain and where there was a river. In that year I got a full score in the Geographic subject because I could remember everything by pictures. If he was still alive, I have no doubt that he would support me one way or another during my study at this level.

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CHAPTER 1
INTRODUCTION

1.1 Background to the Research

As we live in the information age, an immense amount of information is readily available through powerful computers, which are connected through high speed data communication networks such as the Internet, Wide Area Networks (WANs), and Local Area Networks (LANs). The rapid rate of change in the business environment has continuously pushed the need for technologies and acceptance of these technologies at an accelerating rate. The new technologies are enabling organisations to be flatter, networked, and more flexible. Organisations in the 21st century inevitably make substantial investments in Information Technology (IT) in order to achieve competitive advantage, by spending enormous sums of money on computer hardware, software, communication networks, databases and specialised personnel. Consequently, Information Technology is not only commonly found in the workplace, but has also become pervasive in the home and in public areas (Martin, Brown, DeHayes, Hoffer & Perkins 2002).

In addition, according to Turban, Rainer, and Potter (2001), Information Technology is a facilitator of organisational activities and processes. So it is very important for every manager and professional staff member to learn about IT from the standpoint of his or her specialised field, and also from the standpoint of IT across the entire organisation. Significantly, Fary (1984) claims that most jobs in the 21st century will require some use of computers together with communication networks, so members of the workforce unable to use them will be at a disadvantage. Palvia, Palvia, and Zigli (1992) report that many organisations including higher educational institutions are aware of these rapidly changing environments and see Information Technology as not just a set of tools for computing, but rather as a strategic tool to bring organisations growth and prosperity. It is further suggested by Petrides (2000) that Information Technology is already seen to be playing an integral role in organizations, more specifically in universities, as higher education institutions strive to maintain goals of quality, efficiency and effectiveness.

The Internet, an important aspect of Information Technology, at present and in the future, seems to be the most useful technology for communication and obtaining information for individuals, organizations and countries. The Internet is an interconnected network of networks (Tatnall, Paull, Burgess & Davey 2003) and can help connect millions of computers and millions of users around the world by providing many interesting services at low expense (Davison, Burgess & Tatnall 2004). We therefore cannot help think that the world is getting smaller via the Internet. In spite of the fact that the growth in importance of the Internet is quite recent (Hyperdictionary 2006), the Internet is now very popular in many countries worldwide including in the U.S and Australia. Despite the popularity of the Internet, the Internet penetration rate (% of populations use the Internet) is still very low, accounting for only 16.8% of the population - 1,091.7 million from a total population of 6,499.7 million (Internet World Stats 2006c). There are many people in many countries, especially in developing countries that still have no chance to access the Internet. More particularly, in Thailand, the penetration rate is only 12.7 % (Internet World Stats 2006b) which is lower than the penetration rate of the world. Since the total population of Thailand is 66.5 million, Internet users make up only 8.4 million people. This rate has not changed considerably during the last few years. It also cannot be compared with the Internet penetration rate of the U.S.(70%) (Internet World Stats 2006d), Australia (70.7%) (Internet World Stats 2006a) and other countries in South East Asia such as Singapore (67.2%) and Malaysia (40.2%) (Internet World Stats 2006b).

There are questions in respect of the gap between the popularity along with usefulness of the Internet and the low penetration rates in many countries especially in Thailand. The critical issues of how to increase usage of Internet Technology are of national concern. Although the Thai government has various national plans and policies such as IT 2010 (NECTEC 2001) to support and increase Internet usage within schools, and in higher education, the Internet usage rate is still rather low when compared to other countries. The very low Internet penetration rate may represent problems. If Internet Technologies are available via infrastructures, further questions that should be addressed are (1) how to motivate more people to use the Internet, (2) how to motivate experienced users to use the Internet more frequently and (3) how to motivate experienced users to make full use of the Internet, especially in their work.

In higher education, it is important for all academics to use the Internet more in their work as students will all have experience in using the Internet at the basic educational level of study according to the National ICT for Education Master Plan (2004-2006) (Office of the Education Council 2004). An understanding of how to promote academics to use the Internet more will be achieved by utilising the theories/models of technology acceptance as a theoretical base for investigating the key determinants that influence both experienced and inexperienced individuals to use the Internet. The model of technology acceptance is expected to have power in explaining and predicting usage of the technology and to provide a useful tool for top management of the universities to understand the determinants of usage behaviours in order to proactively design interventions (including training) targeted at user populations that may be less inclined to use the Internet in their work. It is hoped to help academics to gain more knowledge and experiences of using the Internet which will certainly help to prepare them to cope with any changes in the teaching and learning process. This in turn will affect students who will graduate from the universities. They will have more experience about using the Internet at the university level and it is hoped that these students will utilise their Internet experience in the work place. Consequently, it is also hoped to improve the Internet penetration rate of the country and thus help the country to cope with the rapidly changing environment in this information age.

1.2 Research Problem

In the Information Systems field, an important area of research is concentrated on technology acceptance. Many theories and models have been developed mostly in the U.S. Some of the most well-known theories/models were the Technology Acceptance Model (TAM) (Davis, F.D. 1989; Davis, F. D., Bagozzi & Warshaw 1989), TAM2 (Venkatesh & Davis 2000), Innovations Diffusion Theory (IDT)(Rogers 1983), Social Cognitive Theory (SCT) (Bandura 1986), Theory of Reasoned Action (TRA) (Ajzen, Icek & Fishbein 1980), Theory of Planned Behaviour (TPB)(Ajzen, I. 1985), Decomposed Theory of Planned Behaviour (DTPB) (Taylor & Todd 1995b), Augmented TAM or Combined TAM and TPB (C-TAM-TPB) (Taylor & Todd 1995a), and The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis & Davis 2003). Despite their popularity and usefulness, a great number of researchers are still interested in investigating whether these theories/models should be revised, extended or modified to account for rapid change in both technologies and their environments. The major intention among the theories/model of technology acceptance being developed is similar because they are being developed in order to explain and predict usage behaviour of the technologies. For example, the major intention of TAM by Davis (1989) is generality and parsimony associated with behaviours across a broad range of computing technologies and user groups.

Most importantly, a great amount of the research has been conducted in the U.S. and only a limited number of studies have focused on the acceptance of technology outside North America (McCoy & Everard 2000). It can be noticed that among these well-known theories/models of technology acceptance, there are some inconsistencies among their key determinants and moderators. Because these inconsistencies were often found it is questioned whether there are only determinants such as perceive usefulness, perceived ease of use, subjective norm, and perceived behaviour control determine behaviour. In addition, whether there are only moderators such as age, gender, experience, and voluntariness. Perhaps there should be some other determinants and moderators that also play important roles with respect to technology acceptance especially in other technology and organisation contexts.

In addition, other than the inconsistencies among these well-known theories/models, it is further wondered whether these theories/models of technology acceptance that have been developed, modified, and extended in U.S. can be used in other cultures or countries, especially in Thailand. According to Ticehurst and Veal (2000), culture can also influence the outcomes of the research. Up to 80 percent of management research published to-date has been conducted by North American researchers on Americans and in American organisations. The findings of any research are not necessarily applicable to organisations in other countries such as in Australia or Thailand. It is clear that great care needs to be taken when extending the findings of business research conducted in other countries such as in the U.S. to Australia or Thailand or to other cultures.

More importantly, as far as I am concerned, there has been no published model of technology acceptance focused on the Internet usage by individual Thai academics. In addition, no evidence has been found in the research literature relating to a model of technology acceptance being developed in the context of the Thai Public University Sector by using individual academics as subjects and the Internet as the technology context. Thus developing a model of technology acceptance in Thai culture is important and necessary in order to promote usage of the technology in Thailand. It is therefore expected that the model being developed together with other key findings from this research will be applicable to higher education institutions in the country and will benefit not only individuals, organisations, and the country as a whole but could also be adapted and validated for other countries as well.

1.3 Objectives of the Study

This thesis is entitled "Examining a Technology Acceptance Model of Internet Usage by Academics within Thai Business Schools". The aim of this study is to develop a model of technology acceptance that will have the power to demonstrate acceptance and usage behaviour of the Internet in Thai Business Schools by using academics within Business Schools in the Thai Public University Sector as subjects. A thorough understanding of the model may help practitioners to analyse the reasons for resistance toward the technology and would also help to take efficient measures to improve user acceptance/usage of the technology. According to Davis (1989) practitioners evaluate systems for two purposes, one is to predict acceptability, the other is to diagnose the reasons resulting in lack of acceptance and to take proper measures to improve user acceptance. The aim of this study leads to the development of the following specific research objectives.

1. To review literature in respect of nine prominent theories and models including Innovations Diffusion Theory (IDT), Social Cognitive Theory (SCT), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Decomposed Theory of Planned Behaviour (DTPB), Technology Acceptance Model (TAM), Technology Acceptance Model 2 (TAM2), Augmented TAM or Combined TAM and TPB (C-TAM-TPB), and The Unified Theory of Acceptance and Use of Technology (UTAUT).

2. To review previous literature about IT acceptance/adoption and usage within four contexts of study include technology, individual, organisational, and cultural contexts.

3. To investigate the extent to which Thai business academics use and intend to use the Internet in their work.

4. To investigate how to motivate Thai business academics to make full use of the Internet in their work.

5. To investigate to what extent using the Internet helps to improve academics' professional practice, professional development and quality of working life.

6. To formulate a model of technology acceptance of Internet usage by Thai academics.

7. To validate and generate a research model that best describes Thai academics' Internet usage behaviour and behaviour intention.

1.4 Significance of the Study

The findings from this research will be beneficial not only to individual academics, Business Schools, and the Thai Public University Sector, but also the country as a whole. In other words, this study will be very useful for three levels include the individual level, organisational level and the national level.

1.4.1 Individual Level

Two different approaches to the use of the technology for teaching are: (1) use of technology as a classroom aid; (2) use of technology for distributed learning (Bates 2000). The use of technologies especially the Internet means that teaching, assessment and administration are all carried out more efficiently and effectively, leaving more time for research and leisure (Pew Internet & American Life Project 2005; Ryan, Scott, Freeman & Patel 2000). If the university utilised the findings from this research by planning the strategies to support Internet usage of academics, it is expected that they will use the Internet more in their work. Accessing the Internet will help by saving time and expense, such as by using email for communications, and accessing information and knowledge effectively world wide free of charge. In addition, teaching through technology will help in changing academics' professional practice especially in the teaching and learning process. They can work more effectively, efficiently and productively, leaving more time for research and leisure. In turn the quality of their working life will be better, consequently helping the university to achieve its educational strategies and goals of quality, efficiency, and cost-effectiveness as well.

1.4.2 Organisational Level

Technologies will enable changes in teaching and learning processes (Leidner & Jarvenpaa 1995). Under the right circumstances, teaching through technology can have several advantages over traditional classroom teaching as learners are able to access high-quality teaching and learning at any time and any place. Also, well-designed multimedia learning materials can be more effective than traditional classroom methods because students can learn more easily and more quickly through illustration, animation, different structuring of materials, and increased control of and interaction with learning materials respectively (Bates 2000). According to Bates (2000), the benefits of using new technologies (including the Internet, email, presentation software, videoconferencing, the World Wide Web, multimedia, and CD-ROM) are :

1) To improve the quality of learning.
2) To improve students' everyday IT skills they will need in their work and life.
3) To widen access to education and training.
4) To respond to the "technological imperative".
5) To reduce the costs of education.
6) To improve the cost-effectiveness of education.

Since all Thai Public Universities are state universities or state-supervised universities they are expected to plan their strategies in accordance with National Plans such as a target to become an e-university and to increase ICT usage as part of the teaching and learning process. In higher education, it is true, according to Garvin (1993), that although universities create and acquire knowledge, they are seldom successful in applying that knowledge to their own activities. Because of the strategies of the National Plans and the benefits of teaching through technologies, the issue of how to make more and full use of the Internet by academics in their work is a significant issue for universities. In accordance with Bates (2000), faculty members usually have a good deal of independence and autonomy and play a central role in the work of universities. So if there is to be any change, especially in core activities of the university such as teaching and research, it is completely dependent on their support. Top management may dream visions and design plans, and deans and department heads may try to implement them, but without the support of faculty members nothing will change.

The findings from this research should help the universities to plan their strategies to support and motivate academics to use the Internet more in their work in order to prepare to cope with any changes in teaching and learning process if universities become e-Universities or change from a teaching orientation to become research oriented universities. The model generated from this research should provide a useful tool for top management at the universities to understand the determinants of usage behaviours in order to proactively design interventions (such as training) targeted at populations of users that may be less inclined to use the Internet in their work in order to prepare academics to gain more knowledge and experiences of using the Internet which in turn may help the university to achieve its educational goals and to help support Thai National Plans.

1.4.3 National Level

As mentioned, the critical issues of how to make full use of ICT in facilitating teaching and learning processes are of national concern. Thai National Plans have been issued to motivate and support ICT usage include:

1) National Education Plan (2002-2016) (Office of the Education Council 2004).
2) the National IT Policy (2001-2010) or IT 2010 (NECTEC 2001).
3) the National ICT for Education Master Plan (2004-2006) (Office of the Education Council 2004).

It is essential for all academics in higher education to use ICT, especially the Internet in order to cope with students who have already had Internet experience, at the basic educational level of study in the near future according to the National ICT for Education Master Plan. The model being generated from this research will provide information necessary in explaining what promotes Internet usage and what hinders usage. This research seems to be at the right time and at the right place. It is expected that this research will help support National Policies especially the policy to increase ICT usage as part of the teaching-learning process at all level of education and help support the strategies of e-Education according to National IT Policy.

1.5 Contributions of the Research

This research set out to make contributions to knowledge as follows:

1. It provides a big picture of relevant aspects of Internet technology in general and in Thailand in particular.

2. It provides a clear description of relevant aspects about Thai Business Schools, Thai Public University Sector and higher education in Thailand.

3. It provides a relatively clear description and understanding of models and theories of technology acceptance that has been synthesised from theoretical and practical viewpoints.

4. It provides the overall picture and details of Internet implementations in Business Schools of the Thai public university sector. It is hoped that the study will contribute to wider understanding regarding the Internet usage of Thai academics including their usage behaviour and intention to use the Internet in the future.

5. It illustrates the effects of some cultural aspects as moderators along with other moderators on the influence of key determinants toward usage behaviour and behaviour intention.

6. It provides information regarding how to make full use of the Internet in academic work.

7. It provides a contribution to the knowledge of to what extent Internet usage helps improve academics' professional practice, professional development and quality of working life.

8. A major contribution to the existing knowledge and literature is the application of Structural Equation Modelling (SEM). The application of SEM promotes a better quality of the research associated with technology acceptance in a cultural context. SEM has useful features, especially in modelling multivariate relations, and there are no widely and easily applied alternative methods of this kind (Byrne 2006).

9. The study contributes significantly to the global understanding of technology acceptance through the development of the research model in a Thai cultural context. This study presents the powerful "Internet Acceptance Model", using academics' actual usage and their intention to use the Internet by testing and verifying the theoretical framework along with practical applications in the environment of the Thai Public University Sector. This outcome is expected to be useful from an academic or scholarly standpoint and will enable other research studies in Thailand and also in other cultures.

1.6 Scope of the Study

This study targeted only full-time academics within Business Schools in the Public University Sector in Thailand. Total population of this study was comprised only of experienced users of the Internet.

This study focuses on usage behaviour of academics together with their intention to use the Internet in their work within Business Schools. These Business Schools were scattered around the country. Academics were asked to assess their current usage of the Internet together with a prediction of their future usages of the Internet associated with their work.

The reason why this research scopes its study only within Business Schools and not covers all faculties or schools within the university is because this attempts to remove the type of courses/teaching subjects delivered by various faculties or schools from affecting Internet usage.

This study did not cover: (1) the Rajamangala University of Technology system comprises nine universities (35 campuses) and was formerly called Rajamangala Institute of Technology before being elevated to University status in 2005 (Wikipedia 2006b); (2) forty one Rajabhat Universities scattered around the country because they came from Rajabhat Institutes (Rajabhat Institute 2004) and just became universities in June 2004 in accordance with the Rajabhat University Act (Commission of Higher Education 2004); (3) Princess of Narathiwat University which was established very recently (Wikipedia 2006a); and (4) Nakhonphanom University which was established recently as well (Wikipedia 2006a).

1.7 Definition of Key Terms

The Internet is a publicly available computer network consisting of a worldwide network of computer networks that use the TCP/IP network protocols to facilitate data transmission and exchange, its synonyms are cyberspace and Net (WordNet Dictionary 2003).

Academic is a full-time member of the instructional staff of a university and may mean, or be used interchangeably with the word “teacher”, “lecturer”, “instructor”, or “faculty member”.

Academic work relates to teaching and teaching related tasks within the University such as teaching in classes, providing a personal web-base for facilitating teaching, preparing teaching materials, writing teaching documents or texts. Moreover, academic work also covers research and administration tasks (Rosenfeld, Reynolds & Bukatko 1992).

Culture is “collective programming of the mind which distinguishes the members of one group or category of people from another” (Hofstede 1997, p. 5). Culture is also defined as “the complete way of life of a people: the shared attitudes, values, goals, and practices that characterize a group; their customs, art, literature, religion, philosophy, etc.; the pattern of learned and shared behaviour among the members of a group"(Digglossary 2004).

1.8 The Structure of the Research

This thesis is structured to provide a critical review of relevant information regarding Internet technology, Thai Business Schools, and the prominent models and theories of technology acceptance. Next the research methodology, theoretical framework and research hypotheses will be provided and discussed. Data gathered is analysed to provide evidence for support of these hypotheses. The research findings together with the research model being generated are then used to suggest implications that are important for the understanding of usage behaviour of Thai academics. The research consists of nine chapters, and its framework is presented as follows.

Chapter 1 provides a brief introduction to the background of the study along with the research problem. The chapter also outlines the objectives of this study together with the significance, contributions, scope, key terms and the structure of the study.

Chapter 2 reviews the literature regarding many aspects of Internet Technology include an Internet definition, the creation of the Internet, the Internet today, Internet usage and the population of the world, Internet culture, Internet access, the impact of the Internet on peoples' lives, the impact of the Internet on education, the future of the Internet, the Internet in Thailand, and impact of the Internet on Education in Thailand.

Chapter 3 provides the background of Thailand, Thai culture, Thai Universities, the Thai Public University Sector, Business Schools within the Thai Public University Sector, and Internet Technology in the Thai Public University Sector.

Chapter 4 reviews and examines the literature related to the nine prominent models and theories of technology acceptance as well as Information Technology adoption and usage within four contexts of study including technology, organisational, individual and cultural contexts.

Chapter 5 proposes a theoretical framework which is comprised of key determinants that are expected to influence usage behaviour of Thai academics, together with the moderators that are expected to moderate the influence of these key determinants. Then the research hypotheses are proposed.

Chapter 6 presents the research methodology and methods as well as the justification of choices and uses. In addition, the research process, design, development of the instrument, pilot study, population, sample and data collection, data analysis methods, and data management of multivariate analysis are presented. The development of the relevant instrument and the outlines of survey problems are discussed.

Chapter 7 presents the results of the preliminary data analysis including (1) the extent to which academics use and intend to use the Internet in their work (2) the motivation regarding how to make full use of the Internet in academic work (3) the extent to which using the Internet helps improve academics' professional practice, professional development and quality of working life, by using descriptive statistics, Cross-Tabulation, and T-Test by using SPSS version 14.0.

Chapter 8 presents the main data analysis related to testing and developing the model of technology acceptance called the "Internet Acceptance Model" by utilising the Structural Equation Modelling analysis using the AMOS software version 6.0.

Chapter 9 highlights the key findings and the Internet Acceptance Model. In addition, the research implications including theoretical, methodological and practical implications are discussed along with the limitations of the study and suggestions for further research.

1.9 Summary

This chapter presents the background of this research, research problem, objectives, significance, contributions, scope of the study, definition of key terms as well as the structure of nine chapters of this study. The structure of the thesis is also presented in Figure 1.1. The next chapter will present a literature review relating to Internet Technology.

Chapter 1
Introduction

1.1 Background to the Research
1.2 Research Problem
1.3 Objectives of the Study
1.4 Significance of the Study
1.5 Contributions of the Research
1.6 Scope of the Study
1.7 Definition of Terms
1.8 Structure of the Study
1.9 Summary

Chapter 2
Internet Technology

2.1 Introduction
2.2 Internet Definition
2.3 The Creation of the Internet
2.4 The Internet Today
2.5 Internet Usage and the population of the World
2.6 Internet Culture
2.7 Internet Access
2.8 Impact of the Internet on People's lives
2.9 Impact of the Internet on Education
2.10 The Future of the Internet
2.11 The Internet in Thailand
2.12 Impact of the Internet on Education in Thailand
2.13 Summary

Chapter 3
Thai Public Universities and Business Schools

3.1 Introduction
3.2 Background of Thailand
3.3 Thai Culture
3.4 Thai Universities
3.5 Thai Public Universities
3.6 Business Schools within Thai Public Universities
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Chapter 4
Technology Acceptance Theories and Models

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4.2 Innovations Diffusion Theory
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4.7 Technology Acceptance Model
4.8 Technology Acceptance Model2
4.9 Augmented TAM or Combined TAM and TPB(C-TAM-TPB)
4.10 Unified Theory of Acceptance and Use of Technology
4.11 Comparison of Model in the Literature
4.12 Consideration of Moderators in the Literature
4.13 Context Consideration
4.14 Dimension of Usage
4.15 Summary

Chapter 5
Theoretical Framework and Hypotheses

5.1 Introduction
5.2 Research Objectives
5.3 Theoretical background
5.4 Basic Concept of the Theoretical Framework
5.5 Theoretical Framework
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5.7 User Behaviour
5.8 Individual Characteristics Moderators
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Chapter 6
Research Methodology

6.1 Introduction
6.2 Research Process
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6.5 Development of the Questionnaire
6.6 Pilot Survey
6.7 Reliability Analysis of the Instrument
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6.9 Population, Sample and Data Collection
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6.13 Generisability of the Findings
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Chapter 7
Preliminary Data Analysis

7.1 Introduction
7.2 Reliability Analysis
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7.5 Background of Internet Usage
7.6 Cross-Tabulation
7.7 Cultural Aspects
7.8 Actual Internet Usage and Intention to Use
7.9 How to Make Full Use of the Internet
7.10 Professional Practice
7.11 Personal Development
7.12 Quality of Working Life
7.13 Different between Groups
7.14 Summary

Chapter 8
Internet Acceptance Modelling

8.1 Introduction
8.2 Constructs of the Research Model
8.3 Construct Reliability
8.4 Discriminant Validity
8.5 Measure of Fit
8.6 Model Estimation
8.7 Internet Acceptance Model
8.8 Multiple-Group Analysis
8.9 Summary

Chapter 9
Conclusions and Suggestions

9.1 Introduction
9.2 Key Findings
9.3 The Internet Acceptance Model
9.4 Research Implications
9.5 Limitations of the Study
9.6 Suggestions for Further Research
9.7 Summary

Figure 1.1 Structure of the Thesis

CHAPTER 2

INTERNET TECHNOLOGY

2.1 Introduction

The Internet was originally designed in the U.S. as a defence communication medium. At present, Internet technology is being widely used because it provides a variety of relatively inexpensive services. If technologies are to be used, they will need to offer something new to the users. They may be faster, cheaper, provide richer information, provide more information or offer sharing alternatives (Davison, Burgess & Tatnall 2003). This chapter will review literature regarding many aspects of Internet Technology including an Internet definition, the creation of the Internet, the Internet today, Internet usage and the population of the world, Internet culture, Internet access, the impact of the Internet on peoples' lives, the impact of the Internet on education, the future of the Internet, and the Internet in Thailand.

2.2 Internet Definition

Information Technology (IT) is defined as computer technology, both hardware and software, for processing and storing information, as well as communication technology including networking and telecommunications for transmitting information (Free On-line Dictionary of Computing 2006; Martin, Brown, DeHayes, Hoffer & Perkins 2002; The American Heritage Science Dictionary 2002).

The Internet is seen to be an important aspect of information technology. *The Internet* is defined as a publicly available computer network consisting of a worldwide network of computer networks that use the TCP/IP network protocols to facilitate data transmission and exchange, its synonyms are *cyberspace* and *Net* as mentioned in the definition of key terms in Chapter 1 (WordNet Dictionary 2003). This definition will be used throughout this research.

In popular parlance, the Internet often refers to the World Wide Web (WWW), electronic mail (email) and online chat services operating on the Internet (Hyperdictionary 2005; WordIQ 2007b). The WWW is a part of the Internet that uses hyperlinks etc. Sometimes, the Internet is called simply "the Net" (Davison, Burgess & Tatnall 2003). It is a worldwide system of computer networks that is a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users on other computers) (Whatis 2007). In other words, the Internet is an interconnected network of networks sometimes known popularly as the information Super Highway or Infobahn (Tatnall, Davey, Burgess, Davison & Wenn 2002). The Internet has a three level hierarchy composed of backbone networks, mid-level networks, and sub networks. These include commercial (.com or .co), university (.ac or .edu) and other research networks (.org, .net) and military (.mil) networks and span many different physical networks around the world with various protocols, mainly the Internet Protocol (TCP/IP) (Hyperdictionary 2005).

2.3 The Creation of the Internet

The core networks forming the Internet started out in 1969 as the ARPANET devised by the United States Department of Defense Advanced Research Projects Agency (ARPA) (WordIQ 2007b). The original aim was to create a network that would allow users of a research computer at one university to be able to talk to research computers at other universities. A side benefit of ARPANet's design was that the network could continue to function even if parts of it were destroyed in the event of a military attack or other disaster, because messages could be routed or rerouted in more than one direction in the network (Whatis 2007).

In 1983, the ARPANET changed its core networking protocols from NCP to TCP/IP, marking the start of the Internet as we know it today. In 1986, another important step in the development of the Internet was the National Science Foundation’s (NSF) building of a university backbone, the NSFNet. Important disparate networks that have successfully been accommodated within the Internet include Usenet, Fidonet, and Bitnet (WordIQ 2007b).

There is no central computer running the Internet (Tatnall et al. 2002). During the 1990s, the Internet successfully accommodated the majority of previously existing computer inter-networks. This growth is often attributed to the lack of central administration, which allows organic growth of the network, and the non-proprietary nature of the Internet protocols as well, which encourages vendor interoperability and prevents one company from exerting control over the network (WordIQ 2007b).

Until the important coming of the World Wide Web in 1990, the Internet was almost entirely unknown outside universities and corporate research departments. The Internet was accessed mostly via command line interfaces such as telnet and FTP (Hyperdictionary 2005). The World Wide Web was developed by a programmer (Tim Berners Lee) at the European Particle Physics Laboratory (CERN) near Geneva in 1989. It organises Internet Information using Hypertext links (Tatnall et al. 2002). From that time the World Wide Web has grown to become highly commercial and a widely accepted medium for many things such as advertising, brand building, and online sales and services. Its original spirit of cooperation and freedom has, to a great extent, survived this explosive transformation with the result that the vast majority of information available on the Internet is free of charge. While the web, primarily in the form of HTML and HTTP, is the best known aspect of the Internet, there are many other protocols in use which support applications such as email, Usenet, chat, remote login and file transfer. There are several bodies associated with running the Internet including the Internet Architecture Board, the Internet Assigned Numbers Authority, the Internet Engineering and Planning Group, Internet Engineering Steering Group, and the Internet Society (Hyperdictionary 2005).

2.4 The Internet Today

The Internet is viewed as an electronic community that interacts for leisure, commerce and research (Davison, Burgess & Tatnall 2003). The Internet today is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols called TCP/IP (for Transmission Control Protocol/Internet Protocol) (Whatis 2007). Two adaptations of Internet technology, the intranet and the extranet also make use of the TCP/IP protocol. Some of the most used protocols in the Internet protocol suit, are, for example, IP, TCP, HTTP, HTTPS, Telnet, FTP, LDAP, and SSL, etc. (WordIQ 2007b). The Internet is held together by bilateral or multilateral commercial contracts (for example peering agreements) and by technical specifications or protocols that describe how to exchange data over the network. These protocols are formed by discussion within the Internet Engineering Task Force (IETF) and its working groups, which are open to public participation and review. These committees produce documents that are known as Requests for Comments documents (RFCs). Some RFCs are raised to the status of Internet Standard by the Internet Architecture Board (IBA). Some of the most popular services on the Internet that make use of these protocols are email, Usenet, newsgroups, file sharing, and the World Wide Web, Gopher etc. The most widely used are email, the World Wide Web and online Chat, and many other services are built upon them, such as mailing lists and web logs. The Internet makes it possible to provide real-time services such as web radio and web casts that can be accessed from anywhere in the world (WordIQ 2007b).

Since email is one of the most widely used services on the Internet, for many Internet users email has practically replaced the Postal Service for short written transactions (Hyperdictionary 2005). It could be described as the direct transfer of letters, memos and documents between computers attached to the same LAN or WAN (Tatnall et al. 2002).

We can also carry on live ‘conversations’ with other computer users using Internet Relay Chat (IRC). Moreover, Internet telephony hardware and software now allows real-time voice conversations. The most widely used part of the Internet is the World Wide Web (‘WWW’ or ‘the Web’). Its outstanding feature is hypertext, a method of instant cross-referencing. By using the Web, we can access millions of pages of information. Browsing is done with a Web browser, the most popular being Microsoft Internet Explorer. The appearance of a particular Web site may vary slightly depending on the browser we use. Also, later versions of a particular browser are able to render more interesting features such as animation, virtual reality, sound, and music files, than earlier versions (Whatis 2007).

2.5 Internet Usage and the Population of the World

According to Internet World Stats (2006b) updated on 30 December, 2006, the total population of the world is 6,499.7 million. Internet users total 1,091.7 million which accounts for only 16.8% of the world’s population. Although Asia has the highest population in the world, with a total population of 3,667.8 million (56.4% of world's population); its Internet users number only 387.6 million (35.5% of world users) which accounts for only 10.6% of the Asian population (Internet penetration rate) (see Table 2.1 and Figure 2.2). This Internet penetration rate in Asia is very low and is far from the originator of the Internet - North America. Total population in North America is only 331.5 million (5.1% of world's population) but Internet users total 232.1 million (21.3% of world users) which accounts for 70% of the North American population. In Europe, the total population is 807.3 million (12.4% of world's population), and Internet users number 312.7 million (28.6% of world users) which accounts for 38.7% of the European population (see Table 2.1 and Figure 2.1).

WORLD INTERNET USAGE AND POPULATION STATISTICS						
World Regions	Population (2006 Est.)	Population % of World	Internet Usage, Latest Data	% Population (Penetration)	Usage % of World	Usage Growth 2000-2006
Africa	915,210,928	14.1 %	**32,765,700**	3.6 %	3.0 %	625.8 %
Asia	3,667,774,066	56.4 %	**387,593,457**	10.6 %	35.5 %	239.1 %
Europe	807,289,020	12.4 %	**312,722,892**	38.7 %	28.6 %	197.6 %
Middle East	190,084,161	2.9 %	**19,382,400**	10.2 %	1.8 %	490.1 %
North America	331,473,276	5.1 %	**232,057,067**	70.0 %	21.3 %	114.7 %
Latin America/Caribbean	553,908,632	8.5 %	**88,778,986**	16.0 %	8.1 %	391.3 %
Oceania / Australia	33,956,977	0.5 %	**18,430,359**	54.3 %	1.7 %	141.9 %
World Total	6,499,697,060	100.0 %	**1,091,730,861**	16.8 %	100.0 %	202.4 %

Table 2.1 Internet Usage and the Population of the World (Internet World Stats 2006b)

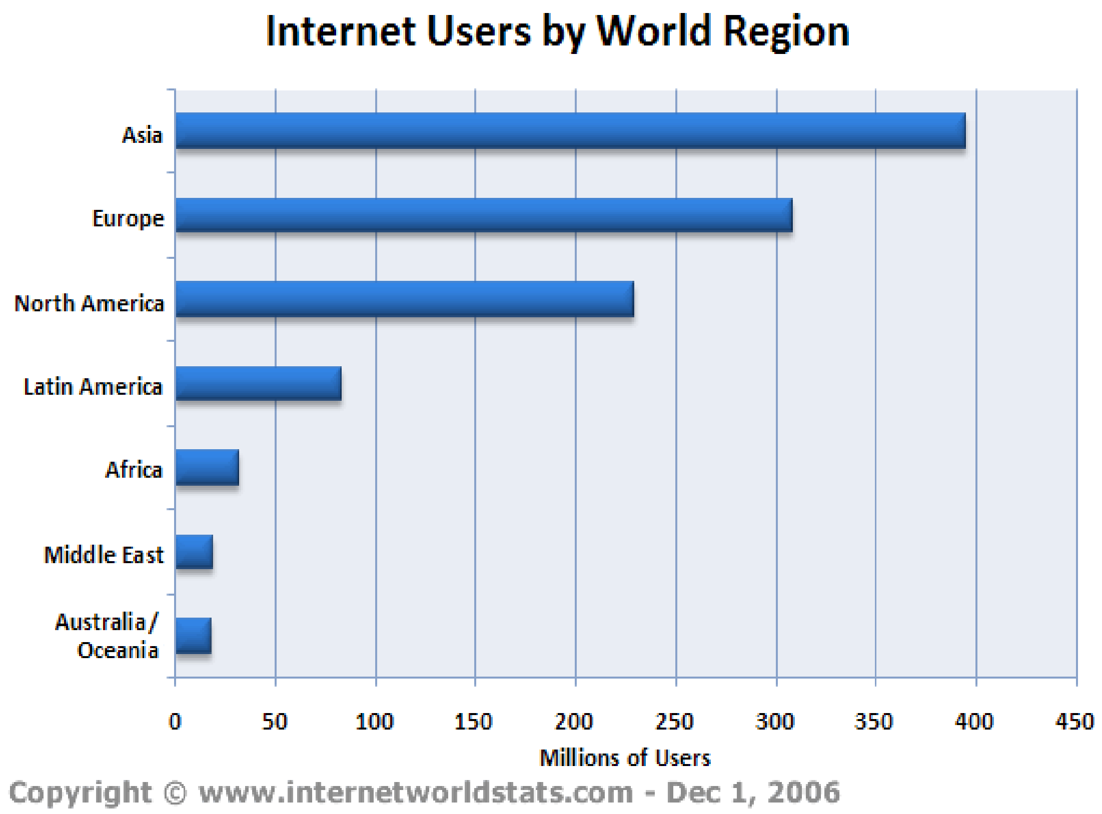

Figure 2.1 Internet Users by World Region (Internet World Stats 2006b)

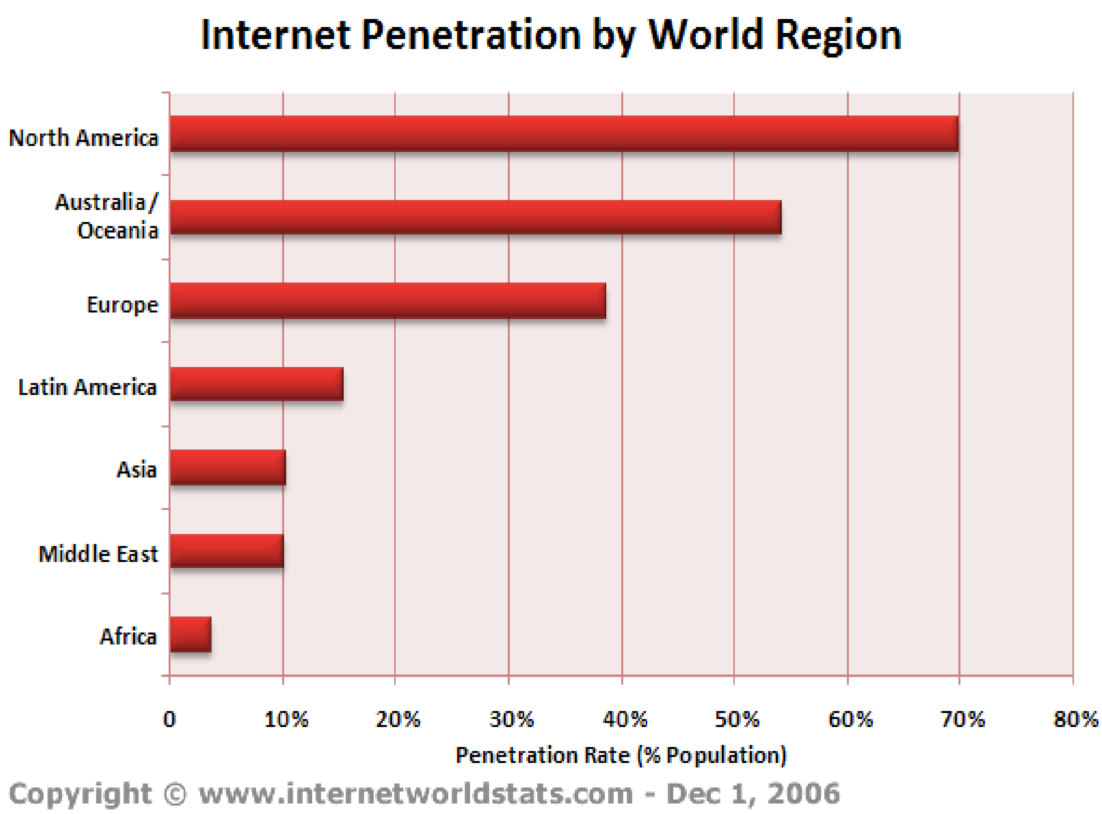

Figure 2.2 Internet Penetration by World Region (Internet World Stats 2006b)

It seems there is a big gap between Internet users and the world's population because only 16.8% of the world population are Internet users. Noticeably, the people in North America have a significantly higher Internet penetration rate (70%), much higher than the second rank - Oceania/Australia (54.3%), and the third rank, Europe (38.7%). Although Asia has the greatest number of Internet users followed by Europe and North America (see Table 2.1 and Figure 2.1), the percentage of the Asia population who use the Internet (Internet penetration rate) is only 10.6% (see Table 2.1 and Figure 2.2).

COUNTRIES WITH HIGHEST NUMBER OF INTERNET USERS						
#	Country or Region	Internet Users, Latest Data	Population (2006 Est.)	Internet Penetration	Source and Date of Latest Data	% Users of World
1	United States	**209,024,921**	299,093,237	69.9 %	Nielsen//NR Oct/06	**19.2 %**
2	China	**123,000,000**	1,306,724,067	9.4 %	CNNIC June/06	**11.3 %**
3	Japan	**86,300,000**	128,389,000	67.2 %	eTForecasts Dec/05	**7.9 %**
4	Germany	**50,616,207**	82,515,988	61.3 %	Nielsen//NR Aug/06	**4.6 %**
5	India	**40,000,000**	1,112,225,812	3.6 %	IWS Nov/06	**3.6 %**
Total		**508,941,128**	2,928,948,104	17.4 %	IWS - Nov. 27/06	**46.6 %**
Rest of the World		**582,789,733**	3,570,748,956	16.3 %	IWS - Nov. 27/06	**53.4 %**
Total World Users		**1,091,730,861**	6,499,697,060	16.8 %	IWS - Nov. 27/06	**100.0 %**

Table 2.2 Countries with Highest Number of Internet Users (Internet World Stats 2006c)

COUNTRIES WITH THE HIGHEST INTERNET PENETRATION RATE					
#	Country or Region	Penetration (% Population)	Internet Users Latest Data	Population (2006 Est.)	Source and Date of Latest Data
1	Iceland	**86.8 %**	**258,000**	297,072	ITU - Sept/06
2	New Zealand	**76.3 %**	**3,200,000**	4,195,729	ITU - Sept/05
3	Sweden	**74.9 %**	**6,800,000**	9,076,757	ITU - Sept/06
4	Portugal	**74.1 %**	**7,782,760**	10,501,051	IWS - Sept/06
5	Australia	**70.7 %**	**14,663,622**	20,750,052	Nielsen//NR - Aug/06
Total		**72.9 %**	**32,704,382**	44,820,661	IWS - Sept/06
Rest of the World		**16.4 %**	**1,059,026,479**	6,454,876,399	IWS - Sept/06
World Total Users		**16.8 %**	1,091,730,861	6,499,697,060	IWS - Sept/06

Table 2.3 Countries with Highest Internet Penetration Rate (Internet World Stats 2006d)

Noticeably, the countries with the highest number of Internet users (Internet World Stats 2006c), are the United States (19.2%), China (11.3%), Japan (7.9%), Germany (4.6%), and India (3.6%)(see Table 2.2).

On the other hand the countries with the highest Internet penetration rate (Internet World Stats 2006d), are Iceland (86.8%), New Zealand (76.3%), Sweden (74.9%), Portugal (74.1%), and Australia (70.7%)(see Table 2.3).

It also can be noted that the countries with the highest population (Internet World Stats 2006e), are China (20.1% of world population), India (17.1 %), the United States (4.6%), Indonesia (3.4%), and Brazil (2.8%) (see Table 2.4). Notably, both China and India have the highest population in the world but their Internet penetration rates are rather low (9.4%, and 3.6%) (see Table 2.2).

COUNTRIES WITH THE HIGHEST POPULATION					
#	Country	Population (2006 Est.)	% of World Population	Population Growth Rate	Expected Pop. for year 2050
1	China	**1,306,724,067**	20.1 %	1.1 %	1,470,468,924
2	India	**1,112,225,812**	17.1 %	1.7 %	1,619,582,271
3	United States	**299,093,237**	4.6 %	0.8 %	403,943,147
4	Indonesia	**221,900,701**	3.4 %	1.8 %	337,807,011
5	Brazil	**184,284,898**	2.8 %	1.4 %	206,751,477
Total		**3,124,228,715**	48.0 %	-	4,038,552,830
Rest of the World		**3,375,468,345**	52.0 %	-	5,045,942,575
Total World Population		**6,499,697,060**	100.0 %	1.1 %	9,084,495,405

Table 2.4 Countries with the Highest Population (Internet World Stats 2006e)

In Asia (Internet World Stats 2006a), the countries with the highest Internet penetration rates are Hong Kong (69.2%), Japan (67.2%), Singapore (67.2%), South Korea (67.0%), Taiwan (60.3%), Macao (41%), Malaysia (40.2%), Vietnam (16.9%), Brunei Darussalem (14.2%) and Thailand (12.7%)(see Table 2.5).

COUNTRIES WITH THE HIGHEST INTERNET PENETRATION RATE IN ASIA						
ASIA	Population (2006 Est.)	Internet Users, (Year 2000)	Internet Users, Latest Data	Penetration (% Population)	(%) Users in Asia	Use Growth (2000-2006)
Hong Kong *	**7,054,867**	2,283,000	**4,878,713**	**69.2 %**	1.3 %	113.7 %
Japan	**128,389,000**	47,080,000	**86,300,000**	**67.2 %**	22.8 %	83.3 %
Singapore	**3,601,745**	1,200,000	**2,421,000**	**67.2 %**	0.6 %	101.8 %
Korea, South	**50,633,265**	19,040,000	**33,900,000**	**67.0 %**	9.0 %	78.0 %
Taiwan	**22,896,488**	6,260,000	**13,800,000**	**60.3 %**	3.6 %	120.4 %
Macao*	**490,696**	60,000	**201,000**	**41.0 %**	0.1 %	235.0 %
Malaysia	**27,392,442**	3,700,000	**11,016,000**	**40.2 %**	2.9 %	197.7 %
Vietnam	**83,944,402**	200,000	**14,210,244**	**16.9 %**	3.6 %	7,005.1 %
Brunei Darussalem	**393,568**	30,000	**56,000**	**14.2 %**	0.0 %	86.7 %
Thailand	**66,527,571**	2,300,000	**8,420,000**	**12.7 %**	2.2 %	266.1 %
Total	**391,324,044**	82,153,000	**175,202,957**	**44.8%**	45.2%	-
Rest of ASIA	**3,276,450,022**	32,150,000	**212,390,500**	**6.5%**	54.8%	-
Total ASIA	**3,667,774,066**	114,303,000	**387,593,457**	**10.6 %**	100.0 %	239.1 %

Table 2.5 Countries (Out of 35 Countries) with the Highest Internet Penetration Rate in Asia (Internet World Stats 2006a)

COUNTRIES WITH THE HIGHEST NUMBER OF INTERNET USERS IN ASIA						
ASIA	Population (2006 Est.)	Internet Users, (Year 2000)	Internet Users, Latest Data	Penetration (% Population)	(%) Users in Asia	Use Growth (2000-2006)
China	**1,306,724,067**	22,500,000	**132,000,000**	10.1 %	34.1 %	486.7 %
Japan	**128,389,000**	47,080,000	**86,300,000**	67.2 %	22.8 %	83.3 %
India	**1,112,225,812**	5,000,000	**40,000,000**	3.6 %	10.6 %	700.0 %
Korea, South	**50,633,265**	19,040,000	**33,900,000**	67.0 %	9.0 %	78.0 %
Indonesia	**221,900,701**	2,000,000	**18,000,000**	8.1 %	4.8 %	800.0 %
Vietnam	**83,944,402**	200,000	**14,210,244**	16.9 %	3.6 %	7,005.1 %
Taiwan	**22,896,488**	6,260,000	**13,800,000**	60.3 %	3.6 %	120.4 %
Malaysia	**27,392,442**	3,700,000	**11,016,000**	40.2 %	2.9 %	197.7 %
Pakistan	**163,985,373**	133,900	**10,500,000**	6.4 %	2.8 %	7,741.7 %
Thailand	**66,527,571**	2,300,000	**8,420,000**	12.7 %	2.2 %	266.1 %
Total	**3,184,619,121**	108,213,900	**368,146,244**	11.6%	95.0%	-
Rest of ASIA	**483,154,945**	6,089,100	**19,447,213**	4.0%	5.0%	-
Total in ASIA	**3,667,774,066**	114,303,000	**387,593,457**	10.6 %	100.0 %	239.1 %

Table 2.6 Countries (Out of 35 Countries) with the Highest Number of Internet Users in Asia (Internet World Stats 2006a)

The countries with the highest number of Internet users in Asia are China (34.1%), Japan (22.8%), India (10.6%), South Korea (9.0%), Indonesia (4.8%), Vietnam (3.6%), Taiwan (3.6%), Malaysia (2.9%), Pakistan (2.8%) and Thailand (2.2%)(see Table 2.6).

Regarding the Internet penetration rate and number of users in Asia, from 35 countries, Thailand is ranked the tenth in Asia in both classifications. The Internet penetration rate of Thailand is rather low (12.7%). Although the total population is 66.5 million, Internet users are only 8.4 million (12.7% of the Thai population) (0.8% of world users or 2.2% of Asia users).

From these Internet world statistics (last updated on December 2006), it is very interesting to think about the future. What if the countries which have the highest population but very low Internet penetration rate, such as China (internet penetration rate 9.4%) and India (3.6%), increase their Internet usages from 172 million Internet users now from out of the total population of 2,418.9 million people, to more than 1,000 million users within five years? How will this exponential increase in usage impact on the Internet, in turn, how will the Internet impact on people's lives, and particularly in Education?

2.6 Internet Culture

The Internet is also having a profound impact on knowledge and worldviews through keyword-driven searching using search engines such as Google. Millions of people worldwide now have easy, instant access to a vast amount and diversity of online information. The Internet represents a sudden and extreme decentralization of information and data compared to encyclopaedias and traditional libraries. English is the most used language for communication on the Internet due to its original creation. English is used commonly in software programming and early computers can handle characters well only in English. This presents a problem to people in Thailand. In recent years, the Internet has developed well enough, so that native languages are available in most developed countries. Moreover, the Internet has helped many groups of people to join together. These include people with very rare diseases, scientific groups, cultural and political groups and those with other interests, etc. Among these benefits of the Internet, there is public concern stemming from some of the controversial materials it contains such as copyright infringement, pornography and paedophilia, identity theft, and hate speeches which are available and difficult to control (WordIQ 2007b).

2.7 Internet Access

There are various methods of Internet access. Dial-up and broadband are the common methods of home access to the Internet. Libraries and Internet cafes, airport halls and public places are available to use the Internet, sometimes just for brief use while standing. Various terms are used, such as “public Internet kiosk”, “public access terminal”, and “web payphone”(WordIQ 2007b).

Wi-Fi for ‘Wireless Fidelity’ is a set of standards for wireless local area networks (WLAN) and provides wireless access to the Internet. Hotspots providing such access include Wifi-cafes, where one needs to bring one's own wireless-enabled devices such as a notebook or PDA. These services may be free to all, free to customers only, or fee-based. A hotspot need not be limited to a confined location. Whole campuses and parks have been enabled, even an entire downtown area. Grassroots efforts have led to wireless community networks(WordIQ 2007b).

Using one's own computer has more advantages than using public computers, for example more upload and download possibilities, using one's favourite browser and browser settings (customisation may be disabled on a public computer), and integrating activities on the Internet and on one's own computer, using one's own programs and data. Another option is remotely hosted files that can be accessed from any Internet-connected machine. Companies such as Apple offer services that allow users to upload files, as a sort of “virtual drive”(WordIQ 2007b).

Countries with particularly good Internet access include South Korea, where 50% of the population has broadband access, Sweden, Canada (where 61.6% of households use the Internet) and the United States (WordIQ 2007b).

The U.S. (the country of origin of the Internet), in 2004, three out of four Americans had Internet access, and 74.9% of Americans living in households with a fixed line phone had home access to the Internet. This accounts for 204.3 million Americans out of the projected 272.8 million who are at least two years old, up from 66% a year earlier. More than 75% of men, women and children ages 2 to 54 access the Internet, and 63.4% of people 55 years old and older access the Internet (WordIQ 2007a).

2.8 Impact of the Internet on People's Lives

Despite the evolution in people's relationship with the Internet, a few things haven't changed much as the Internet gets older. For example, in the U.S., email is still the number one activity and time consumer for the vast majority of Internet users, then information searching, entertainment, and e-commerce. Even though Internet use has grown exponentially, the hierarchy of metaphors that describe it has remained constant. In addition, gaps in Internet usage of Americans still persist along multiple demographic lines including age (the younger are much more likely to be online than senior citizens), socio-economic status (richer and better educated people are more likely to use the Internet than those with less income and education), and college students are higher Internet users than those who have a lower level of education etc. (Pew Internet & American Life Project 2005a). Moreover, relating to relying on the Internet, a large share of Internet users now say that they will turn first to the Internet when they next need information about health care or government services (Pew Internet & American Life Project 2002a).

Even though the Internet is widely used there are some people who do not want to use it. In the United Kingdom, 44% of people did not want to use the Internet claiming that they were not interested in using it (43%), they had no means of access to the Internet (25%), they did not feel that they had the confidence or the skills required to use the internet (21%) and they felt that they had no need to access the Internet (17%) (Donnellan 2002).

2.9 Impact of the Internet on Education

The Internet has been implemented in universities' organisational and educational practices for almost two decades, and has shown its impact not only on people's lives but also on Education. For example, from a 2002 survey conducted in the U.S., it was found that college students seem generally positive about the Internet and its impact on their educational experience, but, distance learning projects have not found much success. There appears to be little interest among traditional college students (those 18-22 years old) to abandon the classroom and take courses online. Only 6% of students took online courses for college credit, and of those only half (52%) thought the online course was worth their time, and another half said they believed they learned less from the online course than they would have from an on-campus one. Based on this finding, it is clear that for students already enrolled in traditional college courses, online education has a long way to go before it might challenge the traditional classroom. About study habits, the finding showed that 73% of college students said that they used the Internet as the primary site of their information searches rather than the library. The convenience of the Internet is tempting students to rely very heavily on it when searching for academic resources (Pew Internet & American Life Project 2002b).

The survey also showed that distance learning projects have not found much success because students can choose between study in classrooms and courses online. But in remote areas, where the classroom is not available for those who are interested in studying, taking online courses may be the only choice and may be better than nothing. In the big picture, we have many remote areas in many countries, so distance learning may help people in those areas to communicate with others and to increase their knowledge by learning via the Internet since they have no chance to study in traditional classrooms (Pew Internet & American Life Project 2002b).

According to Donnellan (2002), Information and communications technology (ICT) projects run by the UK Education Departments have shown that the use of ICT in education provides a number of learning benefits including:

1) Improved subject learning across a wide range of curriculum areas, including English, maths, science, history, geography, modern languages, art, technology, IT and careers, as well as independent study and cross-curricular project work.
2) Improved motivation and attitudes to learning.
3) Development of independent learning and research skills.
4) Improved vocational training.
5) Development of network literacy (i.e. the capacity to use electronic networks to access resources, create resources and communicate with others, these can

be seen as complex extensions of the traditional skills of reading, writing, speaking and listening).

6) Social development.

2.10 The Future of the Internet

In the future, wireless connectivity will increase through laptops, cell phones and personal digital devices, concurrently with the rapid growth of home broadband penetration and broadband speeds will improve in accordance with users' needs. Users will increase their reliance on the Internet for a whole range of activities. People are constantly reshaping the Internet, and the Internet is constantly reshaping people's informational and social universes as well (Pew Internet & American Life Project 2005b). The survey showed that most Internet experts expect the Internet to become more embedded in everyday and commercial life with high-speed connections proliferating with mixed results. Experts envision benefits ranging from the ease and convenience of accessing information to changes in workplace arrangements and relationships. Moreover, the level of surveillance by governments and businesses will grow. Regarding education, 59% of experts agreed that virtual classes will become more widespread in formal education and that students might at least occasionally be grouped with others who share their interests and skills, rather than by age. Fifty six percent of experts agreed that as telecommuting and home-schooling expand, the boundary between work and leisure will diminish and family dynamics will change because of that (Pew Internet & American Life Project 2005b).

2.11 The Internet in Thailand

As previously mentioned, the population of Thailand is estimated at 66.5 million, (last updated 29 December 2006). There are 8.4 million Internet users which accounts for 12.7% (Internet World Stats 2006a). Regarding population, Thailand is ranked 18th in the world population in 1998 and 4th in South East Asia (National Statistical Office 2007b).

The Internet is most widely used in the central part of Thailand especially in Bangkok – the capital (population 5.7 million), and the cities around Bangkok. Other than this the Internet is also widely used in the big cities(or provinces) in other part/regions of the country including cites in northern part of Thailand such as Chiang Mai (population 1.60 million), in the southern part such as Nakhon Si Thammarat (population 1.52 million), and in the north eastern part such as Nakhon Ratchasima (population 2.50 million), Ubon Ratchathani (population 1.75 million), Khon Kaen (population 1.70 million), Buri Ram (population 1.50 million), Udon Thani (population 1.50 million), Si Sa Ket (population 1.42 million), and Surin (population 1.38 million) (Students of the World 2006).

Data from the National Statistical Office of Thailand (2007a) showed that in 2001, the number of computers per 100 households was 5.7, the number of computers per 100 people was 1.5, and the Internet access per 100 people was 5.6. In 2002, use of computers in establishments was 10.5%, Internet access in establishments was 50%, and use of web sites in establishments was 7.6%. Figure 2.3 presents a chart of Internet users in Thailand (NECTEC 2007). The usage growth in Thailand from 2000-2006 was 266.1% (Internet World Stats 2006a).

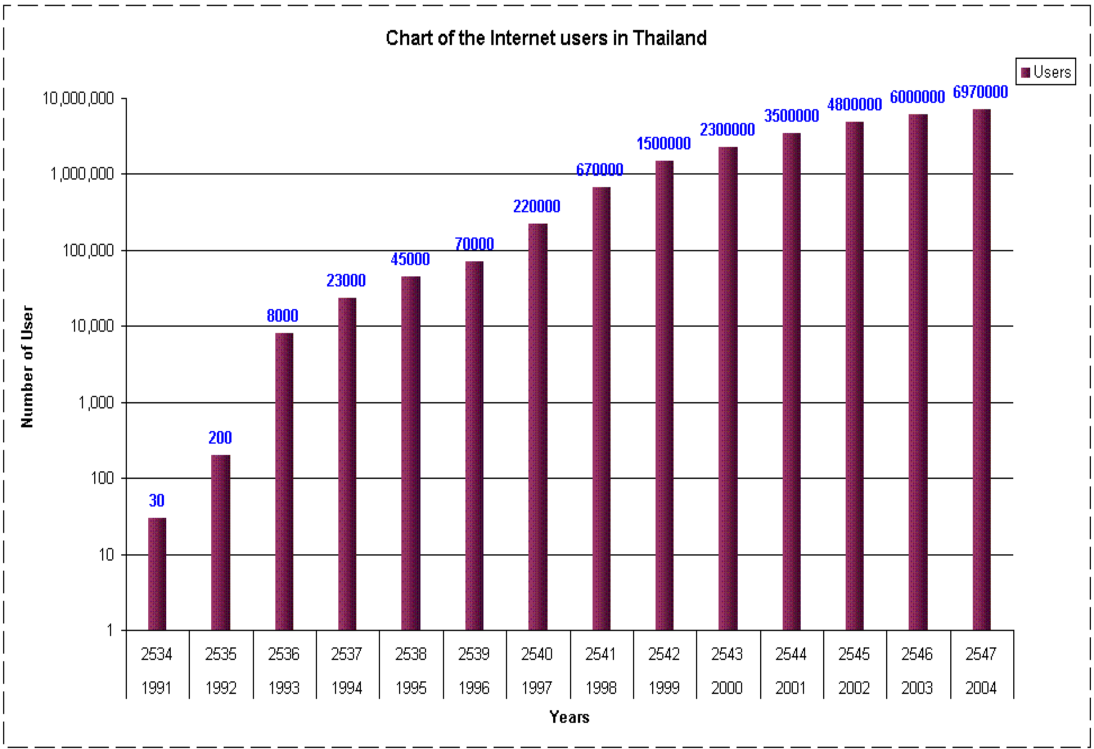

Figure 2.3 Chart of Internet Users in Thailand (NECTEC 2007)

2.12 Impact of the Internet on Education in Thailand

Because of the benefits of using new technologies (Bates 2000), teaching through technology can have several advantages over traditional classroom teaching (Leidner & Jarvenpaa 1995) as mentioned in Chapter 1. In Thailand, the government perceived the benefits of ICT in facilitating teaching and learning processes as shown by various Thai National Plans issued to motivate and support ICT usage.

1) National Education Plan (2002-2016) (Office of the Education Council 2004), aims to develop human learning into a learning society, and to increase knowledge leading to a knowledge-based society by development of technologies for education to support continuous human learning.

2) The National IT Policy (2001-2010)or IT 2010, targets that in the next ten years Thailand aims to move from being a "Dynamic Adopter" to "Potential Leader" on the basis of the United Nations' standard (NECTEC 2001). This policy stipulates 5 specific strategies such as e-Education. Notably, e-Education has as one of its strategies to *increase ICT usage*. In respect of those strategies, two goals must be achieved:

   - By 2010, all schools will be able to connect with the IT network.
   - Computers or IT will be used as part of the teaching-learning process at all levels.

3) One of the strategies of the National ICT for Education Master Plan (2004-2006) (Office of the Education Council 2004), specified that basic educational institutes would be able to access the Internet by covering all primary schools by 2005.

Thai National Plans as shown above all have targets consistently in the same direction. They aim to develop human learning in order to increase people's knowledge by using Internet technologies to support continuous learning in education. The critical issues of how to increase usage or how to make full use of ICT are one of the national concerns. It is essential for all faculty members/academics in higher education to use ICT especially the Internet, since the students that all academics will deal with will all be equipped with the knowledge of how to use the Internet including experiences in using this technology at the basic educational level of study (Office of the Education Council 2004).

2.13 Summary

This chapter presented the background of Internet Technology, especially Internet statistics, together with the impact of the Internet on peoples' lives and on education. In Thailand, Internet usage in the country and the impact of the Internet on Education were also presented. The literature related to the Thai Public University Sector and Business Schools will be presented in the next chapter.

CHAPTER 3
THAI PUBLIC UNIVERSITIES AND BUSINESS SCHOOLS

3.1 Introduction

The Thai public university sector is generally supported by the government. It currently plays the leading role in higher education in the country when compared to the private university sector. This chapter will describe relevant aspects of the Thai public universities including background of Thailand, Thai culture, Thai Universities, Thai Public Universities, Business Schools within Thai Public Universities, and Internet Technology in the Public University sector.

3.2 Background of Thailand

A unified Thai kingdom was established in the mid 14th Century A.D., known as Siam until 1939. The country name in conventional long form is Kingdom of Thailand, and conventional short form is Thailand. The Government is a constitutional monarchy. The location of Thailand is in South Eastern Asia. Bangkok is the capital and Thailand's administrative divisions are divided into 76 provinces (Changwat). Ethnic groups are Thai 75%, Chinese 14% and other 11% (CIA 2006).

With a well-developed infrastructure, a free-enterprise economy and pro-investment policies, Thailand appears to have fully recovered from the 1997-1998 Asian Financial Crises. The country was one of East Asia's best performers in 2002-2004. Boosted by increased consumption and strong export growth, the Thai economy grew 6.9% in 2003 and 6.1% in 2004 despite a sluggish global economy. Growth slowed to 4.4% in 2005 because of oil prices, weaker demand from Western markets, severe drought in rural regions, tsunami-related declines in tourism, and lower consumer confidence. Exports feature textiles and footwear, fishery products, rice, rubber, jewellery, automobiles, computers and electrical appliances (CIA 2006).

3.3 Thai Culture

Thailand is referred to as *'the land of smile'* since Thai people always smile to greet each other, and especially visitors, in order to show their friendliness, kindness and a warm welcome to those people. Thai people also believe that smiling makes them happy and feel good. Nearly everything is acceptable to the Thai people; objections and conflict are avoided at all costs. Moreover, Thai people are known for their hospitalities toward visitors. This attitude makes the Thais an easy-going and compromising people. Religious conflict is rarely seen in Thai culture. Frequently, one can find people of varied religious beliefs socializing happily together (UBC Library 2004).

Thailand is one of the most strongly Buddhist countries in the world. The national religion is Theravada Buddhism. The culture of Thailand is heavily influenced by Buddhism. People who adhere to other religions are allowed full freedom of expression (Wikipedia 2007).

Since Thailand is blessed with a wealth of culture and traditions, it stands out in the Southeast Asian region as a country of grace and pride. Therefore, in terms of human resource development, the nation well realised the challenges of globalisation, and thus highly values international collaborative relationships (Kanjananiyot & Nilphan 2007).

3.4 Thai Universities

3.4.1 Types of Higher Education Institutions

Thai higher education institutions previously were under the supervision of the Ministry of University Affairs. In 2003 they were transferred to be under supervision of the Office of the Higher Education Commission, Ministry of Education (Commission of Higher Education 2007a). Thai higher education institutions can be classified into four types with specific patterns of coordination and institutional governance (SEAMEO RIHED 2007):

- Public universities and institutes
- Private universities and colleges
- Other Institutes and colleges
- Specialized training institutions

1) Public Universities and Institutes

Thai public universities and institutes are classified into three types:

- Limited admission universities
- Open universities
- Autonomous universities

The number of universities/institutes classified by types of institution were: 18 limited admission universities, two Open Universities, and four autonomous universities, altogether totalling 24 public universities and institutes (Commission of Higher Education 2004b).

The National Institute of Development Administration known as 'NIDA' (founded in 1966) offers only graduate programs of study. The two open universities are Ramkhamhaeng University (founded in 1971) and Sukhothai Thammathirat Open University (founded in 1978). The four autonomous universities are Suranaree University of Technology (founded in 1990), Walailak University (founded in 1992), Mae Fah Luang University (founded in 1997) and King Mongkut's University of Technology Thonburi (upgraded to be an autonomous university in 1998). These public autonomous universities also receive financial support from the Royal Thai Government (SEAMEO RIHED 2007).

In addition, the Princess of Narathiwat University, and Nakhonphanom University were not included in this study because they had just been established recently (Wikipedia 2006a).

2) Private Universities and Colleges

Thai private universities are classified into two types:

- Private University
- Private College

There are 54 private universities and colleges including 26 private universities and 28 private colleges (Commission of Higher Education 2004b).

3) Other Institutes and Colleges

These include: Rajamangala Institute of Technology, Rajabhat Institutes, technical and vocational colleges, agricultural colleges, physical education colleges, dramatic arts colleges, and fine arts colleges are also under the Ministry of Education; nursing colleges under the Ministry of Public Health; and professional training institutions under other Ministries such as military and police academies under the Ministries of Defence and Interior, respectively (SEAMEO RIHED 2007).

4) Specialised Training Institutions

Specialised training institutions are, for example, the Asian Institute of Technology, Mahamongkut Buddhist University, and Mahachulalongkorn Buddhist University (SEAMEO RIHED 2007).

3.4.2 Coordination of Higher Education

The Ministry of University Affairs supervises and coordinates public universities/institutes and private universities/colleges. The Ministry of University Affairs is also responsible for formulating educational policy within the framework of the national education development plan. Other responsibilities include standardization of curricula and recommending areas for budget allocations (SEAMEO RIHED 2007).

In July 2003, all public universities/institutes and private universities/colleges which emphasise production of graduates at the Bachelor's degree level and higher, were transferred to be under the supervision of the Office of the Higher Education Commission, the Ministry of Education (Commission of Higher Education 2007a).

The Ministry of Education also supervises and coordinates Rajamangala Institute of Technology, Rajabhat Institutes, technical and vocational colleges, agricultural colleges, physical education colleges, dramatic arts colleges and fine arts colleges (Ministry of Education 2007). These Institutes and colleges emphasise the production of graduates at the Bachelor's degree level and lower. However, the Office of the Higher Education Commission, Ministry of Education, has the right to supervise the public universities/institutes and private universities/colleges that have been transferred from the Ministry of University Affairs since July 2003. These institutes/colleges not only have the right to emphasise production of graduates at Bachelor's degree level and lower but also higher education (Commission of Higher Education 2007a).

Rajamangala University of Technology (RMUT) is a system of nine universities in Thailand providing undergraduate and graduate education. It was elevated to university level in 2005. Before that it was known as Rajamangala Institute of Technology. RMUT is comprised of 35 campuses, two centres, two research and training centres and two faculties scattered around the country (Wikipedia 2006b). Rajabhat Institutes also have 41 institutes scattered around the country (Rajabhat Institute 2004a). In June 2004, all Rajabhat Institutes become Rajabhat Universities in accordance with the Rajabhat University Act (Rajabhat Institute 2004b). Notably, this study will not cover all Rajabhat Universities and the Rajamangala University of Technology since they became universities only recently.

3.4.3 Institutional Governance

Each public university or institute has its own Act empowering the University Council to function as the governing body. Under the University Council is the President who is responsible for university administration. The President operates the university or institute according to the policy laid down by the University Council. As specified by the University Act, the University Council has the powers and duties to control and supervise the general affairs of the university. The University Council is empowered to grant degrees, graduate certificates, diplomas and certificates at the institutional level (SEAMEO RIHED 2007).

Private higher education institutions each has its own council, which is the administrative body responsible for the general functioning of the institution as well as organizing its internal administrative structure. The Council provides policy guidance for long-term planning and formulates control procedures. It also allocates funds and screens proposed budgets as well as curriculum design and revision. The Council functions include the setting up of new academic disciplines, appointment or removal of chief executives, and approval of degree and diploma conferment. The Private Institution Council like the University Council approves and grants degrees and diplomas (SEAMEO RIHED 2007).

3.5 Thai Public Universities

3.5.1 University Staff

The government has a policy to transfer all public universities and institutes to become "*Autonomous universities*". Each autonomous university will be external to the government administrative system but still under the direct supervision of the Minister of Education. This means that autonomous universities will have their own system of personnel administration, finance, academic affairs, and general management appropriate to their characteristics and missions. However, these autonomous universities will still receive financial support from the government (Commission of Higher Education 2007a).

1) Type of Staff

In accordance with the government policy mentioned above, all public universities have followed the policy by separating their staff into two main categories:

- Government officers - those who worked before the policy was inaugurated.
- Non-government officers - those new staff who began work in the Universities after the policy was inaugurated.

There are three types of staff within Thai public universities:

- Academic
- Technical

- Administrative support staff

Total government staff in all public universities in fiscal year 2003 was: 19,157 (44.7 %) academic staff, 11,617 (27.1%) technical staff, and 12,125 (28.2%) administrative support staff, totalling 42,899 (100%). On the other hand, total non-government officers comprise only 3,996 (39.7%) academic staff, and 6,068 (60.3%) technical staff combined with administrative support staff, totalling 10,064 (100%)(see Table 3.1) (Commission of Higher Education 2004a).

Government Officers			Non-Government Officers		
Types of Staff	**Number**	**%**	**Types of Staff**	**Number**	**%**
Academic Staff	19,157	44.7	Academic Staff	3,996	39.7
Technical Staff	11,617	27.1	Technical Staff	6,068	60.3
Administrative Support Staff	12,125	28.2	Administrative Support Staff	-	-
Total	**42,899**	**100.00**	**Total**	**10,064**	**100.00**

Table 3.1 Number of Academic Staff and Non-academic Staff in Public Universities (Commission of Higher Education 2004a)

2) Academic Positions

Thai universities have four types of academic positions:

- Lecturer
- Assistant professor
- Associate professor
- Professor

Within the category of government officer there are 8,682 (45.3%) lecturers, 5,725 (29.9%) assistant professors, 4,416 (23.1%) associate professors and 334 (1.7%) professors, totalling 19,157 (100%) academic positions (see Table 3.2). For the category of non-government officer, there are 3,643 (91.2%) lecturers, 232 (5.8%) assistant professors, 100 (2.5%) associate professors and 21(0.5%) professors, totalling 3,996(100%) academic positions (see Table 3.2) (Commission of Higher Education 2004a)

Academic Positions	Government Officer		Non-Government Officer		Total	%
	Number	%	Number	%		
Lecturer	8,682	45.3	3,643	91.2	12,325	53.3
Assistant Professor	5,725	29.9	232	5.8	5,957	25.7
Associate Professor	4,416	23.1	100	2.5	4,516	19.5
Professor	334	1.7	21	0.5	355	1.5
Total	**19,157**	**100**	**3,996**	**100**	**23,153**	**100**

Table 3.2 Number of Academic Staff in Public Universities Classified by Academic Positions (Commission of Higher Education 2004a)

3) Qualifications of Academic Staff

Qualifications of academic staff within Thai public universities are classified into five categories:

- Lower than Bachelor Degree
- Bachelor Degree
- Graduate Diploma
- Masters Degree
- PhD

Numbers of academic staff classified by categories of degree are: 10 lower than Bachelor Degree, 2,258 Bachelor Degree, 12,676 Master Degree, and 8,209 PhD (see Table 1 in Appendix IV - Part A) (Commission of Higher Education 2004a)

Among the present public and private universities and institutions in the country when ranked academically from first to fourth are: Chulalongkorn, Thammasat, Mahidol, and Kasetsart University. These four universities are state universities (Kasetsart University 2004b). Notably, they have a higher number of PhD academic staff. For example, there are 1,314 PhD academic staff at Chulalongkorn, 402 at Thammasat University, 1,647 at Mahidol University, 694 at Kasetsart University respectively (see Table 1 in Appendix IV - Part A) (Commission of Higher Education 2004a).

Among all Thai universities, Chulalongkorn is the first Thai institution of higher learning, and officially came into being as a higher institution in March 1917.

However, the groundwork and preparation for it in terms of planning and development took place earlier than this (Chulalongkorn University 2004).

Other than this, within the 26 private universities the total academic staff is 9,806 include 1,854 with Bachelor Degree, 3 with Graduate diplomas, 5,380 with Master Degree, and 1,160 with PhD. Qualification within the 28 private colleges, total academic staff is 1,867 including 456 Bachelor Degree, 1,271 Master Degree, and 140 with PhD qualification (Commission of Higher Education 2004a).

3.5.2 Enrolment

In order to present the big picture of Thai universities and institutes, other than details of university staff it is useful to know the number of enrolments in all Thai universities and institutes. Total enrolments are 1,667,736 include 21,108 in courses lower than Bachelor, 1,532,993 Bachelor, 3,245 graduate Diploma, 111,767 Master, and 8,623 PhD (see Table 2 in Appendix IV - Part A) (Commission of Higher Education 2004c).

In the category of Public universities and institutes which include limited admission universities, unlimited admission universities, and autonomous universities, the total number of enrolments is 1,013,565 including 12,152 lower than Bachelor, 884,698 Bachelor, 3,120 graduate Diploma, 105,987 Master, and 7,608 PhD respectively.

- In limited admission universities total enrolments are 336,570 including 2,586 lower than Bachelor, 236,403 Bachelor, 2,916 Graduate Diploma, 88,362 Master and 6,303 PhD.

- In unlimited admission universities (Open University) total enrolments are 652,564 including 9,566 lower than Bachelor, 629,078 Bachelor, 63 Graduate Diploma, 13,037 Master and 820 PhD.
- In the four Autonomous Universities, total enrolments are 24,431 including 19,217 Bachelor, 141 Graduate Diploma, 4,588 Master and 485 PhD.

For the 54 private universities and colleges (Commission of Higher Education 2004c), total enrolments are 253,605 include 242,052 Bachelor, 11,450 Master and 103 PhD. Clearly, the total enrolments of private universities are significantly less than those of public universities, and account for only 25% of public universities. It is also clear that private universities and colleges have less capability in producing students in higher education levels especially regarding the number of undergraduate and graduate students.

3.5.3 Admission to Public University

Having obtained the secondary school or grade 12 certificate, admission to public tertiary universities and institutions (except Open Universities) is dependent on a candidate successfully passing '*the national university entrance examination*' which is organised by a committee consisting of representatives of public universities and the Ministry of Education. In addition, some public universities have their own quota systems and conduct their own entrance examinations for some special programs (Commission of Higher Education 2007b).

3.6 Business Schools within Thai Public Universities

3.6.1 Business Schools

Within the 24 Public Universities, there are only four universities that have no Business School/Faculty or equivalent in which is offered teaching of "Business Curriculum"or similar. These are Suranaree University of Technology, King Mongkut's Institute of Technology Chaokuntaharn Ladkrabang, King Mongkut's institute of Technology North Bangkok, and King Mongkut's Institute of Technology Thonburi (see Table 1 in Appendix IV - Part B).

3.6.2 Academic Staff

Academic staff in all public universities total 23,153 (see Table 3.2) but in the Business Schools/Faculties there are only around 1,000 faculty members (Commission of Higher Education 2004a). All Public Universities and their Business Schools/Faculties have their own websites (see Table 1 in Appendix IV - Part B), and all academic staff have at least their email addresses offered by their own institution (see Table 2 in Appendix IV - Part B).

3.7 Internet Technology in Thai Public Universities

According to the IT 2010 programme, in the next ten years Thailand aims to move to 'Potential Leader' on the basis of the United Nations' standard as mentioned in chapter 2 (NECTEC 2001). In addition, the government has a policy of supporting IT to facilitate teaching and learning processes. In accordance, the Ninth National Economic and Social Development Plan (2002-2006)(Government of Thailand 2001, p. 100) stated that:

> "*Information Technology should be adopted to facilitate teaching and learning processes and teaching instruments to disseminate information and knowledge.*"

Thus, according to government policy, there are networks that link to all state universities. Other important networks regarding research and education are, for example, "ThaiSarn" (Thai Social/Scientific Academic and Research Network), NSTDA, Kanchanpisek Network and SchoolNet Thailand projects (Public Internet Exchange 1998). All Thai Public Universities especially in Bangkok have computer facilities and networking include *intranet, extranet and Internet* to facilitate the teaching and learning environment. Some universities were set up just a few years ago and their computer facilities are still at the beginning of their development. Since all public universities have their computer facilities and networking on board, academic staff and students can use these computer facilities and networking to communicate with others not only within the Campus but also outside the Campus and to the outside world. For example, Kasetsart University (KU) is one Public University that has a big computer centre within the main campus linked to other campuses and to other places. KU has its computer facilities developed to cope with the changing technology environment and in order to follow one of KU's objectives, which targeted to become an e-University in the near future. Developing IT at the university will help KU to maintain its educational goals (Kasetsart University 2004a).

Regarding telecommunication infrastructure, Thailand now has five satellites in geostationary orbit with corresponding Thai-based customer service facilities. These five satellites are owned and operated by Shin Satellite Public Company Limited. It contains some of the most advanced satellite technology in the world. It was the first company in Thailand to be allowed to operate the national satellite project, and the first privately-owned satellite company in Asia. His Majesty King Bhumiphol Adulyadej provided a name for the satellite series, Thaicom, symbolizing the link between Thailand and modern communications technology (THAICOM Satellite 2006b).

These five satellites are THAICOM-1 (launched in 1993), THAICOM-2 (launched in 1994), THAICOM-3 (launched in 1997), THAICOM-4 or IPSTAR (launched in 2005), and THAICOM-5 (launched in 2006). As one of the largest commercial satellite companies in Asia, Shin Satellite PLC has conceived a new generation of Internet Protocol (IP) satellite that would serve the demand for high-speed broadband Internet access in the future. Broadband via satellite has always suffered from high cost compared to other available systems. The company developed IPSTAR technology to increase system capacity and efficiency such that the cost of service would be considerably lower than that currently provided by conventional satellites. THAICOM-4 or IPSTAR-1 is the first of a new generation of broadband satellites that acts both as an Internet backbone connection to fibre optic cables for ISPs and as a last-mile broadband Internet service to consumers, competing with cable modem and ADSL. THAICOM-4 or IPSTAR-1 satellite is one of the largest communications satellites ever built, with a massive bandwidth capacity of 45 Gbps, almost equivalent to all satellites serving Asia today (THAICOM Satellite 2006a).

THAICOM-5 is a three-axis stabilized spacecraft with a payload capacity of 25 C-Band and 14 Ku-Band transponders. Global beam coverage on THAICOM-5 spans over four continents and can service users in Asia, Europe, Australia, and Africa. The high-powered Ku-Band transponders, with both spot and steerable beams, are ideally suited to Digital DTH services for Thailand and other countries in the region. The satellite services help companies and governments broadcast television, connect to the Internet via satellite or link communications among countries under the Thaicom footprint, which covers Asia, Australia, Africa, the Middle East and most of Europe. This satellite system is an important integral part of the infrastructure development in the country (THAICOM Satellite 2006a).

3.8 Summary

The development of Thai higher education is heavily depended on the Thai public university sector, because the Thai public university sector has a greater amount of government support and academic staff along with a greater number of student enrolments. Generally, the universities within the sector especially the universities fully supported by the government have followed government policies regarding their operations. The background of the Thai public university sector enrolments, academic staff, and its business schools along with the infrastructure of the country associated with Internet technology have been presented.

CHAPTER 4
TECHNOLOGY ACCEPTANCE THEORIES AND MODELS

4.1 Introduction

Researchers in the area of Information Systems and Information Technology are interested in investigating the theories and models that will have power in predicting and explaining behaviour across many domains. The main objectives of these studies are to investigate how to promote usage and also examining what hinders usage and intention to use the technology. Each prominent technology acceptance theory or model which has not been superseded by more recent research has different premises and benefits. It is therefore important to study them intentionally, since it is expected that theoretical concepts from these theories will help to provide a sound basis for the theoretical framework for creating a research model that could properly demonstrate the acceptance of Technology for this research.

In this regard, this chapter will review and discuss the literature in relation to nine prominent technology acceptance theories/models according to the first research objective (see Chapter 1). They include (1) Innovation Diffusion Theory (IDT), (2) Social Cognitive Theory, (3) Theory of Reasoned Action (TRA), (4) Theory of Planned Behaviour(TPB), (5) Decomposed Theory of Planned Behaviour (DTPB), (6) Technology Acceptance Model (TAM), (7) Technology Acceptance Model 2(TAM2), (8) Combined TAM and TPB(C-TAM-TPB), and (9) The Unified Theory of Acceptance and Use of Technology (UTAUT). In addition, literature about IT adoption and usage within four study contexts including technology, organisational, individual and cultural context will be examined in accordance with the second research objective (see Chapter 1). Hopefully, the many diverse theoretical perspectives of these four contexts from previous studies will enable a comprehensive understanding of individual acceptance of technology used, to formalise the theoretical framework for this study.

4.2 Innovations Diffusion Theory (IDT)

Innovations Diffusion Theory (IDT) has been used since the 1950s to describe the innovation-decision process. It has gradually evolved until the best well-known innovation-decision process was introduced by Rogers (Rogers 1962, 1983, 1995; Rogers & Shoemaker 1971). The innovation-decision process is one through which an individual (or other decision-making unit) passes (1) from first knowledge of an innovation, (2) to forming an attitude toward the innovation, (3) to a decision to adopt or reject, (4) to implementation of the new idea, and (5) to confirmation of this decision. There are five functions or stages of the model (Rogers 1995).

1) Knowledge occurs when an individual is exposed to an innovation's existence and gains some understanding of how it functions.
2) Persuasion occurs when an individual forms a favourable or unfavourable attitude toward the innovation.
3) Decision occurs when an individual becomes involved in activities that lead to a decision to adopt or reject the innovation.
4) Implementation occurs when an individual puts an innovation into use.
5) Confirmation occurs when an individual seeks reinforcement for an innovation-decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about the innovation.

In the persuasion stage (Rogers 1995), five attributes that persuade an individual to adopt the innovation are:

1) relative advantage
2) compatibility
3) complexity
4) trialability
5) observability

Relative advantage (Rogers 1995) is the degree to which an innovation is perceived as being better than the idea it supersedes, the degree of relative advantage is often expressed in economic profitability but the relative advantage dimension may be measured in other ways (e.g. social). Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of the receivers. Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use. The complexity of an innovation is negatively related to its rate of adoption. Trialability is the degree to which an innovation may be experimented with on a limited basis. Observability is the degree to which the results of an innovation are visible to others. This model of innovation (see Figure 4.1) is one of the most well known theories associated with the adoption of new technology up until now.

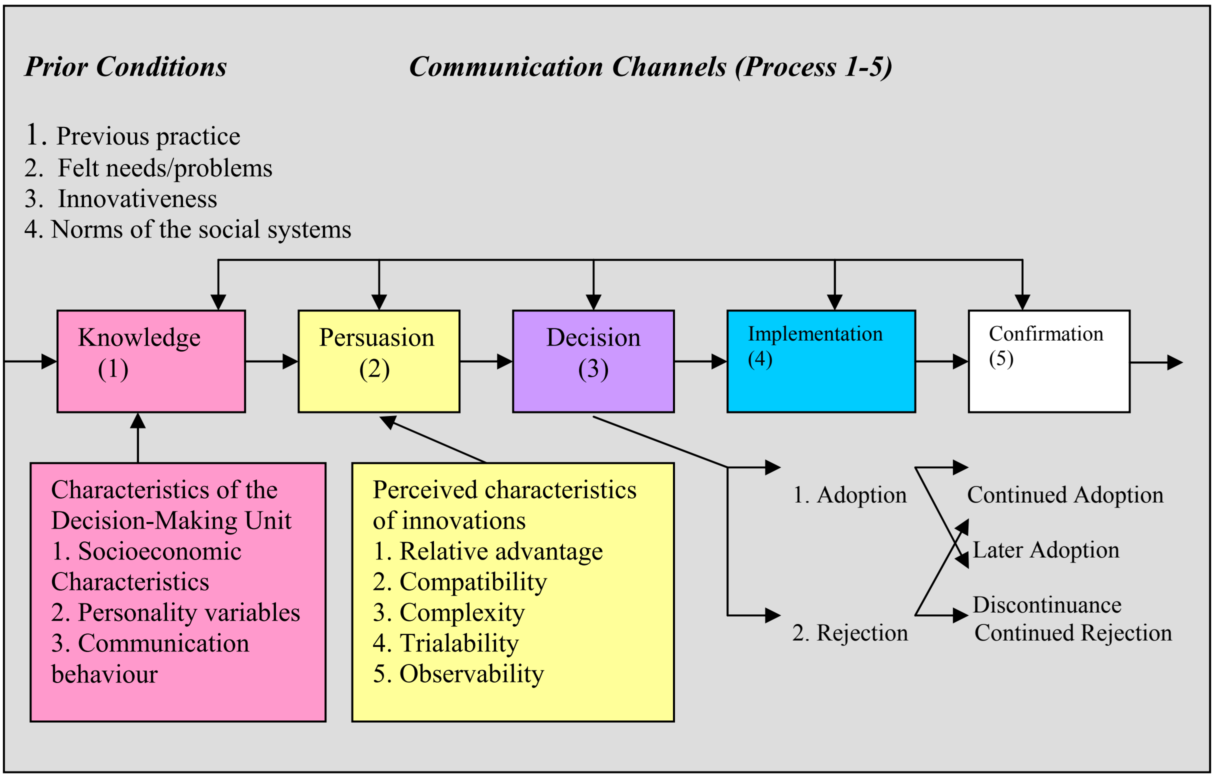

Figure 4.1 A model of stages in the Innovation-Decision Process (Rogers 1995)

4.3 Social Cognitive Theory (SCT)

The social foundations of thought and action: a social cognitive theory was published by Bandura (1986). The theoretical perspective of SCT suggests that human functioning should be viewed as the product of a dynamic interplay of personal, behaviour, and environmental influences. How people interpret the results of their own behaviour informs and alters their environments and the personal factors they possess which, in turn, inform and alter subsequent behaviour. This is the foundation of conception of reciprocal determinism by Bandura (1986), which views: (a) personal factors in the form of cognition, affect, and biological events, (b) behaviour, and (c) environmental influences that create interactions that result in a triadic reciprocality (see Figure 4.2). Bandura altered the label of his theory from social learning to social 'cognitive' both to distance it from prevalent social learning theories of the day and to emphasize that cognition plays a critical role in people's capability to construct reality, self-regulate, encode information, and perform behaviours.

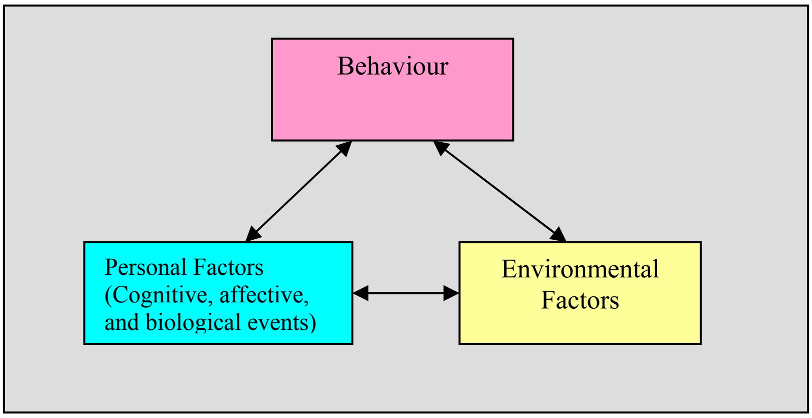

Figure 4.2 Social Cognitive Theory (Bandura 1986)

4.4 Theory of Reasoned Action (TRA)

Ajzen and Fishbein developed a versatile behavioural theory and model in 1980 called the Theory of Reasoned Action (TRA) (TCW 2004). This model forms the backbone of studies associate with attitude-behaviour relationships. This has been adapted for use in many fields and is widely used in academia and business today (Magee 2002). The TRA (Ajzen & Fishbein 1980; Leach, Hennessy & Fishbein 1994) postulates that beliefs influence attitude and social norms which in turn shape a behavioural intention guiding or even dictating an individual's behaviour. Intention is the cognitive representation of a person's readiness to perform a given behaviour, and it is considered to be the immediate antecedent of behaviour.

TRA has two core constructs (main determinants) of intention: (1) attitude toward behaviour (ATB) and (2) subjective norm (SN) associated with that behaviour (see Figure 4.3). The attitude toward the behaviour (ATB) is the previous attitude of a person toward performing that behaviour. It suggests that people think about their decisions and the possible outcomes of their actions before making any decision to be involved or not involved in a given behaviour. This theory views the intention of an individual whether to perform a given behaviour or not as the immediate determinant of action, and attitude is determined by the person's beliefs and evaluation of behavioural outcomes. So an individual, who strongly believes that positive outcomes will result from performing a particular behaviour, will have positive attitudes towards that behaviour. On the other hand, if a person strongly believes that a particular behaviour will have a negative outcome, then there will be negative attitudes towards that behaviour.

Subjective norm (SN) is the social pressure exerted on the person or the decision maker to perform the behaviour. SN refers to an individual's perception about what other people think of his or her behaviour in question (Leach, Hennessy & Fishbein 1994). What other individuals or groups will think, agree or disagree about the decision of a person to perform a given behaviour and how important these other individuals or groups are to the decision maker play a vital role. So it is normal that sometimes people will consult others before making any decisions.

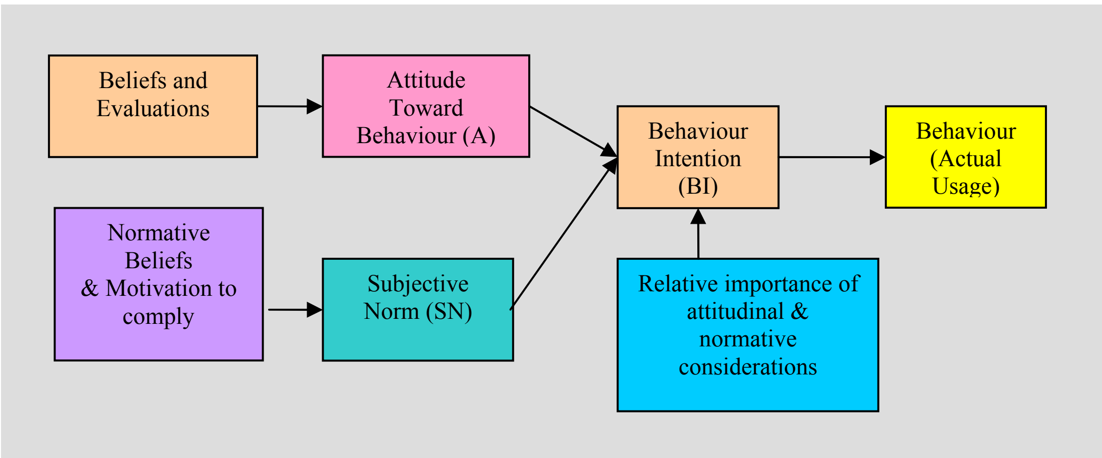

Figure 4.3 Theory of Reasoned Action (TRA) (Ajzen & Fishbein 1980)

TRA is a general well-researched intention model that has been applied extensively in predicting and explaining behaviour across many domains and virtually any human behaviour (Ajzen & Fishbein 1980). IS researchers often use this theory to study the determinants of IT innovation usage behaviour (Han 2003). Although current models of technology acceptance have their roots in many diverse theoretical perspectives, much literature related to technology acceptance begins studies with the Theory of Reasoned action (TRA).

4.5 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) is proposed as an extension of the Theory of Reasoned Action (which was related to voluntary behaviour), because of the limitations of TRA in dealing with behaviours over which people have incomplete volitional control. The TPB introduced a third independent determinant of intention, perceived behaviour control (PBC).

For this reason, TPB was introduced by Ajzen in 1985 (Ajzen 1985) The theory was called the theory of planned behaviour (TPB) since it evolved from the Theory of Reasoned Action, with an additional construct (PCB). According to Ajzen (1991), TPB incorporates an additional construct in order to account for situations where an individual lacks the control or resources necessary for carrying out the targeted behaviour freely. TPB is a theory that predicts deliberate behaviour, because behaviour can be deliberative and planned, and TPB is considered to be more general than TRA because of PCB (Chau & Hu 2002a).

Similar to TRA, the best predictor of behaviour in TPB is intention (TCW 2004). As for TPB, the intention is determined by three core constructs : (1) attitude toward the specific behaviour, (2) subjective norms (SN) and (3) perceived behavioural control (PCB)(Ajzen 1991). Perceived behavioural control influences intentions (perceived behavioural control refers to people's perceptions of their ability to perform a given behaviour). Once again, as a general rule, the more favourable the attitude and subjective norm, and the greater the perceived behaviour control, the stronger should be the individual intend to perform the behaviour in question (see Figure 4.4).

It can be noticed that when given a sufficient degree of actual control over their behaviour, people are expected to carry out their intentions when the opportunity arises. Examples of items that can be researched with the theory of planned behaviour are whether to wear a seat belt, and whether to check oneself for disease.

In addition, according to the TPB, human behaviour is guided by three kinds of beliefs (Ajzen 2002):

1) Behavioural beliefs - beliefs about the likely outcomes of the behaviour and the evaluations of these outcomes. These beliefs produce a favourable or unfavourable attitude toward the behaviour.

2) Normative beliefs refer to the perceived behavioural expectations of such important referent individuals or groups as the person's spouse, family, friends, and teacher, doctor, supervisor, and co-workers, depending on the population and behaviour studied. These beliefs result in perceived social pressure or subjective norm.

3) Control beliefs - beliefs about the presence of factors that may facilitate performance of the behaviour and the perceived power of these factors. These beliefs indicate whether the person feels in control of the action in question and they give rise to perceived behavioural control.

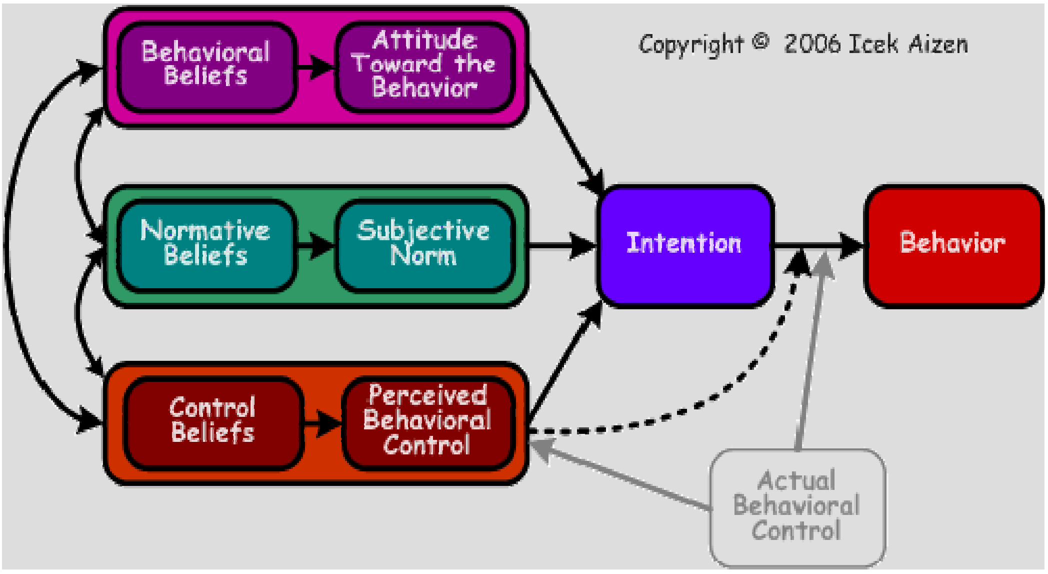

Figure 4.4 Theory of Planned Behaviour (TPB) Diagram (Ajzen 2006)

By changing these three predictors (attitude, subject norm and perceived behaviour control), the chance that the person will intend to do a desired action can be increased and thus increase the chance of the person actually doing it. Ajzen developed TPB a long time ago, and it is the explicit theoretical basis for 222 studies published in the Medline database, and 610 studies published in the PsycINFO database, from 1985 to January 2004 (Ajzen 2006).

4.6 Decomposed Theory of Planned Behaviour (DTPB)

The Decomposed TPB (DTPB) was introduced by Taylor and Todd in June 1995 in their study titled "Understanding Information Technology usage: a test of competing models". This model more completely explores the dimensions of attitude belief, subjective norm (i.e., social influence) and perceived behavioural control by decomposing them into specific belief dimensions (Taylor & Todd 1995b). The DTPB suggests that behavioural intention is the primary direct determinant of behaviour, nevertheless, the original three core constructs still exist: attitude toward behaviour (ATB), subjective norm (SN), and perceived behaviour control (PBC) as first introduced in TPB (see Figure 4.5).

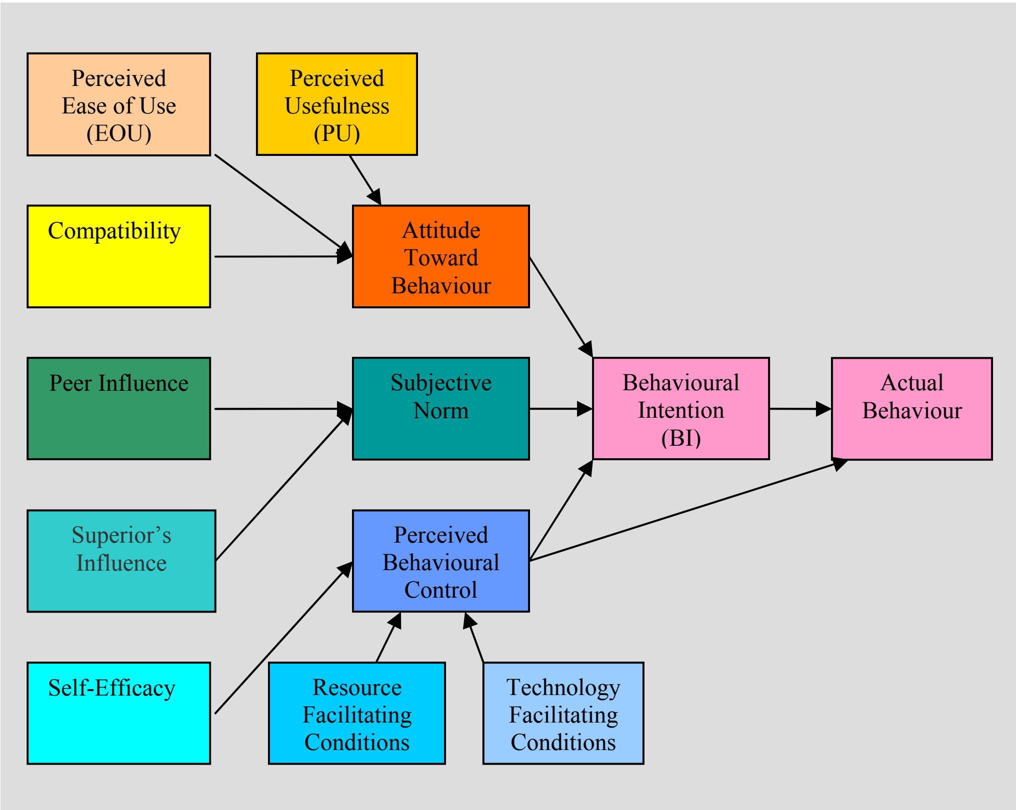

Figure 4.5 Decomposed Theory of Planned Behaviour(DTPB) (Taylor & Todd 1995b)

Taylor and Todd (1995b) suggest decomposing attitudinal belief into three factors: perceived usefulness (PU), perceived ease of use (PEOU), and compatibility. These three factors have been found to be consistently related specifically to IT usage.

Normative belief was decomposed into peer influence and superior's influence, because each may have different views on IT usage. For example, peers of the user may be opposed to the use of a particular system, because they think it requires too much change in their work processes. But superiors of the user may be encouraging the use of the system because they anticipate certain productivity payoffs. In such a situation, a monolithic normative structure may show no influence on subjective norm or intention because the effects of the referent groups may cancel each other out. So it has been suggested to decompose normative belief into two referent groups (peers and superiors) because the expectations of peers, and superiors may be expected to differ (Taylor & Todd 1995b).

Perceived behaviour control (PBC) was decomposed into three constructs: self-efficacy, resource facilitating conditions, and technology facilitating conditions. Self-efficacy (Bandura 1977) is related to perceived ability, and it is anticipated that higher levels of self-efficacy will lead to higher levels of behavioural intention and IT usage (Compeau, D.R. & Higgins 1991). The facilitating conditions construct provides two dimensions for control beliefs: one relating to resource factors (resource facilitating conditions) such as time and money and the other relating to technology compatibility issues (technology facilitating conditions) that may constrain usage. The absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage. However the presence of facilitating resources may not encourage usage (Taylor & Todd 1995b). This model seemed to have more capability in explaining usage behaviour although is a less parsimonious model when compared to TPB.

4.7 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed from TRA by Davis (Davis 1989). This model used TRA as a theoretical basis for specifying the causal linkages between two key beliefs: perceived usefulness and perceived ease of use and users' attitudes, intentions and actual computer usage behaviour. Behavioural intention is jointly determined by attitude and perceived usefulness. Attitude is determined by perceived usefulness (PU) and perceived ease of use (PEOU) (see Figure 4.6). TAM replaces determinants of attitude of TRA by perceived ease of use and perceived usefulness. Generally, TAM specifies general determinants of individual technology acceptance and therefore can be and has been applied to explain or predict individual behaviours across a broad range of end user computing technologies and user groups (Davis, Bagozzi & Warshaw 1989).

The goal of TAM is to provide an explanation of the determinants of computer acceptance that is in general capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified. But because it incorporates findings accumulated from over a decade of IS research, it may be especially well-suited for modelling computer acceptance (Davis, Bagozzi & Warshaw 1989).

Fred F.D. Davis introduced the Technology Acceptance Model (TAM) as an adaptation of TRA in 1986 in his dissertation at Slone School of Management, Massachusetts Institute of Technology (Davis 1986). His dissertation was titled "A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results". He then published "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology" in MIS Quarterly in 1989. In addition, he published "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models" with Bagozzi and Warshaw in Management Science in 1989. Each of these works introduced the original work on TAM. Now Fred D. Davis is a Professor at Sam M. Walton College of Business, University of Arkansas. The Technology Acceptance Model has made him the most well-known researcher in this area of study (Davis 2004).

As of January 2000, the Institute for Scientific Information's Social Science Citation Index listed 517 journal citations for the two journal articles by Davis (1989) and Davis, Bagozzi and Warshaw (1989) that introduced TAM (Gentry & Calantone 2002). In ten years, TAM has become well-established as a robust, powerful, and parsimonious model for predicting user acceptance (Venkatesh & Davis 2000).

Davis (1989) developed and validated better measures for predicting and explaining use which focused on two theoretical constructs: perceived usefulness and perceived ease of use, which were theorised to be fundamental determinants of system use. Aside from their theoretical values, better measures for predicting and explaining system use would have great practical value, both for vendors who would like to assess user demand for new design ideas, and for information systems managers within user organisations who would like to evaluate these vendor offerings.

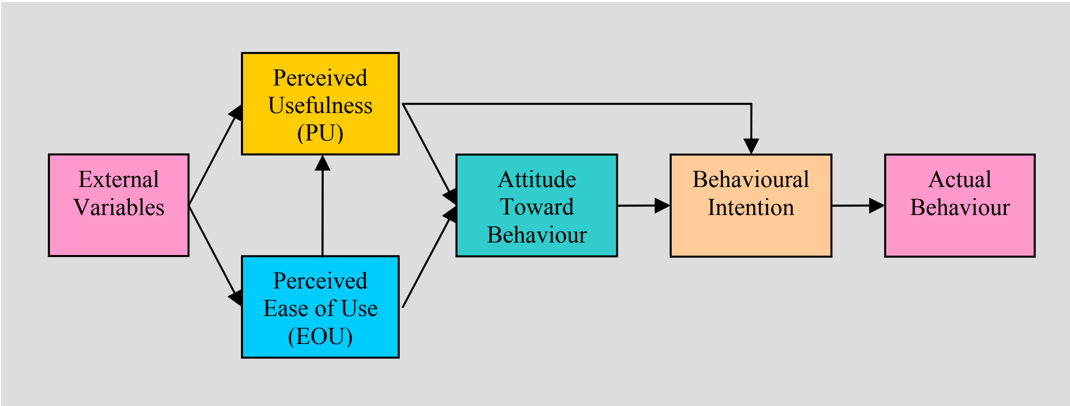

Figure 4.6 Technology Acceptance Model (TAM) (Davis, Bagozzi & Warshaw 1989)

TAM theorised that the effects of external variables (e.g., system characteristics, development process, training) on intention to use are mediated by perceived usefulness and perceive ease of use. Perceived usefulness is also influenced by perceived ease of use because if other things are equal, the easier the system (technology) is, the more useful it can be (Venkatesh & Davis 2000).

One assumption made by TAM is that usage of a particular technology is voluntary (Davis 1989). Another assumption is that, given sufficient time and knowledge about a particular behavioural activity, an individual's stated preference to perform the activity (i.e. behavioural intention) will in fact closely resemble the way they do behave. This assumption only applies when the behaviour is under a person's volitional control (Ajzen & Fishbein 1980). Moreover, TAM has strong behavioural elements; it assumes that when someone forms an intention to act, they will be free to act without limitation. In the real world there will be many constraints, such as limited ability, time constraints, environmental or organisational limits, or unconscious habits which will limit the freedom to act (Bagozzi 1992).

4.8 Technology Acceptance Model 2(TAM2)

TAM2 was developed by Venkatesh and Davis, and it was first introduced in Management Science in 2000 on the research paper titled, "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies"(Venkatesh & Davis 2000). The goal of TAM2 is a theoretical extension of the Technology Acceptance Model (TAM) to (1) include additional key determinants of TAM that explain perceived usefulness and usage intensions in terms of social influence and cognitive instrumental processes and (2) to understand how the effects of these determinants change with increasing user experience over time with the target system. A better understanding of the determinants of perceived usefulness would enable us to design organizational interventions that would increase user acceptance and usage of new systems (technologies) (see Figure 4.7).

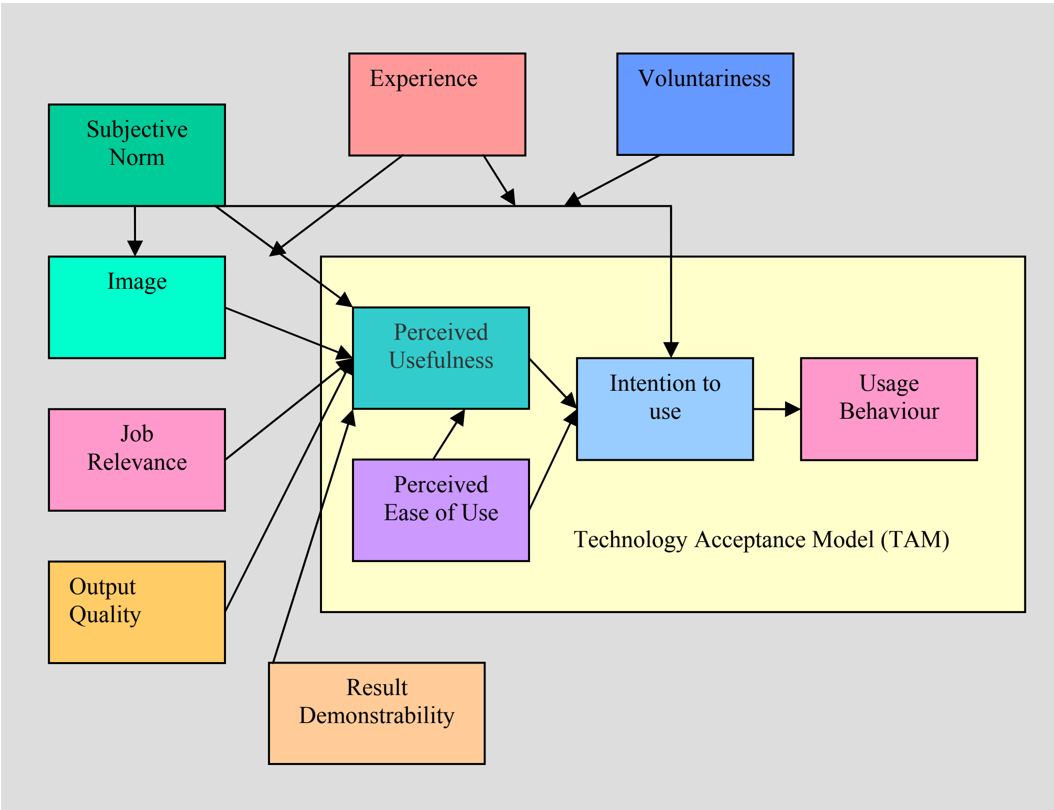

Figure 4.7 TAM2 - Extension of TAM (Venkatesh & Davis 2000)

The extended model (TAM2) was tested using longitudinal data collected regarding four different systems at four organisations, two involving voluntary usage and two involving mandatory usage. Model constructs were measured at three points in time at each organisation: pre-implementation, one month post-implementation, and three months post-implementation. The extended model was strongly supported for all four organisations at all three points of measurement, accounting for 40% to 60% of the variance in usefulness perceptions and 34% to 52% of the variance in usage intentions. Both social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) significantly influenced user acceptance (Venkatesh & Davis 2000).

4.9 Augmented TAM or Combined TAM and TPB (C-TAM-TPB)

TAM does not include the influence of social and control factors on behaviour but those factors have been found to have a significant influence on IT usage behaviour (Mathieson 1991; Moore & Benbasat 1991; Taylor & Todd 1995b; Thompson, Higgins & Howell 1991). It can be noted that these factors are also key determinants of behaviour in the Theory of Planned Behaviour (Ajzen 1991).

The study by Taylor and Todd in 1995 therefore added two factors: subjective norm and perceived behavioural control to TAM to provide a more complete test of the important determinants of IT usage, because of their predictive utility in IT usage research and their wide use in social psychology (Taylor & Todd 1995b). The model referred to "Augmented TAM" or "Combined TAM and TPB" (C-TAM-TPB) (see Figure 4.8).

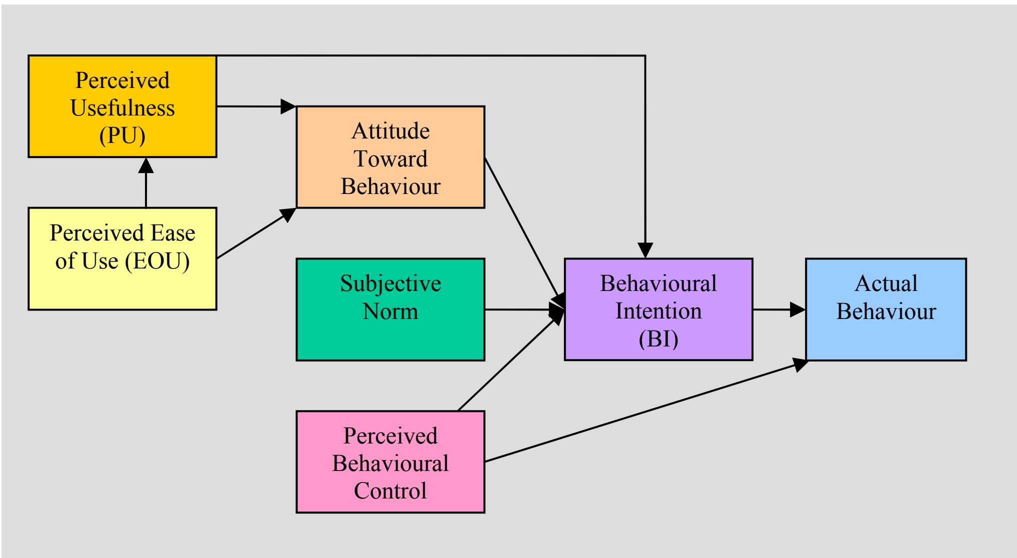

Figure 4.8 Augmented TAM (C-TAM-TPB) (Taylor & Todd 1995a)

Taylor and Todd (1995a) suggest that augmented TAM provides an adequate model of IT usage for both experienced and inexperienced users, accounting for a reasonable proportion of the variance in intention and behaviour. For both groups, all direct determinants of intention, except attitude, were significant. Therefore, the augmented TAM can be used to predict subsequent usage behaviour prior to users having any experience with a system (technology). This suggests that this model can be used to predict usage for people who have never used the technology before as well as the capacity to predict usage for people who have used the technology or for people who are familiar with the technology. So IT usage models may be employed diagnostically prior to implementation or after implementation both with inexperienced and experienced users.

4.10 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh, Morris, Davis, G.B. and Davis F.D.(2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT) with four core determinants of intention and usage, and up to four moderators of key relationships. The UTAUT was formulated by theorising four constructs to play an important role as direct determinants of user acceptance and usage behaviour:

1) performance expectance
2) effort expectancy
3) social influence
4) facilitating conditions

Attitude toward using technology, self-efficacy, and anxiety are theorised not to be direct determinants of intention. The key moderators in the model are gender, age, voluntariness, and experience (see Figure 4.9).

From a theoretical perspective, UTAUT (Venkatesh et al. 2003) provides a refined view of how the determinants of intention and behaviour evolve over time, it is important to emphasise that most of the key relationships in the model are moderated. For example, age has received very little attention in the technology acceptance research literature, but the findings from the study of UTAUT indicate that it moderates all of the key relationships in the model. In addition, gender which has received some recent attention is also a key moderating influence, which is consistent with the findings in the sociology and social psychology literature e.g. Levy (1988).

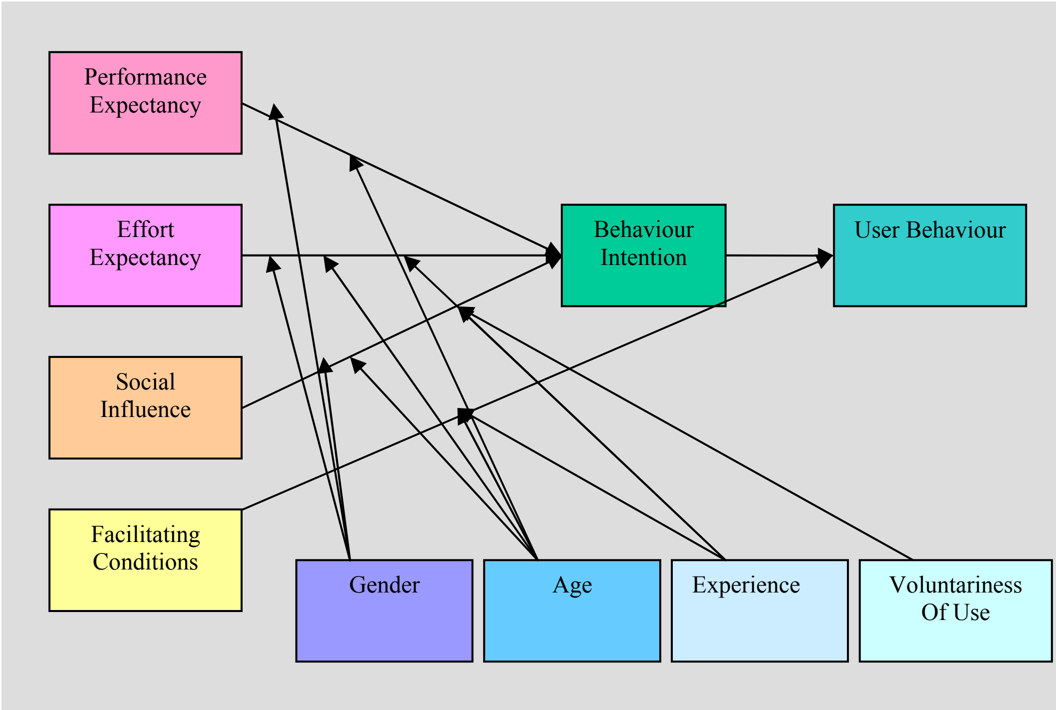

Figure 4.9 Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003)

With this rational, moderators such as age and gender, which show the complex nature of the interactions observed, raise several interesting issues to investigate in future research. An especially important issue of interest in today's societal and workplace environments is creating equitable settings for women and men of all ages (Venkatesh et al. 2003).

4.11 Comparison of Models in the Literature

Generally, there are three groups of theories:

1) The innovations Diffusion Theory (IDT) suggests that the user's perception of the characteristics of an innovation affect adoption (Moore & Benbasat 1991; Plouffe, Hulland & Vandenbosch 2001; Rogers 1995).

2) The intention-based theories of IT adoption such as TAM (Davis 1989; Davis, Bagozzi & Warshaw 1989; Venkatesh & Davis 1996, 2000) and TPB

(Mathieson 1991; Taylor & Todd 1995b; Venkatesh & Brown 2001) have shown that user adoption and usage of an IT innovation is ultimately determined by personal beliefs and attitudes toward the information systems.

3) Other theories such as Social Cognitive Theory (SCT) (Compeau, D.R. & Higgins 1995; Compeau, D.R., Higgins & Huff 1999) and Triandis' model (Cheung, Chang & Lai 2000; Thompson, Higgins & Howell 1991, 1994) that have been applied to user adoption of IS studies.

The model comparison will be made among these theories but heavily weighted on TRA, TAM, TPB, DTPB, C-TAM-TPB and UTAUT because of the similarities of the concepts associated with the personal beliefs in determining IT adoption and usage. A comparison of these theories will help to identify any differences or similarities among them.

4.11.1 TAM and TRA

Davis, Bagozzi and Warshaw (1989) compared the TAM with TRA in their study. The confluence of TAM and TRA led to a structure based on only three theoretical constructs: behaviour intention (BI), perceived usefulness (PU) and perceived ease of use (PEOU). Social norms (SN) as an important determinant of behavioural intention were found to be weak in this study. TAM does not include social norms (SN) as a determinant of BI, which is an important determinant theorised by TRA and Theory of Planned Behaviour (TPB). Davis, Bagozzi and Warshaw (1989) explained that SN scales have a very poor psychometric standpoint, and may not exert any influence on BI, especially when IS applications are fairly personal while individual usage is voluntary. Generally, the comparisons confirmed that TAM is parsimonious and easy to apply across different research settings; nevertheless, it has to pay the trade-off of losing information richness derived from the studies. However, TAM compared favourably with TRA and TPB in parsimonious capability (Han 2003).

4.11.2 TAM, TPB, and DTPB

Mathieson (1991) compared the TAM with TPB, and results indicated that TAM and TPB explained intention very well. The information TPB derived was probably more useful during system development and post-implementation evaluation than the information TAM provided. TPB delivers more specific information, giving more insight into why an individual or group might not use a technology. However, TAM was easier to use than TPB, and provides a quick and inexpensive way to gather general information about an individual's perception of a technology.

Taylor and Todd (1995b) compared the TAM to a traditional version of Theory of Planned Behaviour (TPB) and a decomposed version of TPB(DTPB) to assess which model best helps to understand usage of information technology in their study. The DTPB should have more advantages than TAM in that it does not only identify specific salient beliefs (perceived usefulness, and perceived ease of use) that may influence IT usage as TAM does, but also incorporates additional factors(subject norm and perceived behaviour control) that are not presented in TAM. These additional factors have been found to be important determinants of behaviour (Ajzen 1991). Therefore, DTPB should provide a more complete understanding of technology usage (Taylor & Todd 1995b).

According to Taylor and Todd (1995b), DTPB takes the inclusion of seven more constructs in the DTPB model to increase the predictive power of behaviour 2% over TAM. However, it helps to better understand subjective norm and perceived behavioural control and their roles as determinants of behavioural intention. As a result, it provides a better understanding of behavioural intention. If the central goal is to predict IT usage, it can be argued that TAM is preferable. However, the DTPB model provides a more complete understanding of the determinants of intention. Both TAM and DTPB provide some very useful and direct indicators of behavioural intention and usage behaviour and the DTPB provides the richest understanding of these factors. While TAM focuses on system design characteristics and is of particular use as a guide to design efforts, the DTPB model includes these design factors, but also draws attention to normative and control factors that an organisation can work with to facilitate implementation. Normative beliefs, self-efficacy, and facilitating conditions, the additional components of the DTPB, provide managers with leverage points from which to manage the successful deployment of IT. Normative beliefs speak to the importance of communication and user participation and avenues for reaching these procedures. Furthermore, they provide an important rationale for the impact of top management support. Self-efficacy places a focus on training as an important mechanism to influence system acceptance. Finally, the impact of facilitating conditions (resource facilitating conditions and technology facilitating conditions) should alert management to possible barriers to use etc. Thus, the DTPB may be particularly relevant to providing guidance during implementation efforts. Moreover it may provide a linkage between the study of individual IT usage and the impact of organisational IT deployment decisions on the value of IT to the organisation.

In conclusion, each model has clear strengths (TAM, TPB and DTPB). All of them provided comparable fit to the data. In terms of the ability to explain IT usage behaviour, the results show that the TAM and the two TPB models are comparable. However, when behavioural intention is considered, the results show improvement in explanatory power for both the original TPB and DTPB over the TAM. In the other words, while the TAM is useful in predicting IT usage behaviour, the DTPB provides a more complete understanding of behaviour and behavioural intention by accounting for the effects of normative and control beliefs. This should help to better manage the system implementation process by focusing attention on social influences and control factors in the organisation that influence IT usage (Taylor & Todd 1995b).

In addition, Chau and Hu (2001) compared TAM, TPB and DTPB in understanding individual physicians' usage of telemedicine technology. The results illustrated that TAM explained 40% of the variances, TPB explained 32% and DTPB explained 42% in physicians' acceptance of telemedicine technology. PU was a significant determinant of attitude and BI in both TAM and DTPB models, PEOU did not have any effects on PU or attitude in all models. The findings suggested that instruments that have been developed and repeatedly tested in studies involving end-users and business managers in ordinary business settings may not be equally valid in a professional setting such as physicians.

4.11.3 TPB and DTPB

The DTPB is preferable to the original TPB because it provides better diagnostic value than the original TPB model. DTPB increases explanatory power and a better, more precise understanding of the antecedents of behaviour by providing the additional belief constructs:

1) Attitude toward behaviour comprises perceived usefulness, perceived ease of use, and compatibility.
2) Subjective norm comprises peer influence, and superior's influence.
3) Perceived behavioural control (which is referred to as control influence) comprises self-efficacy, resource facilitating conditions, and technology facilitating conditions.

DTPB suggests specific beliefs that can be targeted by designers or managers interested in influencing system usage. It also provides greater insight into the factors that influence IT usage (Taylor & Todd 1995b).

4.11.4 UTAUT and Other Theories

Typically, among the models, fit statistics and explanatory power being equivalent, the best model is the one which is the most parsimonious (Bagozzi 1992). Because of this, a model that provides good prediction while using the fewest predictors is preferable. Nevertheless, other researchers have argued that parsimony is not desirable by itself but rather is desirable only to the extent that it facilitates understanding (Venkatesh et al. 2003). In this respect, assuming reasonable fit and explanatory power, Taylor and Todd (1995b) suggests that models should be evaluated in terms of both parsimony and their contribution to understanding. For predictive, practical applications of the model, parsimony may be more heavily weighted, on the other hand, if trying to obtain the most complete understanding of a phenomenon, a degree of parsimony may be sacrificed.

In addition, Venkatesh et al.(2003) compared eight models in association with core constructs, beliefs, moderators and percentage of explained variance including TRA, TAM, a motivational model (MM), TPB, C-TAM-TPB, a model of PC utilization (MPCU), IDT, and SCT. They found that the eight models explained between 17% and 53% of the variance in user intention to use information technology. For instance, the variance explained by TAM2 increased to 53% and TAM including gender increased to 52% when compared to approximately 35% in cross-sectional tests of TAM without moderators). Table 4.1 presents models comparison according to the study of Venkatesh et al.(2003) include IDT, SCT, TRA, TPB, DTPB, TAM, TAM2, C-TAM-TPB, and UTAUT. Moreover, BI explained the variance of usage behaviour of around 39%. After comparing these models, they formulated the UTAUT and tested using the original data as for the eight models, and it was found that the result outperformed the eight individual models (69% adjusted R^2). As for this result, UTAUT seemed to be the best theory that should provide a useful tool for management needing to assess the likelihood of success for technology introduction. Moreover, UTAUT helps to understand the drivers of acceptance in order to proactively design interventions including training targeted at populations of users that may be less inclined to adopt and use new technology.

From the literature relating to these theories, it was found that the UTAUT has the highest power in explaining behaviour intention and usage (because an adjusted R^2 was 69% as mentioned). It does this more completely than other theories, contributing to better understanding about the drivers of behaviour. With this rationale, I would like my research to be based rather heavily on this theory as a theoretical framework. However, consideration of other theories to form the theoretical framework for this research should be made as well because of the interesting premises and significant benefits of other theories in enabling description of usage behaviour.

Figure 4.10 presents the overall picture of the formation of the research model (Internet Acceptance Model – “IAM”). The formation of the research model is based on the significant aspects of these nine theories/models as previously discussed. The details of how the research model was developed will be discussed in chapter 5.

Theory/ Model	Belief	Core Construct	Moderator	Predicting Intention (R^2)*
1. IDT	No	1. Characteristics of Decision-Making Unit (3 variables) 2. Perceived characteristics of Innovations (5 variables)		T1=0.38, T2= 0.37, T3= 0.39
2. SCT	No	1.Personal Factors 2. Environmental F.		T1=0.37, T2=0.36, T3=0.36
3. TRA	1. Beliefs & evaluations 2. Normative beliefs & Motivation to comply	1.Attitude toward behaviour (ATB) 2. Subjective norm (SN)	Base on Voluntary	T1= 0.30, T2=0.26, T3=0.19
4. TPB	1. Behaviour beliefs 2. Normative beliefs 3. Control beliefs	1. ATB 2. SN 3. PBC	No	T1= 0.37, T2= 0.25, T3= 0.21
5.DTPB	1. PU, PEOU, and Compatibility 2. Peer & superior's influence 3. Self efficacy, Resource & Technology Facilitating Condition.	1. ATB 2. SN 3. PBC (Perceived Behaviour Control)	No	T1= 0.37, T2= 0.25, T3= 0.21
6.TAM	1.PU 2.PEOU	1. ATB	No, but based on voluntary	T1=0.38, T2= 0.36, T3=0.37
7.TAM2	1. Subjective norm 2. Image 3. Job relevance 4. Output quality 5.Result demonstrability (All determine PU)	1. PU 2. PEOU	Two: Experience (exp.) & voluntary (vol.)	T1=0.38, T2=0.36, T3=0.37
8.C-TAM-TPB	1. PU 2. PEOU (determine attitude)	1. ATB 2. SN 3. PBC	Experience & inexperience	T1=0.39, T2=0.36, T3=0.39
9.UTAUT	No	1. Performance expectancy 2. Effort expectancy 3. Social Influence 4. Facilitating conditions	Four: gender, age, exp., and vol.	T1=0.35, T2= 0.38, T3=0.36 , Pooled = 0.69

Table 4.1: Models comparison (Venkatesh et al. 2003)

R^2 = in voluntary setting before the effect of moderators, Time 1(T1) = post-training, Time2 (T2) = one month after implementation, Time 3(T3) = three months after implementation

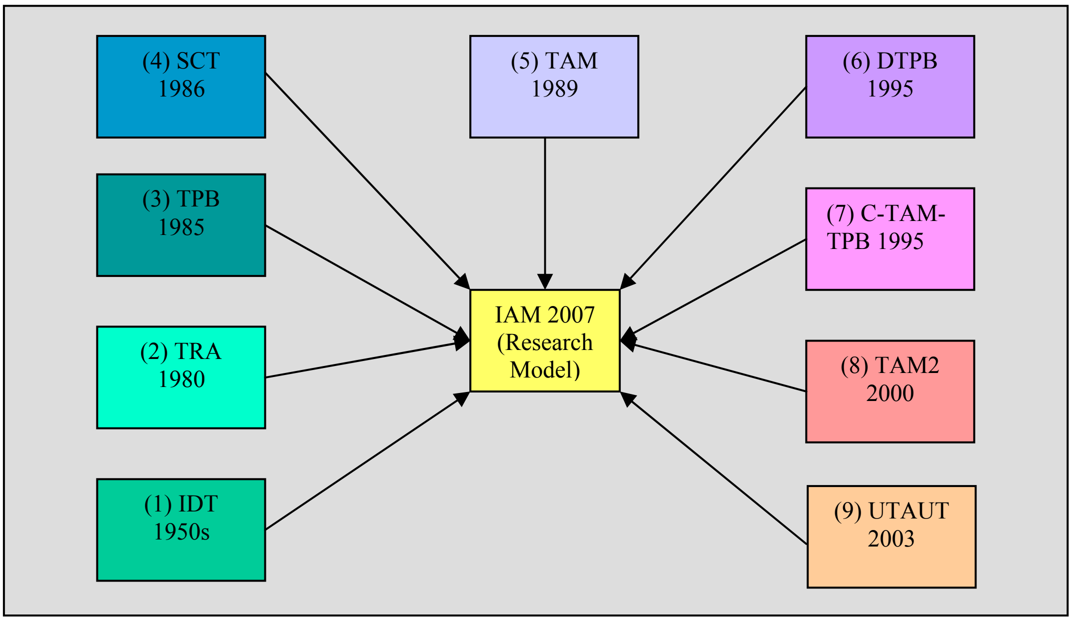

Figure 4.10 Formation of the Research Model (Internet Acceptance Model - IAM) Based on Nine Theories/Models

4.12 Consideration of Moderators in the Literature

The original TAM did not include any moderating effects, and much research suggested incorporating these moderators to include experience, voluntariness, gender and age into the original TAM in order to make better prediction and explanation associated with user behaviour for a particular technology.

4.12.1 Experience and Voluntariness

Usage of a particular technology (system) being voluntary is one of TAM assumptions (Davis 1989). A study by Agarwal and Prasad (1997) showed that perceived voluntariness was significant in explaining current usage, but did not affect the intention to continue use. In TAM2 (Venkatesh & Davis 2000), voluntariness was theorised as an important moderator, a control variable influencing a user's internal beliefs, attitude and intentions with regard to a technology. The results showed that effects of social norms on behavioural intention were significantly moderated by both experience and voluntariness. When usage is mandatory, social norms will directly affect intention. This result is similar to the result from Lucas and Spitler (1999).

In association with the original TPB and DTPB, experience and voluntariness were not explicitly included in the theory. It has been incorporated into TPB via follow-on studies (Morris & Venkatesh 2000). Empirical evidence has demonstrated that experience moderates the relationship between subjective norm and behavioural intention, so subjective norm becomes less important with increasing levels of experience (Venkatesh et al. 2003). This finding was the same as that of Karahanna, Straub and Chervany (1999) who studied in the context of TRA. But Hartwich and Barki (1994) suggest that, although not tested, subjective norm was more important when system use was perceived to be less voluntary.

4.12.2 Experienced and Inexperienced Users

Prior experience has been found to be an important determinant of behaviour (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). Furthermore, past experience may make low probability events more salient, ensuring that they are accounted for in the formation of intentions (Ajzen & Fishbein 1980). This implies that IT usage may be more effectively modelled for experienced users. So it becomes important to assess the utility of models such as the augmented TAM (C-TAM-TPB) for understanding the behaviour of inexperienced users. More importantly, there may be differences between experienced and inexperienced users in the relative influence of the various determinants of IT usage. Such differences may suggest alternative ways to effectively manage the development and implementation of new systems or technologies.

Direct experience will result in a stronger, more stable behavioural intention-behaviour relationship (Ajzen & Fishbein 1980). For experienced users, BI is expected to fully mediate the relationship between PBC and behaviour, and perceived usefulness and attitude has a strong influence on BI and subsequent behaviour for experienced users. By contrast, for inexperienced users with no prior knowledge on which to assess control factors, PBC may directly influence behaviour since it is this direct experience that makes the influence of control factors apparent (Taylor & Todd 1995a). The relative influence of subjective norm on intentions is expected to be stronger for potential users with no prior experience since they are more likely to rely on the reactions of others in forming their intentions (Hartwick & Barki 1994).

These factors may have different relative influences depending on experience. There was a stronger link between behavioural intention and behaviour for the experienced users. This may be because experienced users employ the knowledge gained from their prior experiences to form their intentions (Fishbein & Ajzen 1975). Perceived usefulness was the strongest predictor of intention for the inexperienced group. By contrast, experienced users placed less weight on perceived usefulness but emphasised perceived behaviour control and behavioural intention fully mediated the relationship between PBC and behaviour. However, for inexperienced users' intentions were better predicted by the antecedent variables in the model than were the intentions of experienced users. This may be because communicating information to inexperienced users can have a strong effect on intentions but that this intention will not translate completely to behaviour. This may be due to their ability to access the different antecedents of intention. In addition, perceived behavioural control had less impact on intention, but had a significant influence on behaviour. This suggested that inexperienced users tended to give less consideration to control information in the formation of intentions, but based their considerations primarily on perceived usefulness (Taylor & Todd 1995a).

4.12.3 Expectation Gap

According to Taylor and Todd (1995a), an expectation gap is the difference between intention and behaviour. For experienced users the path from intention to behaviour was stronger than the inexperienced users' path. It can be suggested that experience can fill the expectation gap. It is important to find out how we can find a way to close this gap. This gap happens because of unrealistic user expectations and has been suggested as a key factor in failure of systems implementation (Szajna & Scamell 1993). Expectations are formed by evaluating both the costs and benefits of using a system. The formation of realistic expectations requires the consideration of control factors (Sheppard, Hartwick & Warshaw 1988). Inexperienced users may not adequately consider such control information in forming their expectations. Because they underestimate costs they instead focused mainly on the perceived usefulness or potential benefits of using a system. One way to close the expectations gap for inexperienced users involves communicating to users the facilitating or constraining factors that may limit system usage as well as the benefits of the system and ensuring that both are adequately taken into consideration.

4.12.4 Age and Gender

Gender has found to have an impact on the influence of attitude, subjective norm, and perceive behaviour control. It has been found that attitude was more salient for men, but both subjective norm and perceived behavioural control were more salient for women in early stages of experience (Venkatesh, Morris & Ackerman 2000). Moreover, age was found to affect the influence of attitude, subjective norm, and perceived behaviour control as well. An attitude was more salient for younger workers while perceived behavioural control was more salient for older workers. Subjective norm was more salient to older women (Morris & Venkatesh 2000; Venkatesh & Morris 2000).

Both gender and age were found to affect the influence of the determinants toward behaviour. For example the effects of performance expectancy, effort expectancy, and social influence were moderated by gender and age according to the findings of Venketesh et al.(2003).

4.12.5 Cultural Aspects

Culture can have an impact on an individual's decision to adopt and use a specific system (Myers & Tan 2002). Some cultural aspects such as gender, which is a fundamental aspect of culture, were found to affect the IT adoption process (Gefen & Straub 1997; Venkatesh & Davis 2000). Furthermore, TAM was found to hold only in US and Switzerland but not in Japan, implying that TAM may not predict technology use across all cultures in the world (Gefen & Straub 1997). In other words, this finding is an example of culture that does impact on IT adoption and use.

It has now become evident that gender, age, experience, voluntariness, and culture aspects were moderators in previous research, and were found to affect the influence of core constructs toward behaviour. Based on this strong evidence, it is necessary for this research to investigate the impact of these moderators on the influence of the determinants toward behaviour, in order to generate the model that best describes behaviour intention and usage behaviour.

4.13 Context Consideration

In order to comprehensively understand individual acceptance of technology, we need to interpret user behaviour within at least four contexts: technology (system) context, individual context, organisational (implementation) context and the cultural (national) context (Han 2003), where a context refers to the interrelated conditions in which something exists or occurs (Webster 2006).

4.13.1 Technology Context

Technology (system) context refers to the end-user computing technologies under investigation, such as any IT innovations, information system applications, and communications technology. The technology context defines the factors of a technology and their effects on usage behaviour. Technology factors include usability, interface, interaction style and quality. For Internet technologies characteristics of web-page design, response time, and information location on the web have been tested in empirical studies. For communications technologies, factors such as system social presence and information richness, and system accessibility have significant impact on user's beliefs about using the technology. The Internet is the technology being investigated for this research, and factors of Internet technology (such as technologies usability, and system accessibility) and their effects on usage behaviour will be investigated.

A great number of researchers, have studied the acceptance of technology based on TAM and other theories (such as IDT, TPB, DTPB and SCT) across a wide range of IS applications and other contexts. Examples include:

1) Internet Technologies such as email (Adams, Nelson & Todd 1992; Gefen & Straub 1997; Segars & Grover 1993; Szajna 1996; Venkatesh & Davis 1996), WWW (Agarwal & Karahanna 2000; Cheung, Chang & Lai 2000; Moon & Kim 2001), voice mail (Straub, Limayem & Karahannaevaristo 1995; Subramanian 1994), WWW information services (Agarwal & Prasad 1997,

1998), Online services (Bhattacherjee & Parthasarathy 1998; Chen, Gillenson & Sherrell 2002; Gefen, Karahanna & Straub 2002, 2003), virtual workplace systems (Venkatesh 1999; Venkatesh, Speier & Morris 2002), digital libraries (Hong, Thong, Wong & Tam 2001-2002; Thong, Hong & Tam 2002), B2C e-commerce applications (Gefen, Karahanna & Straub 2003; Koufaris 2002).

2) Other communication technologies such as customer dial-up systems (Subramanian 1994).

3) Key office IS applications, such as the spreadsheet lotus 1-2-3, WordPerfect, Word, Excel (Adams, Nelson & Todd 1992; Brancheau & Wetherbe 1990; Brosnan 1999; Chau 1996; Doll, Hendrickson & Deng 1998; Hendrickson, Massey & Cronan 1993; Mathieson 1991; Segars & Grover 1993; Taylor & Todd 1995a, 1995b; Venkatesh & Davis 1996).

4) Database systems (Doll, Hendrickson & Deng 1998; Hendrickson, Massey & Cronan 1993; Szajna 1994; Venkatesh, Speier & Morris 2002).

5) Microcomputers (Agarwal & Prasad 1999; Chiero 1997; Igbaria, Guimaraes & Davis 1995; Igbaria, Parasuraman & Baroudi 1996).

6) Workstations (Lucas & Spitler 1999; Moore & Benbasat 1991).

7) Telemedicine technology (Chau & Hu 2001, 2002a; Hu, Chau, Sheng & Tarn 1999).

8) Mobile commerce services (Pedersen, P.E. & Nysveen 2003; Pedersen, P.E, Nysveen & Thorbjornsen 2003; Pederson 2002).

9) Others such as DSS Software (Chiasson & Lovato 2001), CASE tools (Wynekoop, Senn & Conger 1992), financial EDI (Teo, Tan & Wei 1995), Internet Banking (Sukkar & Hasan 2005), e-learning (Ong & Lai 2006; Roca, Chiu & MartÃnez 2006), and e-commerce (Pavlou & Fygenson 2006).

4.13.2 Individual Context

Individual context refers to those essential characteristics of individual users that are related to technology usage. An individual may exhibit characteristics completely different from others in other organisations of from different cultures. Individual differences refer to user factors that include characteristics such as personality and demographic variables as well as personal factors that account for differences attributable to circumstances such as experience and training (Agarwal & Prasad 1999).

A large number of researchers used the following subjects in studying technology acceptance. For example:

1) Faculty members (Durrington, Repman & Valente 2000; Dusick 1998).

2) MBA students (part-time, full-time, and professional) (Agarwal & Prasad 1997; Davis 1989; Venkatesh & Davis 2000).

3) Business students in Universities in North America (Mathieson 1991; Szajna 1996; Taylor & Todd 1995a, 1995b).

4) Staff and knowledge workers in organisations in North America (Igbaria, Parasuraman & Baroudi 1996; Montazemi, Cameron & Gupta 1996; Venkatesh 1999; Venkatesh & Morris 2000).

5) Physicians (Chau & Hu 2001, 2002a; Hu et al. 1999).

6) Online users (Koufaris 2002).

7) Government employees (Roberts & Henderson 2000).

4.13.3 Organisational Context

Organisational (implementation) context refers to the specific environment where the individual works and the investigated technology acceptance takes place. The decision to adopt a technology of individual users is secondary; the first decision belongs to organisations in making decisions to adopt that technology. In order to increase the user's acceptance of technology, organisations have to create a favourable environment to support and encourage usage of technology at work. The organisation's computing policy, management support and encouragement are empirically proved to be very important (Han 2003).

Training programmes for specific user groups help users to increase their knowledge about the technology so that they are more likely to have a positive intention to use it in their work. Cooper (1994) found that the role of organisational cultural was significant in new IT implementation. Interpretation of the model of technology acceptance in the organisation context will help us examine the effects of organisational factors on individual behaviour. Measurements or factors that increase user acceptance in one organisation may not function well in another organisation. Organisational factors can assist and affect faculty members or academics' decision to use and adopt electronic technologies in instruction, for example, as can physical resource support and mandate from the university (Medlin 2001). Other important organisational factors from research on computer use in education are (1) resources, such as time, training, human support services, and access to the technology and (2) group norms and values of collaboration and collegiality. It has been found that different tasks were influenced by different organisational factors (Chiero 1997). Similarly, there are a number of environmental factors that influence a faculty member's choice to use or not use computers for instruction: (1) a supportive administration, (2) availability of computers in the classroom, (3) support and sharing of resources, (4) a strong support staff, and (5) training (Dusick 1998; Fulton 1998).

The studies of technology acceptance have been conducted in various types of organisations, for example:

1) Universities in North America (Adams, Nelson & Todd 1992; Agarwal & Karahanna 2000; Agarwal & Prasad 1997; Davis 1989; Doll, Hendrickson & Deng 1998; Igbaria, Iivari & Maragahh 1995; Szajna 1994).

2) Universities in other countries (Hong et al. 2001-2002).

3) Companies in North America including large accounting firms, an investment bank , large financial institutions, a large Canadian integrated steel company, online service firm (Adams, Nelson & Todd 1992; Bhattacherjee &

Parthasarathy 1998; Igbaria, Parasuraman & Baroudi 1996; Karahanna, Straub & Chervany 1999; Montazemi, Cameron & Gupta 1996; Straub, Limayem & Karahannaevaristo 1995; Venkatesh 1999).

4) Hospitals in other countries (Chau & Hu 2001, 2002b; Hong et al. 2001-2002).

5) Agricultural system such as dairy farming in New Zealand(Flett, Alpass, Humphries, Massey, Morriss & Long 2004).

4.13.4 Cultural Context

Culture is defined by Hofstede as a collective programming of the mind which distinguishes the members of one group or category of people from anther. Culture shapes individual values and affects behaviour (Hofstede, G. 1991, 1994; Hofstede, G. 1997). In addition, culture is the complete way of life of a people: the shared attitudes, values, goals, and practices that characterize a group; their customs, art, literature, religion, philosophy, etc.; the pattern of learned and shared behaviour among the members of a group (Digglossary 2004). In other words, it is the customs and beliefs, art, way of life and social organisation of a particular country or group, etc. with its own beliefs (Oxford 2005). In fact, the investigation of cross-culture is dominated by Hofstede studies (Myers & Tan 2002).

The culture (national) context refers to the macro environment in which the investigated user acceptance behaviour may occur and the specific organisation is located. Not only has culture been defined as a set of core values that shape the behaviour of individuals and the whole society, but culture also has an impact on an individual's decision-making process towards using a technology (Han 2003).

Although many researchers have investigated the acceptance and use of information technology, only a limited number of studies focused on the acceptance of technology outside North America (McCoy & Everard 2000). Those which had been conducted outside the U.S (Al-Gahtani 2001; Bazar & Baolc 1997; Chau & Hu 2001, 2002a; Gefen & Straub 1997; Hong et al. 2001-2002; Hu et al. 1999; Rose & Straub 1998; Straub, Keil & Brenner 1997; Veiga, Floyd & Dechant 2001) did not arrive at similar conclusions. Straub, Keil and Brenner studied three countries: USA, Switzerland and

Japan in order to explain different email adoption levels in terms of cultures by collecting data relating to email adoption only and did not collect any cultural data from those countries. The results were not able to provide empirical evidence that culture explained any of the variance. The results indicated that TAM holds for both U.S and Switzerland but not for Japan. Nevertheless, this result might be enough to question whether any technology acceptance model can equally predict user behaviour across cultures (Straub, Keil & Brenner 1997).

This suggests that the culture dimensions of any technology acceptance model should be considered when studying user behaviour in cultures other than North America (Han 2003). In other words, more cultural studies need to be undertaken in order to see how the models of technology acceptance such as TAM fit in other parts of the world (McCoy & Everard 2000). It is expected that culture may moderate the relationship between determinants (such as PU, and PEOU) and behaviour intention (McCoy & Polak 2003). It can be noticed that knowledge derived from studies in North America must be cautiously applied to other cultures, particularly to other countries. The interpretation of user acceptance behaviour within a cultural context will make clear how important a role culture plays in IT adoption (Han 2003).

In conclusion, an understanding of these four contexts and their effects on user behaviour will provide a solid base to explain why users accept or reject a technology in a specific environment. In other words, it will help researchers and practitioners gain more insights into what promotes user acceptance and what hinders acceptance. But it may be hard to generalise from the findings across different research settings (Han 2003).

4.14 Dimension of Usage

Information technology can probably improve individual and organisational performance. The technologies (systems) that are available in organisations cannot fully demonstrate their value until they are used. There are different dimensions of usage behaviour: (1) the temporal dimensions (2) the volitional perspective (Han 2003).

4.14.1 Temporal Dimension

One main purpose of the intention-based theory is to explain and predict initial adoption behaviour (Davis, Bagozzi & Warshaw 1989; Moore & Benbasat 1991). Information Systems or technologies diffuse because of the cumulative decision of individuals to adopt them. The first group of temporary dimensions is the *initial adoption* behaviour (first-time usage, and rejection at the pre-implementation stage). This is measured by frequency and volume of technology usage other than variety of use (Igbaria, Guimaraes & Davis 1995). Users may be persuaded to use a new technology early in the implementation process but the benefits offered may never be achieved in the absence of continued sustained usage (Agarwal & Prasad 1997; Karahanna, Straub & Chervany 1999; Szajna 1996). The second group of temporary dimensions is post-adoption or post-implementation behaviour i.e. sustained continuous usage, discontinuance (replacement or disenchantment). Replacement means users use an alternative technology instead of the original one they began with. Disenchantment means users become dissatisfied with the technology or service and thus not use them anymore(Bhattacherjee & Parthasarathy 1998). The temporal dimension of technology usage may give rise to different behaviour intentions, attitudes and beliefs towards the technology or system being formed. In turn, these are used to predict the probability of usage (Han 2003).

In addition, according to Szajna (1996) and Moore and Benbasat (1991), technology acceptance can be measured by either measuring only one behaviour - either intention to use or usage in cross-sectional study, or measuring two behaviours - both intention to use and actual technology use in longitudinal study.

4.14.2 Mandatory or Voluntary Use

An individual's stated preference to perform the activity (i.e. behavioural intention) will in fact closely resemble the way they do behave if given sufficient time and knowledge about a particular behavioural activity. This assumption only applies when the behaviour is under a person's volitional control (Ajzen & Fishbein 1980). Voluntary use hinders a person's will to perform the behaviour; in contrast, mandatory use hinders a person's will not to perform the behaviour (Ajzen 1985). Moore and Benbaset (1991) introduced perceived voluntariness to measure the degree of volition in performing behaviour, and Venkatesh and Davis (2000) used this voluntariness as one of the control variables in their study. Although most previous studies have been designed in the context of voluntary use, mandatory use is becoming an important research issue as it becomes increasingly prevalent in organisations (Rawstorne, Jayasuriya & Caputi 2000).

4.15 Summary

From the preceding literature, many well-known theories and models in association with technology acceptance have been used as a theoretical base by a large number of researchers. Despite the specific advantages of each theory, the capability of the theory/model in predicting and explaining behaviour is measured by the extent to which the predictors in the theory could account for a reasonable proportion of the variance in intention and usage behaviour. The more the predictors could account for the variance in behaviour, the greater the strength of the model in predicting and explaining the behaviour intention and usage behaviour. In addition, it has been suggested that a preferable model should be evaluated in term of both parsimony and its contribution to understanding. Because one of the objectives of this study is to generate a model of technology acceptance that is expected to have a capability in predicting and explaining usage behaviour, these well-known theories and models were found to have specific characteristics and significant benefits that will form the theoretical framework of this research. The theoretical framework and hypotheses will be discussed in the next chapter.

CHAPTER 5
THEORETICAL FRAMEWORK AND HYPOTHESES

5.1 Introduction

The literature review in the previous chapter discussed many well-known theories and models which are in one way or another, useful for the theoretical background for this research. This chapter will explain and discuss the basic concept of how to form a theoretical framework and will discuss the theoretical framework based on some aspects of these theories/models of technology acceptance. The key determinants in the theoretical framework that are expected to influence usage behaviour of Thai academics will be proposed and discussed. Furthermore, the moderators that are expected to moderate the influence of these key determinants will be discussed and then the research hypotheses will be stated.

5.2 Research Objectives

As mentioned in Chapter 1, the purpose of this study is to develop a model of technology acceptance that will have the power to demonstrate acceptance and usage behaviour of the Internet by using academics within Business Schools in the Thai Public University Sector as subjects. A thorough understanding of the model may help practitioners to analyse the reasons for resistance toward the technology and would also help to take efficient measures to improve user acceptance/usage of the technology. According to Davis (1989) practitioners evaluate systems for two purposes, one is to predict acceptability, the other is to diagnose the reasons resulting in lack of acceptance and to take proper measures to improve user acceptance. The purpose of this study leads to the following specific research objectives as mentioned in Chapter 1.

8. To review literature in respect of nine prominent theories and models including Innovations Diffusion Theory (IDT), Social Cognitive Theory (SCT), Theory of Reasoned Action (TRA), Theory of Planned Behaviour

(TPB), Decomposed Theory of Planned Behaviour (DTPB), Technology Acceptance Model (TAM), Technology Acceptance Model 2(TAM2), Augmented TAM or Combined TAM and TPB (C-TAM-TPB), and The Unified Theory of Acceptance and Use of Technology (UTAUT).

9. To review previous literature about IT acceptance/adoption and usage within four contexts of study include technology, individual, organisational, and cultural contexts.

10. To investigate the extent to which Thai business academics use and intend to use the Internet in their work.

11. To investigate how to motivate Thai business academics to make full use of the Internet in their work.

12. To investigate to what extent using the Internet helps to improve academics' professional practice, professional development and quality of working life.

13. To formulate a model of technology acceptance of Internet usage by Thai academics.

14. To generate and validate a research model that best describes Thai academics' Internet usage behaviour and behaviour intention.

The theoretical framework will be formulated, according to the sixth and seventh research objectives, based on some aspects of theories and models of technology acceptance reviewed in Chapter 4.

5.3 Theoretical Background

A thorough review of the theoretical background (Chapter 4) concentrated on nine prominent theories/models. This has significantly supported development of the theoretical framework for this study. These theories/models have been used by many researchers over the past two decades, especially in the area of Information Systems.

Some of them are good in parsimony, some of them are good in explanation. In order to propose the research model for this study, the theories/models that will be selected depends on a choice between the degree of parsimony and the degree of explanation about the behaviour. Taylor and Todd (1995a) suggest that models should be evaluated in terms of both parsimony and their contribution to understanding. For predictive, practical applications of the model, parsimony may be more heavily weighted, on the other hand, if trying to obtain the most complete understanding of a phenomenon, a degree of parsimony may be sacrificed. Eventually, it is necessary to make an even contribution for both the parsimony and the degree of understanding of the circumstance as much as possible. This research is aimed at generating a model that could contribute to a practical application and a prediction together with an understanding about the phenomenon. Before continuing to the theoretical framework, the basic concept that forms the theoretical framework will be discussed.

5.4 Basic Concept of the Theoretical Framework

Some previous researchers focused on individual acceptance of technology by using intention and/or usage as the key dependent variables. It is very important to make a decision before conducting research relating to the time horizon of the study. This decision will in turn logically affect "the behaviour" that I intend to measure.

In terms of behaviour measuring, technology acceptance can be measured by actual technology use (usage behaviour) as well as by intention to use (behaviour intention) (Moore & Benbasat 1991; Szajna 1996). The following is the evidence from previous research, either longitudinal or cross-sectional study and the behaviour they measured.

1) In longitudinal study, much previous research measured both intention and usage as the key dependent variables (Chen, Gillenson & Sherrell 2002; Davis, Bagozzi & Warshaw 1989, 1992; Mathieson, Peacock & Chin 2001; Moon & Kim 2001; Szajna 1996; Taylor & Todd 1995a, 1995b; Venkatesh & Davis 2000; Venkatesh, Morris, Davis & Davis 2003).

2) In cross-sectional study, a number of researchers measured only intention as the key dependent variable (Agarwal & Karahanna 2000; Agarwal & Prasad 1999; Bhattacherjee 2001; Chau & Hu 2001, 2002; Chin & Gopal 1995;

Gefen, Karahanna & Straub 2003; Gefen & Straub 2000; Hong, Thong, Wong & Tam 2001-2002; Hu, Chau, Sheng & Tarn 1999; Jackson, Chow & Leitch 1997; Karahanna, Straub & Chervany 1999; Mathieson 1991; Straub, Keil & Brenner 1997; Venkatesh & Davis 1996; Venkatesh & Morris 2000).

3) In cross-sectional study, a number of researchers measured only usage as the key dependent variable (Adams, Nelson & Todd 1992; Davis 1989, 1993; Gefen & Straub 1997; Heijden 2003; Hendrickson & Collins 1996; Igbaria, Parasuraman & Baroudi 1996; Igbaria, Zinatelli, Cragg & Cavaye 1997; Karahanna & Straub 1999; Lederer, Maupin, Sena & Zhuang 2000; Subramanian 1994; Szajna 1994; Teo, Lim & Lai 1999; Thompson, Higgins & Howell 1991).

Obviously, the models of technology acceptance which were original developed and surveyed could concentrate either on behaviour intention or usage behaviour or both behaviour intention and usage behaviour depended on the time horizon of their study (a cross-sectional study versus a longitudinal study). For a cross-sectional study, data are gathered just once, perhaps over a peiriod of days or weeks or months. On the other hand, in a longitudinal study data on the dependent variable are gathered at two or more points in time (Sekaran 2003).

From previous research in the case of a cross-sectional study, if the technology had never been introduced before or had just been introduced recently and individuals had no experience about the technology or were in the early stage of experience with very few users of the technology at that time, usually, only behaviour intention was measured. For example, Chau and Hu (2002) surveyed individual professionals (physicians) by considering physicians' intention to use telemedicine technology in Public tertiary hospitals in Hong Kong. Their decision was practical and theoretically justifiable, because at the time of the study actual use of telemedicine technology in Hong Kong was not widespread. However many organisations had shown considerable interest in telemedicine-assisted services and some had committed to or actually implemented the technology. The constraint of primitive but growing technology use prohibited them for using actual technology use (usage behaviour) to generate results with statistical significance.

In contrast, if the technology had been introduced for quite a period of time, the actual usage behaviour was usually measured, more specifically in the cross-sectional study. In the case of longitudinal study in association with a new technology, behaviour intention to use was captured before actual usage behaviour was measured. For example, Venkatesh et al.(2003) first investigated behaviour intention and then investigated usage behaviour from the time of the initial introduction of the technology to stages of greater experience. Thus, in the longitudinal study, the role of intention as a predictor of usage behaviour is critical and has been well-established in IS and the reference disciplines (Ajzen 1991; Sheppard, Hartwick & Warshaw 1988; Taylor & Todd 1995b).

At the time the Internet was first introduced in Thailand (more than fifteen years ago, in 1991), there were only 30 Internet users in the country (NECTEC 2007). Today, actual Internet usage in Thailand is not so widespread when compared to the U.S and Australia. The Internet penetration rate is only 12.7% which is equal to 8.4 million people in the country. It has been found, however, that in higher education especially in Business Schools in Thai Public Univeristy Sector, almost all academics have Internet experience. From the survey conducted in this research, only 0.86% of academics have no Internet experience (see Chapter 6). Because of this and because this research is a cross-sectional study, conducted over a period of three months and the goal of this research is to understand usage as the dependent variable, measuring actual usage was a reasonable choice.

Measurement of behaviour intention as a predictor of future usage behaviour is also important as another key dependent variable in order to predict usage behaviour in the future. More importantly, experience in using the Internet will impact on the intention of academics whether they intend to use the Internet more or less in the future. In other words, behaviour intention that will be measured in this cross-sectional study will help to identify future usage of the Internet.

The basic concept underlying the user acceptance model of this research adapted from Venkatesh et al.(2003) suggests that individual reactions to use the Internet may influence actual usage of the Internet and consequently, actual usage of the Internet may influence intentions to use the technology (see Figure 5.1). It is expected that a research model, based on this concept after some tests and modifications (if necessary), could have power in explaining usage behaviour and could predict future usage based on user' intention to use the Internet.

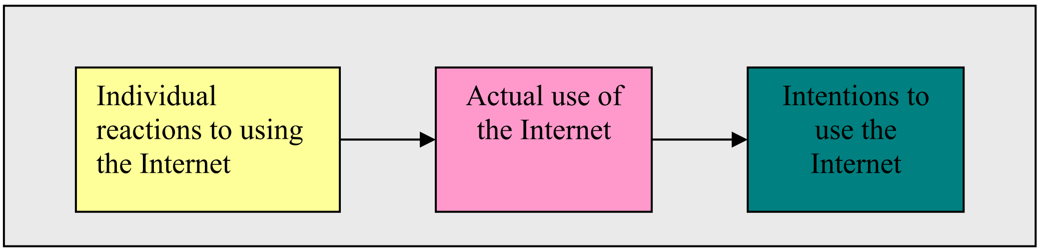

Figure 5.1 Basic Concept of the Research Model Adapted from Venkatesh et al.(2003)

5.5 Theoretical Framework

A theoretical framework is defined as a collection of theories and models from the literature which underpins a positivistic research study (Hussey & Hussey 1997). In other words, it is a conceptual model of how the researcher theorises or makes logical sense of the relationships among the several factors that have been identified as important to the problem. Developing such a conceptual framework helps us to postulate or hypothesise and test certain relationships and thus to improve our understanding of the dynamics of the situation. In total, the theoretical framework discusses the interrelationships among the variables that are considered important to the study. It is essential to understand what a variable means and what the different types of variable are. After the theoretical framework has been formulated, then testable hypotheses can be developed to examine whether the theory formulated is valid or not (Sekaran 2003). In conclusion, the theoretical framework may be referred to as a conceptual framework or as the research model. These three terms are used interchangeably in this research.

The proposed research model (the theoretical framework) comprised three important types of variables (see Figure 5.2).

1) Five core constructs (independent variables) are perceived usefulness (PU), perceived ease of use (PEOU), social influence (SI), facilitating conditions (FC) and self-efficacy/perceived ability (SE). These core constructs are

expected to influence usage behaviour in teaching (TEACH) and other tasks (OTASK). A definition of each code (such as PU, PEOU, and TEACH) is presented in Table 8.1 in Chapter 8.

2) Two dependent variables are usage behaviour in teaching (TEACH) and other tasks (OTASK) and behaviour intention in teaching (BITEACH) and other tasks (BIOTASK). Usage behaviour in teaching and other tasks are expected to influence behaviour intention in both tasks (see definitions of codes in Table 8.1 in Chapter 8).

3) Nine moderating variables consist of two major groups: the first group is individual characteristics including gender, age, education, academic position and experience; the second group is some culture aspects including e-university plan and research university plan, level of reading and writing and Thai language. These moderators are expected to impact on the influence of core constructs toward usage behaviour and impact on the influence of usage behaviour toward behaviour intention.

Based on the proposed research model, several hypotheses will be tested:

1) whether these determinants (PU, PEOU, SI, FC, and SE) may have any significant influence on usage behaviour (TEACH and OTASK).

2) whether usage behaviour (TEACH and OTASK) may significantly influence on behaviour intention (BITEACH and BITASK).

3) whether these moderators may have any significant impact on the influence of these determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour(TEACH and OTASK).

4) whether these moderators may have any significant impact on the influence of usage behaviour toward behaviour intention.

Next is a discussion about the determinants that form the proposed research model.

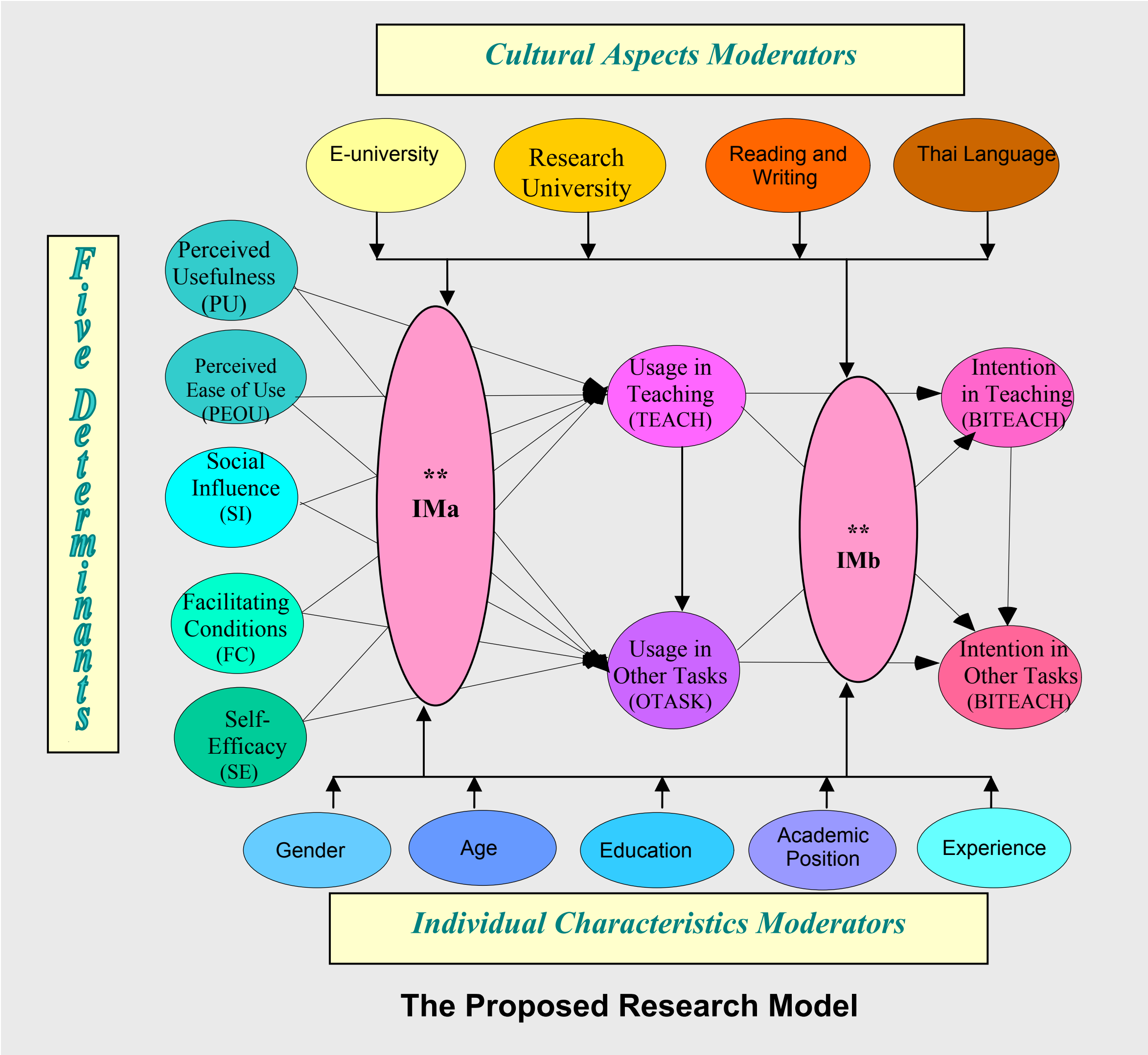

Figure 5.2 The Proposed Research Model

** IMa : The impact of moderators on the direct paths between determinants and usage behaviour
** IMb : The impact of moderators on the paths between usage behaviour and intention

5.6 Direct Determinants

Quite a number of determinants pertaining to user acceptance have been identified from previous research. Inconsistencies in using major constructs (determinants) in the theories/models in previous research have been found. For this study, I will focus on the major constructs (determinants) based on literature on the prominent theories/models in Chapter 4 in combination with the findings from previous research. The major determinants in the proposed research model in this study are perceived usefulness (PU), perceived ease of use (PEOU), social influence (SI), facilitating conditions (FC), and self-efficacy/perceived ability (SE). Next is a justification with explanation of why these determinants were integrated into the proposed research model.

5.6.1 Perceived Usefulness

Despite the fact that perceived usefulness (PU) in TAM (Davis 1989) , TAM2 (Venkatesh & Davis 2000) and Augmented TAM or Combined TAM and TPB called (C-TAM-TPB) (Taylor & Todd 1995a), was theorised as a direct determinant (a core construct) of behaviour intention, strong evidence supported that perceived usefulness was also found as a direct determinant of usage behaviour (Adams, Nelson & Todd 1992; Davis 1989; Dishaw & Strong 1999; Gefen & Keil 1998; Gefen & Straub 1997; Hendrickson & Collins 1996; Igbaria, Parasuraman & Baroudi 1996; Igbaria et al. 1997; Lederer et al. 2000; Szajna 1994; Taylor & Todd 1995a; Teo, Lim & Lai 1999; Thompson, Higgins & Howell 1991). Perceived usefulness is analogous to the relative advantage of perceived characteristics of the Rogers' Innovations Diffusion Theory (Venkatesh et al. 2003). From the evidence, it is a good rationale to use perceived usefulness as the direct determinant of usage behaviour in this cross-sectional study. Perceived usefulness (PU) is defined and used in this study as:

> *"The degree to which a person believes that using a particular system would enhance his or her job performance"(Davis 1989, p. 453).*

It is expected that perceived usefulness will significantly determine usage behaviour in teaching and in other tasks.

5.6.2 Perceived Ease of Use

Perceived ease of use (PEOU) was also theorised as the direct determinant of behaviour intention in a number of theories and models including TAM , TAM2 , and C-TAM-TPB. In addition, strong evidence supported that perceived ease of use (PEOU) was also found as a direct determinant of usage behaviour (Adams, Nelson & Todd 1992; Davis 1989; Gefen & Keil 1998; Gefen & Straub 1997; Hendrickson & Collins 1996; Igbaria, Parasuraman & Baroudi 1996; Igbaria et al. 1997; Lederer et al. 2000; Szajna 1994; Teo, Lim & Lai 1999; Thompson, Higgins & Howell 1991). PEOU is analogous to the complexity of perceived characteristics of Rogers'

Innovations Diffusion Theory, although in the opposite direction (Venkatesh et al. 2003). Based on many theories/models and previous research, perceived ease of use is justified as an important determinant to influence usage behaviour in the research model. Perceived ease of use (PEOU) is defined and used here as:

> *"The degree to which a person believes that using a particular system would be free of effort"(Davis 1989, p. 320).*

5.6.3 Social Influence

Social influence is represented as a subjective norm in many theories (Venkatesh et al. 2003) including the TRA, TPB, DTPB, TAM2, and C-TAM-TPB. Not only do these theories suggested that social influence is found as a direct determinant of behavioural intention but some other research also comes up with the same suggestion (Lucas & Spitler 1999; Venkatesh & Morris 2000). In contrast, a number of researchers found that social influence (SI) has no significant effect on behaviour intention (Chau & Hu 2001, 2002; Davis 1989; Dishaw & Strong 1999; Mathieson 1991; Venkatesh & Morris 2000; Venkatesh et al. 2003). Some articles suggested both non-significant and significant effects of SI toward intention because they studied in different conditions and generated inconsistent results of the effect of SI on behaviour intention. More importantly, it has been found that social influence has significant effects on usage(Igbaria, Parasuraman & Baroudi 1996; Thompson, Higgins & Howell 1991). Although not being tested, Hartwich and Barki(1994) suggest that subjective norm was more important when system use was perceived to be less voluntary. But it is questioned that SI will be really less important when the Internet use was perceived to be in a voluntary environment.

The inconsistencies in these findings associated with social influence effect on usage or behaviour intention have led to an interesting question. Will social influence have a significant effect on usage behaviour in association with the Internet in Thai society? With this supported rationale, social influence is used as a direct determinant in this study and it is expected to determine usage behaviour. Social influence is defined in this study as:

"The degree to which an individual perceives that other important persons believe he or she should use the system" (Venkatesh et al. 2003, p. 451).

5.6.4 Facilitating Conditions

Facilitating conditions were modelled as a direct antecedent of behaviour intention and usage in the theory of DTPB which expected that the impact of facilitating conditions (resource facilitating conditions and technology facilitating conditions) should alert management to possible barriers to usage (Taylor & Todd 1995b). The facilitating conditions determinant (FC) was found non-significant in predicting intention but significant in determining usage (Venkatesh et al. 2003). It has been suggested that the absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage. However the presence of facilitating resources may not encourage usage (Taylor & Todd 1995b). Moreover, it was found that facilitating conditions significantly related to the actual usage of Internet-based teaching (Limayem & Hirt 2000). Although, FC is the least studied construct in the existing theories/models it is very important to investigate whether this construct is a direct determinant of usage behaviour in the Thai public university environment. Supporting this, from the preliminary interviews (see Chapter 6), a few interviewees indicated that the facilitating conditions factor was an important factor for them in influencing their use of the Internet. Thus it is theorised that the facilitating conditions determinant is a direct determinant and is expected to influence usage behaviour. The facilitating conditions determinant is defined and used in this research as:

"The degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system"(Venkatesh et al. 2003, p. 453).

5.6.5 Self-Efficacy

Self-efficacy (Bandura 1977a) is related to perceived ability. Self-efficacy is defined as the belief that one has about capability to perform a particular behaviour (Bandura 1986a). The definition of self-efficacy used in this research is:

> *"An individual's self-confidence in his/her ability to perform a behaviour"(Taylor & Todd 1995b, p. 150).*

Self-efficacy (SE) as a construct of interest to the IT community stems originally from the work of Bandura, and his Social Learning Theory (Bandura 1977a, 1977b, 1986b, 1995, 1997). Self-efficacy has long been found as a significant predictor of computing behaviour which plays an important role in determining a person's behavioural intention and actual behaviour(Downey 2006; Hwang & Yi 2002). It is a construct of interest to both researchers and IT professionals because of its strength in motivating end-users as well as its ability to be enhanced, particularly through training and experience(Downey 2006). Not only have several studies found that self-efficacy had a significant effect on actual technology usage (Hwang & Yi 2002) but several studies have shown that self-efficacy influences academic achievement (Ramayah & Aafaqi 2004). With respect to Information Technology usage it was anticipated that higher levels of self-efficacy lead to higher levels of behavioural intention and IT usage(Compeau & Higgins 1991). Taylor and Todd (1995b) stated in DTPB that self-efficacy was a significant determinant of perceived behavioural control, and also a significant determinant of behaviour both in intention and usage. This determinant places a focus on training (which seems to directly relate to self-efficacy) as an important mechanism to influence system acceptance. Although, Venkatesh et al. (2003) found that computer self-efficacy had no significant influence on behaviour intention there is evidence that self-efficacy is theorised as a direct determinant to behaviour. Therefore, self-efficacy will be integrated into the research model as a direct determinant and thus it is expected that self-efficacy is a significant determinant of usage behaviour.

5.7 User Behaviour

Dependent variables in this study are usage behaviour and behaviour intention and they both will be measured and investigated in a way that usage behaviour will significantly influence behaviour intention.

5.7.1 Usage Behaviour

Normally in Thai Public Universities, Internet usage by academics depends on their own free will. Because of this, it can be said that this research will be conducted in the context of voluntary use (used willingly, not because users are forced) which is similar to most previous research. Since an individual's stated preference to perform the activity (such as behavioural intention) will in fact be closely related to the way they do behave, this assumption only applies when the behaviour is under a person's volitional control(free will)(Ajzen & Fishbein 1980). Therefore, it is logically claimed that academics' intention to use the Internet will be closely related to their usage behaviour if the use of the technology depends on their own free will. In addition, much previous research found that behaviour intention and usage behaviour have a significant relationship (Chen, Gillenson & Sherrell 2002; Davis 1989; Davis, Bagozzi & Warshaw 1992; Dishaw & Strong 1999; Mathieson, Peacock & Chin 2001; Moon & Kim 2001; Szajna 1996; Taylor & Todd 1995b; Venkatesh & Davis 2000; Venkatesh et al. 2003).

Thus, it can be said that having experience in using the Internet will be closely related to academics' intention to use the Internet in the future. Therefore, this research expects that usage behaviour (self-reported usage) will have a significant influence on behaviour Intention to use the Internet (self-predicted future usage) in the future.

5.7.2 Behaviour Intention

The TAM asserts that intention is a proper proxy to examine and predict a user's behaviour toward a particular technology or system. Results from much research have shown consistent results showing a significant correlation between behaviour intention (BI) and usage behaviour. Moreover, the path from behavioural intention to behaviour is significant in the TAM, TPB, and DTPB models. User Behaviour is largely influenced by behavioural intention (BI), so BI plays an important role in predicting usage behaviour. But it is important to note that BI is more predictive of usage behaviour when individuals have had prior experience with the technology (Taylor & Todd 1995b).

Because this research is a cross-sectional study, and individual academics already have had Internet experience (at the time of survey) academic' behaviour intention was actually influenced by actual usage (usage at the time of survey). Significantly, behaviour intention (associated with self-predicted future usage of the Internet) will play an important role in predicting usage behaviour of individual academics in the future. In addition, this research tends to investigate both usage behaviour and behaviour intention at the same time in the survey. It is rather not so similar to other previous research in that other research either investigated usage behaviour or behaviour intention but not both especially on a cross-sectional study. The aim of this research was to investigate intention as well as usage behaviour because the investigation of behaviour intention may help in predicting future usage. Consequently, it is expected that usage behaviour (self-reported *current* usage) will significantly influence behaviour intention to use the Internet in the future (self-predicted *future* usage).

5.8 Inividual Characteristics Moderators

The moderator or the moderating variable is one that has a strong contingent effect on the independent variable and dependent variable relationship. That is, the presence of a third variable (the moderating variable) modifies the original relationship between the independent and the dependent variables(Sekaran 2003). The moderating hypothesis can be tested using multiple-group analysis in AMOS(Holmes-Smith, Cunningham & Coote 2006). A multiple-group analysis in AMOS version 6.0 can estimate a model in two or more groups simultaneously (Arbuckle 2005). The moderating hypothesis (e.g gender) will test the direct paths between independent variables and dependent variables and whether they might differ in magnitude and/or direction across groups (e.g. male and female). If the result shows a difference across groups, it indicates that the influence of the independent variable toward dependent variables is moderated by that moderator (e.g. gender).

Nine moderators will be investigated to see whether they will affect the influence of independent variables toward dependent variables. The first group of moderators comprises five personal characteristics of academics including gender, age, education, academic position, and experience. The second group of moderators comprises four cultural aspects including e-university plan, research university plan, level of reading and writing and Thai language.

5.8.1 Gender, Age and Experience

Gender and age differences have been shown to exist in technology adoption contexts(Morris & Venkatesh 2000). It is evident that gender, age, and experience sigificantly moderate the influence of the determinants on behaviour intention. For example, in accordance with the findings of Venkatesh et al. (2003), it has been found that (1) the effect of performance expectancy (perceived usefulness) on behaviour intention was moderated by gender and age; (2) the influence of effort expectancy (perceived ease of use) on behaviour intention was moderated by gender, age and experience; (3) the influence of social influence on behaviour intention was moderated by gender, age , voluntariness and experience; (4) the influence of the facilitating conditions determinant on behaviour intention was moderated by age and experience, and (5) computer self-efficacy was not significant in determining behaviour intention and has not been tested with any moderators (Venkatesh et al. 2003).

Experience was clearly theorised as a moderator in TAM2, in that experience significantly moderated the influence of subjective norm toward behaviour intention(Venkatesh & Davis 2000). Although, experience and voluntariness were not explicitly included in the original TRA, the role of experience was empirically examined using a cross-sectional analysis (Davis, Bagozzi & Warshaw 1989), no change in the salience of determinants was found. In contrast, the attitude was found to be more important with increasing experience while subjective norm became less important with increasing experience. It is evident that experience moderated the relationship between subjective norm and behavioural intention (Karahanna, Straub & Chervany 1999). Experience was not explicitly included in the original TPB as well but it has been incorporated into TPB via follow-on studies (Morris & Venkatesh 2000).

Despite the fact that individual characteristics were investigated as moderators relating to technology acceptance, some previous research used demographic variables or individual characteristics (such as age and gender, computer experience, computer anxiety, computer self-efficacy, computer skills, cognitive style, self-competence, and perceived relevance) as predictors/factors not as moderators. They found that these factors are significant predictors of computer use(Durrington, Repman & Valente 2000; Dusick 1998), however, it depended on the type of tasks (activities) investigated, different predictors influencing different tasks (Chiero 1997). Nevertheless, Zakaria (2001), found that some demographic variables such as age and gender were not significant predictors of Information Technology usage.

Inconsistencies were found in using individual characteristics, sometime as moderators, sometime as predictors. However, it is evident that in the specific investigation of technology acceptance, all these individual characteristics (gender, age, experience) were usually examined as moderators and they were found to impact on the influence of various determinants on behaviour. With this evidence, for this research, gender, age and experience were investigated as moderators as it was expected that they would moderate the influence of determinant on usage behaviour.

It should be noted that all academics as subjects in the survey of this research have already had the Internet experience. Experience was classified into three groups including low experience, moderate experience and high experience subjects according to self-assessments of academics in the survey.

Other than this, normally academics used the Internet depending on their own free will, meaning that this research has been conducted on the basis of voluntariness of use. Therefore, the voluntariness of use will not be examined as a moderator .

5.8.2 Education Level

Despite the fact that educational level was proved to be an antecedents of PU or PEOU (Agarwal & Prasad 1999), it can also be found that level of education has been used as a moderator but not in the research associated with technology acceptance. For example, it has been found that parental education moderated the genetic and environmental contributions to variation in verbal IQ (Rowe, Jacobson, Oord & Edwin 1999). Educational level has been investigated as a factor/predictor in the study related to factors that influenced adoption and use of information technology.

For example, Zakaria (2001) indicated that only highest educational level was a significant predictor and contributed significantly to the variance of Information Technology Implementation. Mahmood (2001) suggested that the factor of education level had a substantial effect on IT usage but the magnitude of the effect was lower than other factors which were the perceptions of the user (perceived usefulness and perceived ease of use) and organisational support.

Although, education level was not used as a moderator in technology acceptance, it was instead examined as a factor to determine technology usage. Nevertheless, the education level seemed to have an impact on the influence of determinants toward technology acceptance in some way or another in this study. It is in the sense that academics who have differnet levels of education may have different perceptions and thoughts relating to using the Internet. Thus, education will be investigated as a moderator, and it is expected to impact the influence of determinant toward usage behaviour.

5.8.3 Academic Position

In Thailand, academics positions are: lecturer, assistant professor, associate professor, and professor (Commission of Higher Education 2004) The way to be promoted to a higher position is by considering the number of years in teaching together with assessments of the materials which those academics have produced such as writing books, and journal articles. In addition, other professional work such as doing research will be required for the assessment of higher academic positions, the more the better.

The basic requirements of academic promotion are related to finding necessary information to produce their academic materials. At present one of the means in doing so is via the Internet. So, it is questioned whether higher academic positions will have different perceptions or thoughts about using the Internet in their work than lecturers. Is it possible that those in higher academics positions have perceived that the Internet is more useful for them than those who are lecturers? So the thoughts of academics in different positions may be different regarding using the Internet in their work. Despite the fact that the literature hardly investigated the impact of academic position as a moderator or as a factor in technology acceptance, it seemed to be important to investigate whether there are different perceptions and thoughts regarding using the

Internet. Because of this, the study will consider the impact of academic positions on the influence of determinants and it is expected that academic positions which plays a role as a moderator will impact on the influence of determinants toward usage behaviour in using the Internet. (Actually in Thailand “lecturer” is not regarded as an academic “position” in the same way as professor etc. In this thesis the word “position” is used for all these.)

5.9 Cultural Aspects Moderators

Culture can also influence the outcomes of research, and up to 80 percent of management research published to-date has been conducted by North American researchers on Americans and in American organisations. The findings of this research are not necessarily applicable to organisations in Australia or in other countries. Clearly, great care needs to be taken when extending the findings of business research deducted in other countries to Australia or to other cultures (Ticehurst & Veal 2000).

As previously mentioned, most models/theories of technology acceptance were proposed, adapted and extended in the U.S while the impacts of cultural factors on usage behaviour were not investigated. Recently, there has been an increase in the amount of cross-cultural research associated with the impact of culture on IT acceptance/adoption especially in Asia (Burn, Tye & Ma 1995; Wan & Lu 1997) and sometime comparing the U.S with another country such as China (Srite 2006), Singapore (Tan, Smith, Keil & Montealegre 2003; Watson, Ho & Raman 1994), Hong Kong (Chau, Cole, Massey, Montoya-Weiss & O'Keefe 2002) and sometime many countries concurrently (Watson, Kelley, Galliers & Branchaeu 1997). Zakour (2004) suggested that individuals were conditioned by their culture, so the impact of cultural factors on usage behaviour should be considered when studying technology acceptance (such as TAM) in countries outside the U.S. Hofstede (1997) stated that culture, shaped individual values and affected behaviour and was seen to be different across nations or continents: people may behave differently depending on their culture. Not much research has attempted to link culture with models of technology acceptance but some researchers such as Gefen and Straub (1997) found that TAM held for the US and Switzerland but not for Japan.

Moreover, Igbaria and Iivari (1995) studied cross-cultural settings between two countries and found that culture exerted effects on the computer self-efficacy of Finns. Because of this evidence culture may impact on IT usage, and so some cultural aspects would be examined in this study.

According to Hofstede (1997) almost everyone belongs to a number of different groups and categories of people at the same time. People unavoidably carry several layers of mental programming within themselves, corresponding to different levels of culture including (1) a national level (country), (2) a regional and /or ethic and /or religious and/or language groups, (3) a gender level, (4) a generation level ,(5) a social class level associated with educational opportunities and with a person's occupation or profession, (6) for those who are employed, an organisational or corporate level according to the way employees have been socialised by their work organisation. The difference between national and organisational cultures is based in their different mix of values and practices. National cultures are part of the mental software we acquired during the first ten years of our lives, in family, in the living environment and at school and they contain most of our basic values. According to Hofstede and Hofstede (2005) organisational (or corporate) cultures are acquired when we enter a work place and they consist mainly of the organisation's practices. It has been found that the organisational cultural role was significant in new IT implementation (Cooper 1994).

Based on these perspectives, four cultural aspects were investigated to see if they have any impacts on the influence of determinants toward Internet usage of Thai academics including (1) e-university plan as an organisational culture, (2) research oriented university plan as another organisational culture, (3) level of reading and writing of Thai people and (4) Thai language as a national language normally used in the country.

5.9.1 E-university Plan

One of the strategies of the National IT Policy (2001-2010) (IT 2010) is to stipulate e-Education. More specifically, according to the IT 2010 programme, over the next ten years Thailand aims to move to "Potential Leader" (based on the United Nations' standard) (NECTEC 2001). Furthermore, the ninth national economic and social development plan (2002-2006)(Government of Thailand 2001) issued by the Thai government states that information technology should be adopted to facilitate teaching and learning processes and as an instrument to disseminate information and knowledge.

So it is essential for many public universities that are state universities or state-supervised universities to follow the National Plan and National IT policy. Thus, they have set one of their goals to become an e-university in the future. The acknowledgement of academics about this plan may positively affect Internet usage of academics because they may prepare themselves for the future by changing their behaviour so as to increase the utilisation of the new communication technology (e.g. the Internet) compared with academics who did not acknowledge this plan. Therefore, it is worth investigating whether the acknowledgement of e-university plan may impact the influence of determinants toward usage behaviour although there is no previous evidence of this kind of investigation.

5.9.2 Research University Plan

The Ninth National Economic and Social Development Plan (2002-2006)(Government of Thailand 2001) and the National Education Plan (2002-2016) (OEC 2004), all aim to develop human learning in order to increase people's knowledge by using Internet technologies to support continuous learning in education. One of the strategies to provide new knowledge to people is via research. Previously, the organisational culture of the Thai public university sector was teaching oriented and they concentrated mainly on teaching. But in accordance with the National Plans, Thai public universities now have strategies to become research oriented universities because they realised that being a research oriented university will contribute significantly more benefits to the country than being a teaching oriented university. It is thus questioned whether acknowledgement of the research university plan will significantly impact on the influence of predictors toward usage behaviour.

Academics who acknowledged the research university plan might prepare themselves for the future, for example by trying to use communication technologies (e.g. the Internet) to search for information for their research. On the other hand, academics who have not acknowledged this plan may concentrate only on teaching and not pay any attention to research. Consequently it may impact on the influence of determinants on usage behaviour.

5.9.3 Level of Reading and Writing

According to the Office of Education Council of Thailand(OEC 2004), the national culture of Thai people tends to exhibit habits of not much reading and writing. This habit of Thai people sometimes does not encourage or support using the Internet. When someone uses the Internet it is essential to put effort especially into reading the information or occasionally writing (keying), for example when using email. Importantly, from the preliminary interviews (see Chapter 6), an interviewee who is an expert in Information Technology, not only in the university but also in many IT projects of the Thai government, suggested the same issue about Thai people's tends to have habits of not much reading and writing. So academic perception of whether their level of reading and writing are obstacles or not in using the Internet will be investigated to see if there is any significant impact on the influence of determinants toward usage behaviour.

5.9.4 Thai Language

Thai language is the first or national language of the Thai people and it is one of the layers of culture according to Hofstede (1997). The national language used in the country is different to the main Internet language which is normally English (Internet World Stats 2007). Moreover, databases developed in the Thai language are still not sufficient to support the demands of the Thai people especially in higher education. So Thai people, especially academics, have to search the Internet in English to get the essential information they need, if the information is not available in the Thai language. In addition, from the preliminary interviews (see Chapter 6), some interviewees stated that they thought that Thai language was an obstacle in using the Internet. So academic perception of whether Thai language is an obstacle or not in using the Internet will be investigated to see if there is any significant impact on the influence of determinants toward usage behaviour.

5.10 Research Hypotheses

Two categories of the hypotheses will be tested. The first category is the hypotheses for direct paths for testing the significance of direct paths between key determinants and usage behaviour. The second category is the moderating hypotheses for testing the influence of independent variables toward dependent variables and will be moderated by moderating variables.

5.10.1 Direct Path Hypotheses

The direct path hypotheses that will be tested are divided into three groups, the first group is the hypotheses for testing the significant influence of determinants on usage behaviour in teaching and teaching related tasks (TEACH). The second group is the hypotheses for testing the significant influence of determinants on usage behaviour in other tasks (OTASK)(see details of codes in Chapter 8). The third group is the hypotheses for testing the influence between usage behaviour toward behaviour intention.

1) Determinants and Usage Behaviour in Teaching and Teaching Related Tasks (TEACH)

$H_1$1a: Perceived usefulness has a significant influence on usage behaviour (TEACH).

$H_1$2a: Perceived ease of use has a significant influence on usage behaviour (TEACH).

$H_1$3a: Social influence has a significant influence on usage behaviour (TEACH).

$H_1$4a: Facilitating conditions has a significant influence on usage behaviour (TEACH).

$H_1$5a: Self-efficacy has a significant influence on usage behaviour (TEACH).

2) Determinants and Usage Behaviour in Other Tasks (OTASK)

$H_1$1b: Perceived usefulness has a significant influence on usage behaviour (OTASK).

$H_1$2b: Perceived ease of use has a significant influence on usage behaviour (OTASK).

$H_1$3b: Social influence has a significant influence on usage behaviour (OTASK).

$H_1$4b: Facilitating conditions has a significant influence on usage behaviour (OTASK).

$H_1$5b: Self-efficacy has a significant influence on usage behaviour (OTASK).

3) Usage Behaviour and Behaviour Intention

$H_1$6: Usage behaviour in teaching (TEACH) has a significant influence on usage behaviour in other tasks (OTASK).

$H_1$7: Usage behaviour in teaching (TEACH) has a significant influence on behaviour intention in teaching (BITEACH).

$H_1$8: Usage behaviour in teaching (TEACH) has a significant influence on behaviour intention in other tasks (BIOTASK).

$H_1$9: Usage behaviour in other tasks (OTASK) has a significant influence on behaviour intention in teaching (BITEACH).

$H_1$10: Usage behaviour in other tasks (OTASK) has a significant influence on behaviour intention in other tasks (BIOTASK).

$H_1$11: Behaviour intention in teaching (BITEACH) has a significant influence on behaviour intention in other tasks (BIOTASK).

5.10.2 Moderating Hypotheses

The hypotheses that will be tested for moderators (moderating hypotheses) are categorised into two groups: 1) testing the influence of five determinants toward usage behaviour in teaching and other tasks will be moderated by moderators, and 2) testing the influence of usage behaviour toward behaviour intention will be moderated by these moderators.

1) Determinants and Usage Behaviour

$MH_1$1a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by gender.

$MH_1$2a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by age.

$MH_1$3a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by education.

$MH_1$4a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by academic position.

$MH_1$5a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by experience.

$MH_1$6a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by acknowledgement of e-university plan.

$MH_1$7a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by acknowledgement of research university plan.

$MH_1$8a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by level of reading and writing.

$MH_1$9a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by Thai language.

2) Usage Behaviour and Behaviour Intention

$MH_1$1b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by gender.

$MH_1$2b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by age.

MH_1 3b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by education.

$MH_1$4b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by academic position.

$MH_1$5b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by experience.

$MH_1$6b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by acknowledgement of e-university plan.

$MH_1$7b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by acknowledgement of research university plan.

$MH_1$8b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by level of reading and writing.

$MH_1$9b : The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by Thai language.

5.11 Measurement Items

Measurement items will be discussed in two groups, the first one is measurement items in core constructs (determinants) and the second category is measurement items in usage behaviour and behaviour intention which will basically use various academic tasks as items for measurements.

5.11.1 Core Constructs

Measurement items used in this research particularly for the core constructs (five key determinants) of the proposed research model(see Figure 5.2) have been adapted from the measurement items originally used in many theories including TAM (Davis 1989), TAM2 (Venkatesh & Davis 2000), DTPB (Taylor & Todd 1995b), UTAUT (Venkatesh et al. 2003) (see Table 5.1). All original measurement items used in measurements of the core constructs of the theories/models including perceived usefulness, perceived ease of use, social influence, facilitating conditions and self-efficacy had statistical explanation and prediction to user behaviour in the technology context under investigation (Davis 1989; Davis, Bagozzi & Warshaw 1989; Taylor & Todd 1995b; Venkatesh & Davis 2000; Venkatesh et al. 2003). In addition, researchers usually ask users to rate their agreements with the statements by choosing a number based on 5-point or 7-point Likert scale (Han 2003).

In particular, original measurement items used to measure perceived usefulness and perceived ease of use have been adopted in many empirical studies, and all had significant statistical explanation and prediction to illustrate behaviour of users towards Information Technology or Information System (Adams, Nelson & Todd 1992; Davis 1989; Lucas & Spitler 1999; Mathieson 1991; Szajna 1994, 1996; Venkatesh 1999; Venkatesh & Morris 2000). It has been found that the construct convergent reliability and discriminant validity of PU and PEOU all had statistically significant reliability and validity. The pattern of factor loadings will confirm the structure of PU and PEOU with its items loading highly on these factors and the results confirmed the psychometric strength of the PU and PEOU scales.

Consequently, PU, PEOU are very powerful belief constructs to determine user behaviour about computer technologies in organisations. The measurement scales and psychometric properties are empirically shown to be robust but researchers have to be aware that for different users, their perceptions of PU and PEOU may vary across contexts in term of technology and organisation (Han 2003).

The concepts or core constructs of the research model (see Figure 5.2), the codes of measurement items or indicators, and the measurement scalesare presented in Table 5.2. The mesurement scales used in this research is 7 point-Likert scales adapted from the 7 point-Likert scales in the study of Davis (1989).

PERCEIVED USEFULNESS (PU) about the Internet usage

1. Using the Internet enables me to accomplish tasks more quickly.
2. Using the Internet enhances the quality of my work
3. Using the Internet makes it easier to do my work.
4. I find the Internet useful in my work.

PERCEIVED EASE OF USE (PEOU) about using the Internet

1. Learning to use the Internet is easy for me.
2. I find it easy to use the Internet to do what I want to do.
3. I find it easy for me to become skilful in using the Internet
4. I find the Internet easy to use.

SOCIAL INFLUENCE (SI) about using the Internet.

1. Peers think that I should use the Internet.
2. Family and friends think that I should use the Internet.
3. Students think that I should use the Internet.
4. Management of my university thinks that I should use the Internet.
5. In general, my university has supported the use of the Internet.

FACILITATING CONDITIONS (FC) within your University about using the Internet

1. The resources necessary (e.g. new computer hardware and software, communication network etc.) are available for me to use the Internet effectively.
2. I can access the Internet very quickly within my University.
3. Guidance is available to me to use the Internet effectively.
4. A specific person (or group) is available for assistance with the Internet difficulties.

SELF-EFFICACY (PERCEIVED ABILITY)(SE) about using the Internet

1. I feel comfortable when I use the Internet on my own.
2. I am able to use the Internet even if there is no one around to show me how to Use it.
3. I can complete my task by using the Internet if I can call someone for help if I get stuck.
4. I can complete my task by using the Internet if I have a lot of time.

Table 5.1 Item Used in Measurement of the Research Model for Five Key Core Constructs (Determinants) Adapted from Venkatesh et al. (2003), Venkatesh and Davis (2000), Taylor and Todd (1995b), Davis (1989).

Concept	Code of Item/ Indicator	Measurement Scales
Perceived Usefulness (PU)	pu1-pu4	Respondents selected the answers coming closest to their own agreements in accordance with items by using 7 point-Likert scale: 1 = Strongly Disagree, 2 = Quite Disagree, 3 = Slightly Disagree, 4 = Neutral, 5 = Slightly Agree 6 = Quite Agree, 7 = Strongly Agree.
Perceived Ease of Use (PEOU)	peou1-peou4	7 point-Likert scale
Social Influence (SI)	si1-si5	7 point-Likert scale
Facilitating Conditions (FC)	fc1-fc4	7 point-Likert scale
Self-Efficacy/ Perceived Ability (SE)	se1-se4	7 point-Likert scale

Table 5.2 Concepts (Key Determinants), Measurement Items (Indicators) and the Measurement Scales

5.11.2 Academic Work

One goal of integrating computers and information technology (IT) into higher education is to reach new levels of productivity (Green & Gilbert 1995). Usually, instructors have both positive and negative reactions to IT. Some of the positive reactions of instructors to IT have resulted from: (1) exploiting the potential of interactive technology, (2) changing teaching style, (3) assisting classroom management, and (4) having greater feelings of self-worth (Sheingold & Hadley 1990). Although, faculty member's attitudes towards the use of IT in their teaching sometime were very positive, sixty-nine percent of faculty members still faced barriers in using IT in their teaching (Zakaria 2001).

Academics (faculty members) normally work on instruction and non-instruction activities. Instructors assumed the primary roles of teachers, counselors, and supervisors in their regular responsibilities; they frequently play all three roles simultaneously. Functions within each of these three roles are planning, acting, and evaluating (Shedd & Bacharach 1991). Tasks of instructors are (1) preactive tasks include activities such as comprehending, preparing, and adapting content, plans, and materials; (2) interactive tasks are those performed during instruction; (3) postactive tasks include reflecting on both one's own actions and student responses, interacting with colleagues, and continuing professional development (Raynolds 1992).

Various task domains were identified (Rosenfeld, Reynolds & Bukatko 1992):

1) in teaching and teaching related tasks (referred as teaching for short) including planning and preparing for instruction, managing the classroom, implementing instruction, evaluating student learning and instructional effectiveness ;

2) in other tasks including administrative responsibilities, additional professional responsibilities (e.g. research) .

It can be said that academic work therefore relates to teaching and teaching related tasks within the University such as teaching in classes, providing a Personal web-base for facilitating teaching, preparing teaching materials, writing teaching documents or texts. Moreover, academic work also covers research and administrative tasks (Rosenfeld, Reynolds & Bukatko 1992).

The instrument (questionnaire survey) was developed based on these various task domains which were used as items to measure usage behaviour and behaviour intention in the proposed research model.

In conclusion, the researcher usually asks users to rate their agreements with the statements for measuring usage behaviour and behaviour intention by choosing a number based on 7-point Likert scale (1 = Strongly Disagree, 2 = Quite Disagree, 3 = Slightly Disagree, 4 = Neutral, 5 = Slightly Agree, 6 = Quite Agree, 7 = Strongly Agree) according to the measurement scales adapted from Davis (1989).

5.12 Summary

This chapter has proposed a theoretical framework(or a research model) based on prominent theories/models of technology acceptance together with the findings from previous research which presented strong evidence toward the formation of the research model. The development of the theoretical framework has been based on an understanding of (1) how the core determinants are related to usage behaviour, (2) how usage behaviour in teaching and in other tasks are related to behaviour intention in both tasks, (3) how the moderators impact on the influence of these key determinants toward usage behaviour, and (4) how the moderators impact on the influence of usage behaviour toward behaviour intention.

Two categories of hypotheses have been proposed 1) direct path hypotheses and (2) moderating hypotheses, in order to verify the proposed research model. Structural Equation Modelling with AMOS version 6.0 was used to test the proposed hypotheses in relation to the theoretical framework.

A detailed explantion of the analytical techniques used to achieve the fourth to seventh objectives of this study will be provided in Chapter 6. The data analyses and discussions of the results will be provided in Chapter 7 and Chapter 8.

CHAPTER 6

RESEARCH METHODOLOGY

6.1. Introduction

There are many types of research including exploratory, descriptive, analytical, predictive, quantitative, qualitative, deductive, inductive, applied, and basic research (Hussey & Hussey 1997). No matter what type of research the researchers intend to use, they need to focus their efforts on answering two significant questions. Firstly, what methodologies and methods will be used in their research? Secondly, how do they justify this choice and use of these methodologies and methods? Justification of their choices and particular uses of methodology and methods is something that reaches into the assumptions about reality that they bring to their work (Crotty 1998).

The research methodology and methods for this research were chosen in order to successfully achieve the research objectives. The justification of choices and uses will be presented in this chapter. The rationale will be discussed and explaining in terms of research process, design, development of the instrument, pilot study, population, sample and data collection, data analysis, and data management of multivariate analysis. The development of the relevant instrument with the outline of problems in the survey will be discussed.

6.2 The Research Process

This research were conducted in accordance with a research process based on the concepts of hypothetico-deductive method which has eight steps (Sekaran 2003).

1) Observation (it was conducted, but was not used as a research methodology).

2) Preliminary information (data) gathering through semi-structured interviews in order to gathering information on what is happening and why, so the researcher could get an idea or a feel for what was happening in the situation. The information from this step helped in designing the questionnaire.

3) Obtaining more information through literature survey. A literature survey was conducted in order to obtain more information so that the researcher could identify how such issues have been tackled in other situations. This information gave additional insights into various possibilities, sometimes including some that had not surfaced in interviews, and helped to confirm that these variables were good predictors of usage behaviour and behaviour intention (see literature survey in Chapter 2, 3 and 4).

4) Theory formulation (theorising) is a step in developing a theory incorporating all the relevant factors contributing to the usage behaviour and behaviour intention of academics to use the Internet. It was an attempt to integrate all the information in a logical manner, and was a collection of theories and models from literature to help conceptualise and test the reasons for the problems. In other words, it explained the research questions or hypotheses, and made variables clearly identified and labelled (Hussey & Hussey 1997)(see Chapter 5).

5) Hypothesizing

   This step was used to generate various hypotheses for testing to examine whether the theory formulated was valid or not (see Chapter 5).

6) Data collection

   A questionnaire was developed, based on various theorised factors, to determine the use and intention to use the Internet. This was then used as a survey tool to collect data (see details in the specific topic in this chapter).

7) Data analysis

   Data obtained through the questionnaire was analysed to see what factors influence behaviour. Other information about the academic' characteristics and background of Internet usage was also obtained from this stage (see details of data analysis methods in specific topic in this chapter and see details of data analysis in Chapter 7 and Chapter 8).

8) Deduction

This is the process of arriving at conclusions by interpreting the meaning of the results of the data analysis (see details in Chapter 7 and Chapter 8).

6.3 Research Design

Research design involves a series of rational decision-making choices. The research design was devised following a number of the researcher's decisions associated with the purpose of the study (exploratory, descriptive, hypothesis testing), where the study would be conducted (i.e., the study setting), the type of study it should be (type of investigation), the extent to which the researcher manipulated and controlled the study (extent of researcher interference), the temporal aspects of the study (time horizon), the level at which the data would be analysed (unit of analysis), sampling design (the type of sample to be used), how the data would be collected (data collection methods), how variables would be measured (measurement), and how they would be analysed to test the hypotheses (data analysis). In other words, the research design is the step aimed at designing the research study in such a way that the essential data can be gathered and analysed to arrive at a solution (Sekaran 2003). The following are the design considerations for this research in accordance with the guidelines suggested by Sekaran (2003).

1) The Purpose of the Study

Studies can be either exploratory, descriptive, hypothesis testing (analytical and predictive), or they may use case study analysis. Each one is also a method of solving problems, or for understanding phenomena of interest and generating additional knowledge in that area. The purpose of this study was hypothesis testing in nature because usually, studies relating to hypothesis testing explain the nature of certain relationships; establish the differences among groups or the independence of two or more factors in a situation. In other words, hypothesis testing is undertaken to explain the variance in the dependent variable. Hypothesis testing offers an enhanced understanding of the relationships that exist among variables, and could also establish cause and effect relationships.

2) The Type of Study

There are two types of investigation: causal and correlational study. This is a correlational study since the research is interested in delineating the important variables that are associated with the problem instead of delineating the cause of one or more problems (a cause and effect relationship) - a causal study. This research also attempts to establish cause-and-effect relationships through certain types of correlational or regression analyses such as path analysis, just like some attempts by other researchers (Billings & Wroten 1978; Namboodiri, Carter & Blalock 1975).

3) The Study Setting

As this research is a correlational study it was conducted in non-contrived settings, whereas rigorous causal studies are done in contrived lab settings. Organisational research can be done in the natural environment where work proceeds normally (i.e., in non-contrived settings) or in artificial, contrived settings.

4) Unit of Analysis

For this study**,** the unit of analysis is an individual academic within Thai Business Schools in the Thai Public University Sector. The unit of analysis refers to the level of aggregation of the data collected during the subsequent data analysis stage. The researcher treated each response as an individual data source.

5) Time Horizon of the Study

A study can be either a cross-sectional or longitudinal study. This research study is classified as a one-shot or cross-sectional study because it aims to collect data just once, perhaps over a period of months in order to answer the research objectives. It is different to a longitudinal study, where data on the dependent variable is gathered at two or more times to answer the research question.

6) Extent of Researcher Interference with the Study

This research was conducted in the natural environment of the organisation and so would consequently minimize interference by the researcher with the normal flow of the work, compared to that caused during causal studies.

7) Data Collection

Data collection is the process of collecting data associated with variables in the hypotheses in order to test the hypotheses that would be generated in this study (details of data collection are provided in this chapter).

8) Data analysis

Data analysis is the step where data is analysed statistically to see if the hypotheses can be substantiated (details in Chapter 7 and 8).

6.4 Survey Research Methodology

Methodology is the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes (Crotty 1998). Hussey and Hussey (1997) also define methodology as the overall approach to the research process, from the theoretical underpinning to the collection and analysis of data, and also suggest that methodology is concerned with the following main issues: why you collected certain data, what data you collected, from where you collected it, when you collected it, how you collected it, and how you will analyse it.

6.4.1 Methodology Strategy

There are many methodologies (Crotty 1998), for example, experimental research, survey research, ethnography, phenomenological research, grounded theory, heuristic inquiry, action research, discourse analysis, and feminist standpoint research. Among these methodologies, the survey research methodology (which is a positivistic methodology), was considered to be the most appropriate for this research. It is concerned with drawing a sample of subjects from a population and studying this in order to make inferences about the population. In the case of a small total population, this methodology normally allows data to be collected about each member of the population involved in the study (Hussey & Hussey 1997). Since academics within Business Schools in Thai Public Universities are estimated at 1,045 individuals (including non-experience and experience Internet users), this seemed to be a small population. On the other hand, when the population is large, only a sample of the whole population is used (Hussey & Hussey 1997). This was not the case for this study. In particular, this study was classified as an analytical survey where the main intention was to determine whether there is any relationship between different variables.

Because methodology is the process or design lying behind the choice and use of particular methods and linking to the desired outcomes (Crotty 1998), it was therefore necessary to identify which methods should be used in the research. Methods are the various means or techniques or procedures used to gather and analyse data related to some research question or hypothesis (Crotty 1998; Hussey & Hussey 1997).

Methods used in this research were categorised into three groups (1) interview method was used to gather preliminary information before conducting the main survey, (2) questionnaire method is the most important method used to collect primary data in the survey, and (3) many statistical methods were used to analyse data such as descriptive statistics, T-tests, and Structural Equation Model (details in specific topics).

Interviewing, administering questionnaires, and observing people and phenomena are the three main data collection methods in survey research (Sekaran 2003). On the other hand, others suggest questionnaire and interview are specific methodologies used to conduct survey research (Gay & Diehl 1992; Veal 2005). Even though the data source for this research is new information (primary data) which was obtained from questionnaire survey, it was often necessary to make use of other existing information (secondary data) such as government statistics and previous research (Ticehurst & Veal 2000), obtained through the literature survey (see Chapter 2, 3, and 4). Secondary data are data that already exist and do not have to be collected by the researcher (Sekaran 2003).

Silverman (1994) offers a useful clarification of the basic concepts in this research about theory, hypothesis, methodology, and method (see Table 6.1). It has been suggested that models are an alternative for theories or more often refer to theories with a narrow focus (Hussey & Hussey 1997).

Concept	Meaning	Relevance
Theory	A set of explanatory concepts	Usefulness
Hypothesis	A testable proposition	Validity
Methodology	A general approach to studying research topics	Usefulness
Method	A specific research technique	Good fit with theory, hypothesis and methodology

Table 6.1 Basic Concepts in Research (Silverman 1994)

6.4.2 Interview Method for Developing the Questionnaire

This research used semi-structured interviews to gather preliminary information during the exploratory stage of the research because Sekaran (2003) suggests that it is a useful data collection method to include of this stage. The interviews were conducted by face to face interviewing with open-ended questions to collect preliminary information from academics within Business Schools. This method has advantages in that the interviewer can adapt the questions as necessary, clarify doubts, and ensured that the responses are properly understood by repeating or rephrasing the question, and could establish friendly relationships and motivate respondents. By using this technique, any other body language unconsciously exhibited by the respondent could also be detected. This would not be possible to detect in a telephone interview and so, rich data could be obtained.

The procedure of selecting academics to be face-to face interviewed based on simple random sampling was as follows. Ten academics were selected from two Business Schools in two Thai Public Universities in Bangkok: Kasetsart University and Sukhothai Thammathirat Open University. The rationale of using face-to-face interviews using tape-recording was because the level of complexity of the issues involved was rather high, and the estimated duration of the interview was rather lengthy (at least 30 minutes to 60 minutes). Each university was located in a similar geographic area in Bangkok which made conducting the interviews convenient.

Tape-recording of semi-structured or in-depth interviews is commonly used, although in some cases it might be felt that such a procedure could inhibit respondents. If tape-recording is not possible then notes must be taken, either at the time or immediately afterwards. However, because academics allowed tape-recordings, this helped in producing complete verbatim (word-for-word) transcripts of interviews. This is however a laborious process as one hour of interview may take as much as six hours to transcribe (Ticehurst & Veal 2000). In practice, transcribing the tape-recording for this research took more than ten hours for each one hour of tape. Such transcripts can be used to analyse the results of interviews in a more methodical and complete manner than is possible with notes (Ticehurst & Veal 2000). This technique has however some disadvantages such as the geographical limitations that the researcher may deal with on the surveys, the vast resources needed if such surveys need to be done nationally or internationally, respondents may be concerned about confidentiality of information given, they can introduce interviewer biases, and respondents can terminate the interview at any time (Sekaran 2000). In this case there was no geographical limitation because the interviews were conducted within two universities in Bangkok and the respondents were informed that the information they gave would be kept strictly confidential.

6.4.3 Questionnaire Method for the Main Survey

A questionnaire is a pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives (Sekaran 2000, 2003). The rationales behind the use of questionnaire method as a major survey tool in this research are:

1) It was used because it is an efficient data collection mechanism when the researcher knows exactly what is required and how to measure the variables of interest. Field studies, comparative surveys and experimental designs often use questionnaires to measure the variables of interest (Sekaran 2003).

2) It was used because quantified information is required concerning a specific population and academics' behaviour and attitudes are acceptable as a source of information (Ticehurst & Veal 2000).

Sekaran (2003) suggests that the advantage of the questionnaire method is that administering questionnaires to large numbers of individuals simultaneously is less expensive and less time consuming than interviewing. It also does not require as much skill to administer a questionnaire as to conduct interviews. Nevertheless, there are a number of problems associated with the use of questionnaires relating to the issue of confidentiality (Hussey & Hussey 1997). It was confirmed in the covering letter to all academics that the data collected would be strictly handled in consideration of issues of anonymity and confidentiality.

Questionnaires can be personally administered or by mail. The later technique was mainly used to collect primary data for this research, because (1) this technique can cover a wide geographical area. Since there are many universities that are scattered around twelve cities (provinces) in five regions of the country outside Bangkok, it was impossible to use the first technique (personally administered questionnaire) because of high expense and time consumed, (2) the respondents can complete questionnaires at their own convenience such as in their homes at their own pace, and anonymity is high. On the other hand, personally administered questionnaires, are a good way to collect data when the survey is confined to a local area and the organisation is willing and able to assemble groups of employees to respond to the questionnaires at the workplace. It is to be expected that the return rate of mail questionnaires will typically be low, and with a very low return rate it is difficult to establish the representativeness of the sample. However, a 30 percent response rate is considered acceptable. With this drawback, the researcher therefore utilised much effort in order to improve the response rate. Mail questionnaires also have another drawback, in that if the respondents have any doubts, their doubts cannot be clarified (Sekaran 2003).

As mentioned, questionnaire technique in the main survey and semi-structured interviews were used in the preliminary investigation because of the appropriateness and usefulness of these techniques. It can be noted that survey research methodology has been used in much previous research, and that most of them used questionnaires survey. See for example, Gefen, Karahanna and Straub (2003), Chau and Hu (2001), Venketesh and Davis (2000), Venketesh and Morris (2000), Hu et al. (1999), Venkatesh (1999), Chau (1996), Igbaria, Parasuraman, and baroudi (1996), Igbaria, Guimaraes and Davis (1995), and Taylor and Todd (1995) etc. Other research used interview survey together with questionnaire survey, for example, Hong et al. (2001-2002), and Chau and Hu (2002) etc.

6.5 Development of the Questionnaire

In order to develop the questionnaire to be as a tool to collect primary data, this research conducted preliminary information gathering by using semi-structured interviews together with information from a literature survey before going into the stage of questionnaire design for the main survey.

6.5.1 Preliminary Information Gathering

It was expected that preliminary information gathering (interviews) could help in designing a questionnaire and perhaps help to develop the theoretical framework.

These interviews were conducted between 9 September 2004 and 31 October 2004 within two Business Schools in the Thai Public University Sector: Kasetsart University and Sukhothai Thammathirat Open University in Bangkok Thailand. The interviewer had a list of predetermined open-ended questions and could also ask other relevant questions. The questions were aimed at investigating the working environment of academics associated with use of the Internet. After the interviews, the information provided details of the opinions of academics associated with the issues under investigation, and provided more information about specific variables of interest with additional insights of possible determinants that seemed to be important in this study. After this stage, the researcher could further focus on the factors and associated information through further questionnaire surveys. A mass of information was collected through the interviews and literature survey and this important information helped to develop the theoretical framework and questionnaire. However, because the objective of the semi-structured interviews conducted in this research was to provide information necessary for the design of a formal questionnaire, detailed analysis was less important (Ticehurst & Veal 2000). Key variables from the literature review were elaborately combined with the information from interviewing with the aim of developing an effective questionnaire to be used in this survey.

Four cultural aspects (see Chapter 5) associated with two aspects of organisational culture: e-university and research university plans and two aspects of national culture: the habits of Thai people in reading and writing, and Thai language were investigated because they were expected to impact on the influence of the determinants toward Internet usage. Because of this, they were elaborately integrated into the questionnaire design as well. This information about culture aspects emerged from the interview stage supported by the literature survey.

Some other key information from the results of the interviews and supported by the literature survey about how to make full use of the Internet, was that Internet usage may affect professional practices, professional development, and quality of working life of academics, were all integrated into the questionnaire design. Questions in the questionnaire were formulated in order to elicit important information for this research associated with the background of Internet usage, profiles of academics, organisational culture, some other cultural aspects, key determinants of usage behaviour and behaviour intention, frequencies of Internet usage and behaviour intention, motivations to make full use of the Internet and how Internet usage affects academics' professional practice, professional development and quality of working life.

6.5.2 Questionnaire Design

In order to minimize bias in this research, the researcher has focused on three areas when designing questionnaire, according to Sekaran (2003): (1) the wording of the questions, (2) planning of issues of how the variables will be categorised, scaled, and coded after receipt of the responses, and (3) the general appearance of the questionnaire.

The items used to measure the research model (items used in the questionnaire) are based mostly on items used in measurements by Venkatesh et al. (2003), Venkatesh and Davis (2000) and Taylor and Todd (1995). Statistical analysis methods were then used to analyse data from the questionnaire survey.

The questionnaire design stage for this research took over a year until the pilot survey was done (July 2004 to January 2006). This was because the researcher was aware that in designing questionnaires it is important to take it slowly and carefully and always to keep in mind why the research was being done (Ticehurst & Veal 2000). Thus the researcher acknowledged that the aim in designing the questionnaire was to achieve the research objectives (see Chapter 1) , and always considered the basic criteria of relevance and accuracy (Zikmund 2003).

A questionnaire is a list of carefully structured questions, chosen after considerable testing with a view to eliciting reliable responses from a chosen sample (Hussey & Hussey 1997). The theories and models (in Chapter 4), especially the theoretical framework and the research hypotheses (in Chapter 5) guided the questionnaire design process significantly. I integrated questions into the questionnaire only when they related to the research objectives. Some parts of questionnaires from previous studies which were considered relevant to the study and possibly for further data analysis were selected to become part of the input into the questionnaire design process. For example, questions used in measurement of the research model were based on the prominent models/theories (Davis 1989; Taylor & Todd 1995; Venkatesh & Davis 2000; Venkatesh et al. 2003) (see Chapter 5). The information gathered about academics from this questionnaire survey was generally divided into three groups (1) respondent characteristics, (2) attitudes and motivations, and (3) activities and behaviour (Ticehurst & Veal 2000). I attempted to design a questionnaire according to the suggestions of Tull and Hawkin (1990), in that the overall questionnaire should reflect the research objectives by logically moving from one topic to another topic.

It was essential to attach a covering letter to introduce respondents to the study and explain the survey objectives. To establish credentials and legitimacy, the covering letter explained that the study was a research project of Victoria University, Melbourne, Australia, and that all information obtained would be subject to anonymity and confidentiality and used only for the purposes of the present study. On the top of each questionnaire it was clearly stated that this survey was only for respondents who had Internet experience. In order to improve the response rate, respondents need to regard the questionnaires as interesting and worthwhile. There were some respondents who kindly gave their opinions about this research noting that this survey was interesting, obviously timely and it was worth participating in.

The questions were structured and separated into 10 sections starting from A-J (see Appendix I - Part A). Some sections used a 7-point Likert scale because it is extremely popular for measuring attitudes and the method is simple to administer. With the Likert scale, respondents indicate their attitudes by checking how strongly they agree or disagree with carefully constructed statements that range form very positive to very negative toward the attitudinal object. Respondents generally choose from five alternatives and may number from 3 to 9 (Zikmund 2003). In this study, seven alternatives was used according to the measurement scales used in previous well-known studies such as Davis (1989). This scale ranges from strongly disagree = 1, quite disagree = 2, slightly disagree = 3, neutral = 4, slightly agree = 5, quite agree = 6, and strongly agree = 7. A briefly summary of the use of scales and measurements follows.

Section A focused on Internet usage background. It comprised 9 questions all established as nominal scales, such as how often do academic currently use the Internet. The design at this section was based on literature survey.

Section B focused on respondents' data and comprised 5 main issues associated with: (1) whether they used the Internet by choice (established as a nominal scale); (2) academics' habits of reading and writing , and their opinions on whether these were obstacles in using the Internet (established as a 7-point Likert scale); (3) academics opinion about whether the Thai language was an obstacle in using the Internet (established as a 7-point Likert scale); (4) the organisational culture associated with e-university and research university plans (established as a nominal scale); and (5) demographic data such as academic position, educational level, gender and age (established as a nominal scale). These last five questions were considered as sensitive questions especially age, so they were put in the last part of this section.

Section C was an important section used for testing and generating the models and especially the model of technology acceptance for this research. It focused on the predictors or determinants that were expected to influence behaviours based on theories and models in Chapter 4 and 5, including perceived usefulness and perceived ease of use toward internet usage (established as a 7-point Likert scale). There were two parts in this section. Section C1 was developed to access perceived usefulness which comprised four items such as "Using the Internet enables me to accomplish tasks more quickly". Section C2 was developed to test perceived ease of use which comprised four items such as "I find it easy to use the Internet to do what I want to do".

Section D was also an important section used for generating the model of technology acceptance. It focused on another set of predictors or determinants that were expected to influence behaviours based on theories and models in Chapter 4, and 5, including those of social influence, facilitating conditions and self-efficacy toward Internet usage (established as a 7-point Likert scale). There are three parts in this section. Section D1 was developed to assess the social influence which comprised 5 items such as “Family and friends think that I should use the Internet”. Section D2 was developed to assess facilitating conditions which comprised 4 items such as “I can access the Internet very quickly within my university”. Section D3 was developed to assess self-efficacy or perceived ability of academics about using the Internet. This comprised 4 items such as “I am able to use the Internet even if there is no one around to show me how to use it”.

Section E focused on investigating current Internet usage in the work of academics (established as a 7-point Likert scale). There are three parts in this section. Section E1 was developed to investigate how academics currently make use of the Internet in teaching and teaching related tasks. This was based on the literature survey and interview information (see Chapter 5). It comprised 5 items such as “I use the Internet when teaching in classes”. Section E2 was developed to investigate the views of academics associated with their current Internet usage in other tasks, and was based on the literature survey and interview information (see Chapter 5). It also comprised 5 items such as “I use the Internet for searching information for my research”. Section E3 was developed to determine on overall assessment of the current Internet usage in the work of these academics. It comprised only one item “Overall, I use the Internet in all of my work”.

Section F focused on self-reporting of the frequency of current internet usage in academic work. This was established as an 8-point scale. It was developed by using similar categories of items as in section E but with different measurement scales and was based on the literature survey and interview information (see Chapter 5).

Section G focused on investigating the views of academics concerning their intention to use the Internet in their future work. This was established as a 7-point Likert scale (see Chapter 5). This section was developed like section E, but as I intended to measure intention, the items used were slightly changed with wordings such as "I intend to use the Internet more when teaching in classes".

Section H focused on self-prediction of frequency of future Internet usage in their work. It was established as an 8-point scale. This section was similar to section G but used different measurement scales and was based on the literature survey and interview information (see Chapter 5).

Section I was associated with the opinions of academics regarding how to make full use of the Internet in their work. It was established as an interval scale (7-point Likert scale). This section has two parts. I1 has one item, aimed to assess for those academics who still have not made full use of the Internet in work, whether they intend to use the Internet more in their work in future. Section I2 comprised 7 items, and was developed to investigate what motivations played an important role in motivating academics to make full use of the Internet. Questions were used such as "If technicians are available in helping me when I have difficulties, this would motivate me to make full use of the Internet in my work".

Section J focused on academic' opinions in relation to whether using the Internet could help in improving professional practices, professional development and quality of working life. It was established as a 7-point Likert scale. This section has three parts. Section J1 comprised 5 items, established to investigate whether using the Internet helped improve academics' professional practice. Questions included "Using the Internet help improving my research". Section J2 comprised 3 items, and was established to investigate whether using the Internet helped improve professional development, with questions such as "Using the Internet helps in improving my academic knowledge". Section J3 was developed to investigate whether using the Internet helped improve quality of working life. It comprised 5 items such as "Using the Internet helped me to save money".

Questions on section B (question B2, B3, and B4), section E, F, G, H, I, and section J, were established from information arising from the interviews, together with support from the literature review (see Chapter 5).

In summary, section B (B2, and B3), section C, D, E, G, I and J used a 7-point Likert scale. Only section F, and H used an 8-point scale, ranging from "do not use at all" = 1, "use about once each month" = 2, "use a few times a month" = 3, "use about once each week" = 4, "use a few times a week" = 5, "use five to six times a week" = 6, "use about once a day" = 7, and "use several times a day" = 8 respectively.

Strategies to enhance the response rate were considered in the design of the questionnaire.

1) Some easy-to-answer questions were established in the first section with a view to encouraging participation and engaging curiosity, because people seemed to enjoy responding to questions associated with their abilities and their experience in using the technology.

2) Sensitive questions such as age, educational level, and academic position were put in the second section of the questionnaire after introducing the interesting and motivating questions in the first section. If questions such as age and gender were put in the final part of the questionnaire, it could be expected that this information may be left without any response because the respondent may be fatigued or less interested in completing the survey when 20 or 60 minutes had passed. As expected there was some missing data about age, but it was rather surprising that there was also some missing data on gender. In order to promote an age response, the age question offered four options. It could be understood why academics did not want to provide their age (missing 5 cases = 1.1% from 455 cases) but it is questioned why they did not want to identify their gender (missing 17 cases = 3.7% from 455 cases).

3) The wordings of questions were simplified with a view to enabling respondents to easily understand and answer them. Open-ended questions were generally minimised as much as possible for reasons of coding, comparability, and respondent freedom of choice but for the last part of the survey, I provided a free space for any additional comments for respondents who wished to provide this.

Because this survey was executed in Thailand, and Thai academics normally used Thai language for everyday life, it was inappropriate to conduct this survey in English even though many Thai academics have sufficient English proficiency to understand an English questionnaire. It was thus necessary to translate the questionnaire from English to Thai and to ascertain that the translation was equivalent. Berry (1980) suggested that the goal of translation is conceptual equivalence to obtain instruments that elicit responses which convey similar meanings to members of various groups. McGorry (2000) suggests that a central concern of every translation is to produce an instrument that has the same meaning as the original instrument and suggests four procedures for translation of an instrument: (1) one way translation; (2) double translation; (3) translation by committee; and (4) decentering. Decentering is a way to develop instruments that would be culturally appropriate when cross-cultural research is conducted (Werner & Campbell 1970). Nevertheless, double translation was considered to be the most appropriate for this study because this process has been described as one of the most suitable (Marin & Marin 1991), even though issues of literal translation and missing information may arise. I used a few iterations of this process to ensure proper translation. This leads to a more costly and time consuming translation process. Two bilingual individuals participated independently in this translation process. This process was considered effective because the instrument went through a number of filters produced independently by the researcher. The steps of the double translation process used in this study include:

1) The version in the original language (English) of the questionnaire was translated by the first translator into the target language (Thai);

2) A second independent translator took the results from the previous step and independently translated the instrument (questionnaire) back to the original language (English);

3) The researcher compared two versions of the questionnaire in original language (English) for any inconsistencies, mistranslation, meaning, cultural gaps and lost words or phrases, after some differences were found, the researcher consulted with both translators to find out why this occurred and how the instrument could be revised.

Prior to using the Thai version of the questionnaire in the main survey, two pre-tests and a pilot study were exercised by using the double translation process to ensure proper translation of the survey, in order to avoid confusion or misinterpretation (Brislin, Lonner & Thorndike 1973).

In each case, I always kept in mind that each question was constructed to ensure that the results would provide sufficient information for examining the usage behaviour and behaviour intention, testing the relationships between variables, especially in testing and generating the model of technology acceptance and investigating the impact of moderators on the influences of predictors toward the behaviours .

6.5.3 Pre-testing the Questionnaire

Pre-testing is a trial run with a group of respondents for the purpose of detecting problems in the questionnaire instructions or design, whether the respondents have any difficulty understanding the questionnaire or whether there are any ambiguous or biased questions (Sekaran 2003). The pre-testing should be administered to a sample that is expected to respond similarly to the samples on which the scale eventually will be applied. The pre-testing' objective is to evaluate the items used in the design questionnaire (Hair, Black, Babin, Anderson & Tatham 2006). Sekaran (2003) suggests that it is important to pre-test the questionnaire used in the survey to ensure that the respondents understood the questions posed and that there is no ambiguity and no problems associated with wording or measurement. Pre-testing may rely on colleagues, respondent surrogates, or actual respondents for the purpose of refining a measuring instrument (Cooper & Schindler 1998). The size of the pre-testing group may be 25 or 50 subjects (Zikmund 2003).

In this study, the first pre-testing was conducted (between 27 September 2005 and 23 October 2005), by distributing 25 Thai language questionnaires (after double translation) to individual academics within three Business Schools in three universities in Thailand: Kasetsart University, Sukhothai Thammathirat Open Univerisity, and Mahasarakarm University. Some of academics were research and information technology professionals. Twelve questionnaire returns meant a rather good response rate (48%). The suggestions highlighted some potential problems with wordings or measurement and ambiguities. It is important to give careful consideration to wordings because question wording substantially influences accuracy (Zikmund 2003). A basic statistical analysis was made of this first pre-test. After the first pre-test, the questionnaire was significantly revised because the respondents had suggested some changes with wordings and the inappropriate sequencing of the questionnaire design. The revision was made after consulting with the translators.

Then a second pre-testing was conducted (4 November 2005 to14 November 2005), with 25 PhD and DBA students within the Graduate School of Business in Victoria University, Australia, and 18 returns meant a good respond rate (72%). The rationale for using these subjects was that some were academics from Business Schools in Thailand who were on study leave, while other subjects were from the business area and had experience with the use of the technology. For this pre-test, questionnaires both in English and Thai had been specifically distributed to Thai PhD students and an English version only to other Students. It had been expected that they could help by suggesting some potential problems with the questionnaire design. There were interesting comments such as one PhD student suggesting that she herself would not like to answer about her age and may put only 22 years old in the space provided or leave it blank. Another had similar thoughts and suggested that the researcher should provided options for respondents to select, rather than just providing the space for putting their age. Data collected from this second pre-test was also analysed by using basic statistics. After the second pre-testing, it was found that there were some other ambiguities and inadequacies. It was better to find these early before distributing questionnaires to a large number of respondents. The questionnaire was again revised to incorporate suggestions about wording and inappropriate sequencing, after the researcher consulted with the translators.

6.6 Pilot Survey

A pilot study is conducted to detect weaknesses in design and instrumentation and to provide proxy data for selection. It should draw subjects from the target population and simulate the procedures and protocols that have been designed for data collection. For example if the survey is to be distributed by mail , the pilot questionnaire should be mailed (Cooper & Schindler 1998). The pilot survey was conducted within two Business Schools in two Private Universities in Bangkok, Thailand. A pilot survey is a small-scale version of the larger survey; it relates particularly to questionnaire survey but can relate to any type of research procedure. It is always advisable to carry out one or more pilot surveys before starting the main data collection exercise. The double-translation process was still used, and once the translation was complete, the researcher delivered the survey to a pilot group. The purpose of pilot surveys is (Ticehurst & Veal 2000):

1) Testing questionnaire wording
2) Testing question sequencing
3) Testing questionnaire layout
4) Gaining familiarity with respondents
5) Testing field work arrangements (if required)
6) Training and testing fieldworkers (if required)
7) Estimating response rate
8) Estimating interview or questionnaire completion time
9) Testing analysis procedures

The size of the pilot group may range from 25 to 100 subjects (Cooper & Schindler 1998). In this study, the pilot survey was carried out by using personal visits to the secretarial office of each Business School and asking the staff to distribute them to the respondents with some explanation about the survey, and a request for a telephone number to contact when following up the survey. In total, 70 questionnaires were sent to the offices of two Thai Business Schools within two Private Universities: Dhurakij Pundit University, and Sripatum University. The completion time for the pilot survey was around 30 minutes to 60 minutes. After many telephone calls to the staff of each secretarial office to check about the progression of the survey, it produced a 64.6% response rate. Forty two (42) responses were received from a total of 65 academics. This included 27 returned questionnaires from 40 academics of Sripatum University, and 15 returned questionnaires from 25 academics of Dhurakit Pundit University. The duration of this pilot survey was from 15 December 2005 to 10 January 2006. From the results of reliability tests, validity tests and some basic data analysis, a minor change was also made to the questionnaire design such as the format of the questionnaire in order to improve understanding. It was clear that the pilot survey could be used to test out all aspects of the survey and not just question wording (Ticehurst & Veal 2000).

After the data was collected, reversed scoring was performed for the negatively worded items, data was analysed by using preliminary basic statistical methods using SPSS, and the respondents feedback was summarised. Any biases could also be detected if the respondents had tended to respond similarly to all items or stuck to only certain points on the scale (Sekaran 2003). The feedback and data analysis indicated that there was some problem with the original survey; so revision was again made after the researcher consulted with the translators. After this the researcher could proceed to the main survey. The next two topics consider the reliability and validity of the instrument and confirm that the instrument was ready to be used in the main survey.

6.7 Reliability Analysis of the Instrument

Testing goodness of data is testing the reliability and validity of the measures. According to Ticehurst and Veal (2000), reliability is the extent to which research findings would be the same if the research were to be repeated at a later date, or with a different sample of subjects. In other words, the reliability of a measure indicates the extent to which the measure is without bias (error free) and hence offers consistent measurement across time and across the various items in the instrument. It helps to assess the goodness of measure, and indicates accuracy in measurement (Sekaran 2003).

This research used the most popular test of inter-item consistency reliability that is the Cronbach's coefficient alpha (Cronbach 1951; Nunnally 1979; Peter 1979; Sekaran 2000). This is a test of the consistency of respondents' answers to all the items in a measure. To the degree that items are independent measures of the same concept, they will be correlated with one another (Sekaran 2000). Table 6.2 presents the Cronbach's coefficient alpha for the pilot study with 42 cases. According to Sekaran (2000), reliabilities less than 0.6 are considered to be poor, those in the 0.7 range, acceptable, and those over 0.8 good. The closer the reliability coefficient gets to 1.0, the better. In other words, the generally agreed upon lower limit for Cronbach's alpha is 0.70 (Peter 1979; Robinson, Shaver & Wrightsman 1991a, 1991b), but this may decrease to 0.60 in exploratory research (Robinson, Shaver & Wrightsman 1991a).

Measurement Items (Interval Scale)	**Items**	**Cron-bach' Alpha**	**Reliability Results**	**Inter-Item Correlation**	**Item-to-total correlation**
Perceived Usefulness (PU)	4	0.939	good	*0.734-0.848*	*0.810-0.880*
Perceived Ease of Use (PEOU)	4	0.904	good	*0.646-0.830*	*0.732-0.844*
Social Influence (SI)	5	0.917	good	*0.523-0.875*	*0.747-0.878*
Facilitating Conditions (FC)	4	0.755	acceptable	*0.298-0.588*	*0.524-0.611*
Self-Efficacy(SE)	4	0.817	good	*0.391-0.725*	*0.529-0.737*
Usage Behaviour					
-Teaching (TEACH)	5	0.763	acceptable	*0.077-0.629*	*0.235-0.714*
-Other tasks(OTASK)	5	0.832	good	*0.223-0.677*	*0.515-0.760*
-All work	10	0.835	good		
Behaviour Intention					
-Teaching (BITEACH)	5	0.868	good	*0.381-0.912*	*0.562-0.768*
-Other tasks (BIOTASK)	5	0.930	good	*0.620-0.859*	*0.767-0.841*
-All work	10	0.932	good		
Usage Behaviour (Frequency of use)					
-Teaching	5	0.792	acceptable	-0.051-0.801	0.240-0.763
-Other tasks	5	0.762	acceptable	0.109-0.633	0.383-0.669
-All work	10	0.824	good		
Behaviour Intention (Frequency of Use)					
-Teaching	5	0.795	acceptable	0.115-0.942	0.468-0.651
-Other work	5	0.905	good	0.440-0.937	0.506-0.915
-All work	10	0.916	good		
Motivation to make Full Use of the Internet	7	0.924	good	0.333-0.853	0.579-0.873
Overall PP and PD and QOW					
-Professional Practices (PP)	5	0.877	good	0.390-0.855	0.586-0.777
-Professional Development (PD)	3	0.961	good	0.859-0.917	0.901-0.946
-Quality of Working life	5	0.807	good	0.234-0.805	0.322-0.724

Table 6.2 Summary of Cronbach' Alphas, Inter-Item Correlation and Item-to-Total Correlation Values in Pilot Study

All internal consistency reliabilities based on Cronbach' alphas for measurement items (all interval scales) were greater than 0.70 and were considered to be good and acceptable. Almost all reliability tests were quite high (0.8 up); and indicated the items in each set (concept) were positively correlated to one another. Items in each set are independent measures of the same concept, and indicated accuracy in measurement.

Other than Cronbach' Alpha, another measure to assess internal consistency is the item-to-total correlation (the correlation of the item to the summated scale and the inter-item correlation (the correlation among items) (Hair et al. 2006). For the pilot study, item-to-total correlation values all exceed 0.5 (except some items in usage behaviour and frequency of use) and the inter-item correlation values all exceed 0.3 (see Table 6.2), (except a few items in usage and intention behaviour and frequency of usage and intention). These suggested that the questionnaire was a reliable measurement tool. It has been suggested that the item-to-total correlations should exceed 0.50 and that the inter-item correlations should exceed 0.30 (Robinson, Shaver & Wrightsman 1991a).

6.8 Validity of the Instrument

Validity is the extent to which the data collected truly reflect the phenomenon being studied. Usually, business research faces difficulties about validity, specifically in the measurement of attitudes and behaviour, since there are always doubts about the true meanings of responses made in surveys, interviews, and self-reporting of behaviour (Ticehurst & Veal 2000). Sekaran (2003), suggests several types of validity tests for testing the goodness of measures include content validity, criterion-related validity, and construct validity.

6.8.1 Content Validity

Content validity or face validity assesses the correspondence between the individual items and the concept through ratings by expert judges, and pre-tests with multiple sub-populations or other means (Hair et al. 2006). It was used in this research. This research used both strategies to test content validity (face validity) by (1) asking three experts in information technology to provide their judgements on the questionnaire especially on the items in each set (concept) to check whether individual items corresponded with the concept. Some minor revisions were made to the instrument according to their suggestions. (2) Other than this, the instrument has been pre-tested twice with a sub-population and a group of PhD students and one pilot study was tested with a group of similar subjects as the population (academics within Business Schools in Private Universities).

6.8.2 Construct Validity

Construct validity that was used in this research testified to how well the results obtained from the use of the measure fit the theories around which the test was designed. In other words, construct validity testified that the instrument did tap the concept as theorised. Construct validity can be established through (1) correlational analysis (convergent and discriminant validity), (2) factor analysis, and (3) the multi-trait, multi-method method matrix of correlations. Others suggest the three most widely accepted forms of validity are convergent, discriminant, and nomological validity (Campbell & Fiske 1959; Peter 1981).

Convergent validity is synonymous with criterion validity (Zikmund 2003) and with correlational analysis, and is one way of establishing construct validity for this research. It indicates that items that are indicators of a specific construct should converge or share a high proportion of variance in common (Hair et al. 2006). In other words, it assesses the degree to which two measures of the same concept are correlated, with high correlation indicating that the scale is measuring its intended concept. Thus reliability is also an indicator of convergent validity (Hair et al. 2006).

According to rules of thumb, it has been suggested that item-to-total correlations exceed 0.50 and the inter-item correlations exceed 0.30 (Robinson, Shaver & Wrightsman 1991a). Cohen (1988) suggests correlation (r) = 0.10 to 0.29 (small correlation: both positive and negative correlation), r = 0.30 to 0.49 (medium correlation), and r = 0.50 to 1.00 (large correlation). As results of the inter-item correlation values of the indicators in each construct (PU, PEOU, SI, FC, SE, usage in teaching (TEACH), usage in other tasks (OTASK), intention in teaching (BITEACH) and intention in other tasks (BIOTASK)) were in both medium and high levels (higher than 0.30, and most of them higher than 0.50) (except some inter-items correlation values in usage behaviour), and the item-total correlation values were also in a high levels (higher than 0.50) (except some item-total correlation values in usage behaviour), these indicated the convergent validity of the instrument (see Table 6.2 - constructs in italic).

Because of the reliability results with high coefficient alpha, and correlation values of the questionnaire, and the results of the convergent validity of this pilot study, a minor change was made to the questionnaire wording after the pilot study. The instrument was developed and designed based on the theoretical literature survey and also using two pre-tests together with content validity from expert agreements. Thus the measures of the instrument provided adequate coverage of the concepts; and the instrument has clear and understandable questions. Consequently, the instrument was reliable, valid when considered content validity, construct validity and theoretical validity, and was ready to be used in the main survey.

Discriminant Validity was also used in this research (see Chapter 8). It is another way of testing construct validity. A measure has discriminant validity when it has a low correlation with measures of dissimilar concepts (Zikmund 2003).

6.9 Population, Sample and Data Collection

6.9.1 Population

The population of this research, the entire group of people that the researcher wishes to investigate (Sekaran 2003), is academics within Business Schools in the Thai Public University Sector who have already had experience in using the Internet. The total number of business academics is 1,045, comprising both academics that have Internet experience and those that have no Internet experience. It was found that only 927 academics have Internet experience as identified by the local secretarial offices, thus the total population is 927 academics (N = 927 academics). These subjects of study were academics within 22 Business Schools (or equivalent) in 24 Universities in the Thai Public University sector at the time of survey (22 January 2006 to 23 April 2006). One university has three Business Schools located and managed separately, and four universities have no Business Schools. This research did not cover four categories of universities (see Chapter 3):

1) The Rajamangala University of Technology system comprised nine universities (35 campuses) in the system.

2) Forty one Rajabhat Universities scattered around the country.

3) Princess of Narathiwat University and Nakhonphanom University.

4) Four Public Universities which have no Business Schools within them: King Mongkut's Institute of Technology Ladkrabang, King Mongkut's Institute of Technology North Bangkok, King Mongkut's Institute of Technology Thonburi, Suranaree U. of Technology.

6.9.2 Sample Size

Sampling design and the sample size are important to establish the representativeness of the sample for generalisability (Sekaran 2003). Roscoe (1975) proposed the following rules of thumb for determining sample size:

- Sample sizes larger than 30 and less than 500 are appropriate for most research.
- When samples are to be divided into sub-samples, a minimum sample size of 30 for each category is necessary.
- In multivariate research, the sample size should be several times (preferably 10 times or more) as large as the number of variables in the study.

A sample is a subset of the population, comprising some members selected from the population. In this study the population (N) = 927 subjects. A subject for this study is an individual full-time academic within Business Schools (or equivalent) who has Internet experience. Sampling is the process of selecting a sufficient number of elements from the population (Sekaran 2003). For this study, because the size of the population was small, it was important to use all subjects in the population as targets of this survey (Sekaran 2003). According to the generalised scientific guideline for sample size decision for a given sample size (Krejcie & Morgan 1970):

- If the population (N) = 950, the sample size (n) will be needed = 274.
- If N = 900, the sample size (n) will be needed = 269.

- Therefore, if the population in this study (N) = 927, the sample size (n) will be needed = 272.

In this study, the sample size (n) = 455 subjects was comprised of usable responses from all subjects who participating in this research and was representative of the population for generalisability. The sample size requirements for statistical techniques used in this research are presented in a specific topic in this Chapter.

6.9.3 Data Collection

This survey research was conducted in twelve cities (or provinces) in five regions of Thailand: Central, Northern, Eastern, North Eastern, and Southern Regions within a period of three months from 22 January 2006 to 23 April 2006:

- In the Central region of Thailand the survey was conducted in two cities: Bangkok (seven universities) and Nakornprathom (one university).

- In the Northern region in three cities: Chiang Mai (two universities), Chiang Rai (one university) and Pitsanulok (one university).

- In the Eastern region, in one city: Chonburi (two universities one of these is another campus of a university in Bangkok).

- In the North Eastern region, in four cities: Sakolnakorn (one university, it is another campus of a university in Bangkok), Khon Kaen (one university), Mahasarakham (one university), and Ubon Ratchathani (one university).

- In the Southern region, in two cities: Pethaburi (one university), and Songkla (three universities).

The researcher was seriously concerned about the response rate for this survey since the response rate associated with mail questionnaires in Thailand is usually very low about 10% or sometimes less. Thai people still have not got used to survey research and often throw it away when they received them from their mail boxes. For example, despite the fact that one researcher had spent much effort in various ways associated with mail questionnaires (used many telephone calls, and sending follow up letters), she still received the rather low response rate only around 10% (40 questionnaire returns from total distributed questionnaires of 400 for the survey period of six months). Therefore, the researcher was always worried about how to improve the response rate. Since the target population is rather small at around 927 academics, if the response rate is 10% the sample size will be around 100 respondents. With this number, it would have been impossible to conduct statistical analysis effectively.

Within the 20 Public Universities there were 22 campuses/locations for distributing questionnaires. Kasetsart University has three campuses, each campus with its own Business School. Table 6.3 presents the summary of data collection in Bangkok, universities outside Bangkok, and total responses from all targeted universities together with the response rates.

Description	**Universities In Bangkok (BKK) (7 campuses for 7 universities)**	**Universities Outside BKK (15 campuses and 14 universities)**	**All 20 Universities (22 locations)**
Total academics	441	604	1045
Academics who are on study leave	14	95	109
Academics who have no experience about using the Internet	6	3	9
Total target population (academics)	**421**	**506**	**927**
Questionnaire Returns	143	312	455
Response Rate (%)	**34%**	**62%**	**49%**

Table 6.3 Summary of the Questionnaire Survey

In collecting data, instead of mailing questionnaires to individual academics directly, questionnaires were packed into one or two packages and were registered and mailed to the secretary of each Business School. Before mailing, it was necessary to contact the secretary by telephone (including long distance calls) especially for the universities that are located far away from Bangkok, informing them about this survey and asking for a person who could take charge of this survey. After identifying the responsible staff, the researcher asked for their names, telephone numbers and addresses to send the questionnaires to them. A long conversation by phone was then made with these staff about the details of the survey in order to make them understand clearly. The explanations were about the objective of this survey, briefly explaining the covering letter and the content of the questionnaire, the period of time for this survey, when the questionnaires should be sent back to the researcher, suggestions about how to follow up the questionnaires and a request for the staff there to distribute questionnaires to individual academics, if possible by hand, telling them when to pick them up. This was expected to help increase the response rate. Finally, the researcher requested these staff to make many follows up. Other than this, the researcher also enclosed money for package registrations and self-addressed envelopes for when they were mailed back to the researcher. Because of the long period of the survey, the researcher provided two or three packages in case the questionnaires were not all sent at one time to the researcher.

In term of the response rate, I tried to keep the questionnaires as brief as possible but some respondents still complained about their length of 8 pages in Thai (see Appendix I - Part A), but only 5 pages in English (see Appendix I - Part A). A couple of universities requested the letter from the researcher be sent directly to the Deans before allowing the questionnaire survey, and they issued the questionnaires, adding their own introductory cover letter. This may have helped to elicit a better response rate (Sekaran 2003) but unfortunately it did not help much. The response rate for one of two universities was around 13% and another university was around 48%.

I made personal visits to a few universities in Bangkok and talked directly with the staff of the secretarial offices before leaving similar materials for sending questionnaires back to the researcher. Even with personal visits and many telephone calls to follow up the progression of the survey, the response rates were still not high compared to universities far away from Bangkok. Table 6.4 to Table 6.8 present the details of data collection in this survey for each university in each city categorised by regions including Central Region (see Table 6.4), Northern Region (see Table 6.5), Eastern Region (see Table 6.6), North-Eastern Region (see Table 6.7), and Southern Region (see Table 6.8) respectively.

University in Central R. (Bangkok - BKK and one province)	Total Aca.	Study Leave	No Internet Exp.	Target Pop.	Quest. Returns	Res. Rate (%)
1) Chulalongkorn -BKK	123	10	0	113	13	12
2) Thammasat -BKK	92	0	0	92	12	13
3) Kasetsart-BKK	59	2	2	55	34	62
4) Srinakharinwirot-BKK	18	0	0	18	15	83
5) NIDA-BKK	25	0	0	25	12	48
6) Sukhothai Thammathirat Open U - BKK	50	2	4	44	39	89
7) Ramkhamhaeng - BKK	74	0	0	74	18	24
Total in Bangkok	441	14	6	421	143	34
8.) Mahidol - Nakornprathom P	14	0	0	14	10	71
Total in Central Region	**455**	**14**	**6**	**435**	**153**	**35.2**

Table 6.4 Summary of Data Collection in Central Region

University in Northern Region (4 U in 3 provinces)	Total Aca.	Study Leave	No Internet Exp.	Target Pop.	Quest. Returns	Res. Rate (%)
9) Chiang Mai - Chiang Mai Province	47	9	0	38	26	68
10) Maejo - Chiang Mai Province	20	0	0	20	18	90
11) Mae Fae Luang - Chiang Rai Province	23	4	0	19	19	100
12) Naresuan - Pitsanulok Province	55	12	0	43	38	88
Total in Northern Region	**145**	**25**	**0**	**120**	**101**	**83.5**

Table 6.5 Summary of Data Collection in Northern Region

University in Eastern Region	Total Aca.	Study Leave	No Internet Exp.	Target Pop.	Quest. Returns	Res. Rate (%)
13) Kasetsart U – Sriracha Campus - Chonburi Province	33	7	0	26	16	62
14) Burapha – Chonburi Province	19	3	0	16	11	69
Total in Eastern Region	**52**	**10**	**0**	**42**	**27**	**64.3**

Table 6.6 Summary of Data Collection in Eastern Region

University in North-	Total	Study	No	Target	Quest.	Res.

Eastern Region	Acas	Leave	Exp.	Pop.	Returns	Rate (%)
15) Kasetsart U - Chalermprakiat Sakon Nakorn Campus - Salolnakorn P	43	5	0	38	25	66
16) Khon Kaen –Khon Kaen P	50	13	0	37	23	62
17) Mahasarakham – Mahasarakham P	93	20	3	70	37	53
18) Ubon Rachathani- Ubon Rachathani P	52	11	0	41	39	95
Total in North-Eastern Region	**238**	**49**	**3**	**186**	**124**	**66.7**

Table 6.7 Summary of Data Collection in North-Eastern Region

University in Southern Region	Total Aca.	Study Leave	No Internet Exp.	Target Pop.	Quest. Returns	Res. Rate (%)
19) Silpakorn – Pethaburi Campus	41	5	0	36	11	31
20) Prince of Songkla - Songkla P	60	4	0	56	22	39
21) Thaksin – Songkla P	16	0	0	16	7	44
22) Walailuk – Songkla P	38	2	0	36	10	28
Total in Southern Region	**155**	**11**	**0**	**144**	**50**	**34.7**

Table 6.8 Summary of Data Collection in Southern Region

6.9.4 The Response Rate

From the total of 457 questionnaires returned, only two questionnaires were unused, and were not integrated as elements of the sample size (455 cases). One questionnaire had only one section completed with a couple of questions answered, another informed that she had no experience in using the Internet but only wanted to help, so she was treated as the academic who had no experience in using the Internet.

The response rate in Northern region was the highest (83.5%) (see Table 6.5), followed by North-Eastern Region (66.7%)(see Table 6.7), Eastern Region (64.3%)(see Table 6.6), in Central Region (35.2%) (See Table 6.4) and the Southern Region (34.7%) (see Table 6.8) the lowest. For universities in Bangkok the response rate was the lowest (34%) compared to universities outside Bangkok (62%) (see Table 6.3). Consequently, the overall response rate to this survey was 49% (n = 455: usable questionnaire returns from target population N = 927 academics). Participation was on a voluntary basis. As a 30% response rate is considered acceptable (Sekaran 2003), the response rate of 49% for this study was satisfactory (Seale, Gobo, Gubrium & Silverman 2005). The response rate was high (49%) like this, because of much follow up by both sides: the researcher toward the staff at each Business School, the staff toward the respondents. If this survey has been conducted without any follow up, the response rate may have been reduced to only 10%. In remote areas (far away from Bangkok), it was not the case that Internet Technology could not be reached there. Although, they are far away from Bangkok, each university is located in the central part of the region with a high degree of access to the technology. Interestingly, as mentioned, it has been found that the response rate in these areas was higher (62%) than in Bangkok (34%). This may be because academics in other regions out of Bangkok have more spare times than academics in Bangkok, so they could pay more attention to the survey than their counterparts. In addition, it may be because of their experience in using the Internet as an effective tool to communicate with the outside world at low cost, when they were asked to participate in the survey they have may thought that it was interesting and been enthusiastic in responding.

6.10 Data Editing and Coding

After collecting data, coding was required so that it could be stored (Zikmund 2003) using SPSS software version 14.0. Data was edited by checking and adjusting for errors, omissions, legibility and consistency in order to ensure completeness, consistency, and readability of the data. This was achieved by using "frequency distribution" in SPSS. Data was coded by assigning character symbols (mostly numerical symbols), and edited data before it was entered into SPSS. Each question or item in the questionnaire has a unique variable name, some of which clearly identify the information such as gender, age, and academic position.

A coding sheet (see Appendix I – Part B) was used to keep information about how each variable was coded. It comprised a list of all variables in the questionnaire, the abbreviated variable names that were used in SPSS and the way in which the responses were coded. In relation to data input into SPSS, screening and cleaning of data before furthering the data analysis stage was necessary to make sure that there were no errors at the stage of keying data due (mainly) to human errors. By using descriptive statistics in SPSS (such as frequency analysis), the data was screened by checking each variable to see if the score was out of range for this category (checking frequencies), or for continuous variables (checking minimum, maximum, mean and standard deviation). After finding errors, it was necessary to go back to the questionnaires to confirm the data before correcting the error in the data file. After correcting errors, I could proceed to the data analysis stage.

Data sheets were created in SPSS including the original data file (455 cases), and the data file after handling missing data (455 cases). Other than these, there are twenty two official data files for keeping various set of data for usage on specific occasions of data analysis. These data files were, for example, two data files for gender (male and female), two data files for age (younger subjects and older subjects), three data files for education (bachelor degree subjects, master degree subjects, and doctoral degree subjects), and two data files for positions (lecturer subjects and higher position subjects)(see Table 6.9).

Data Files in SPSS	**File1(cases)**	**File 2(cases)**	**File 3(cases)**
Original data file	455		
Data file after handling missing data	455		
Gender	173 - male	265 - female	
Age	282 - younger	168 - older	
Education Level	17 - bachelor	369 - master	59 - doctoral
Academic Position	332 - lecturer	114 - higher	
Experience	50 - low exp	314 - moderate exp	89 - high exp
E-university Plan	315 acknowledged e-university	89 unacknowledged e-university	
Research university Plan	389 acknowledged research university	52 unacknowledged research university	
Level of Reading and Writing	360 Level of reading and writing is not an obstacle	57 Level of reading and writing is an obstacle	
Thai language	254 Thai language is not an obstacle	118 Thai language is an obstacle	

Table 6.9 Summary of Data Files in SPSS

6.11 Data Analysis

Data analysis was separated into two stages. The first stage involved testing the reliability (inter-item consistency reliability) and validity of the measurement (convergent validity), descriptive statistics such as minimum, maximum, frequency, percent, mean, standard deviation, skewness, kurtosis, Pearson correlation, and T-tests by using SPSS (see Chapter7). The second stage was testing the validity of the measurement of the model by testing discriminant validity and analysing data by Structural Equation Modelling using AMOS (see Chapter 8). Descriptive statistics have a number of benefits (Pallant 2005):

- Describing the characteristics of the sample.
- Checking variables for any violation of the assumptions underlying the statistical techniques used.
- Addressing specific research objectives.

Data analysis by using questionnaire survey was expected to provide significant information to fulfil the objectives of this research. Data analysis according to research objective 3, 4, and 5 (see Chapter 5) will be presented in Chapter 7 and data analysis according to research objectives 7 (see Chapter 5) will be presented in Chapter 8.

- To investigate the extent to which academics use and intend to use the Internet in their work (objective 3).
- To investigate how to motivate academics to make full use of the Internet in their work (objective 4).
- To investigate to what extent using the Internet helps improve academics' professional practice, professional development and quality of working life (objective 5).
- To generate and validate a research model that best describes Thai academics' Internet usage behaviour and behaviour intention (objective 7).

There are different types of scales including nominal, ordinal, interval and ratio scales which can be used to measure the operationally defined dimensions and elements of a variable (Sekaran 2003), but only nominal, and interval scales were used in this study. Many statistical analysis methods including simple and

advanced techniques were used in this research in order to analyse the data efficiently and effectively (see details in a specific topic in this chapter).

Statistical techniques used in this research were categorised into two groups: (1) techniques used to explore differences between groups by using T-tests (Pallant 2005; Sekaran 2003) and (2) Structural Equation Modelling (SEM) which is a technique used to estimate a series of interrelated dependence relationships simultaneously (Hair et al. 2006). This technique is used to help in generating a model of relationships among variables (Hayduk 1987). Before analysing data by using these statistical techniques, it is important to test the reliability of the questionnaire along with testing the convergent validity (see Chapter 7) and discrimiant validity (see Chapter 8). Each technique is justified and explained in a specific topic in this chapter. Details of analysing data by T-Tests will be presented in Chapter 7 and SEM which will be presented in Chapter 8.

6.11.1 T-Test

Independent sample t-tests (Sekaran 2003) were used to explore the differences between two groups such as males and females, younger and older subjects. They are used because this study needs to compare the mean score on some continuous variables.

6.11.2 Structural Equation Modelling (SEM)

The main objective of this research was to generate a model of Technology Acceptance that best described usage behaviour of academics who have Internet experience within Thai Business Schools. In order to achieve this main research objective, Structural Equation Modelling was considered to be suitable. The generated model is expected to be a model that is both substantively meaningful and statistically well-fitting (Jöreskog 1993).

Structural Equation Modelling (SEM) is a multivariate technique combining aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts-factors with multiple variables) to estimate a series of interrelated dependence relationships simultaneously (Hair et al. 2006;

Schumacker & Lomax 1996). SEM also integrates other techniques such as recursive path analysis, non-recursive econometric modelling, ANOVA, analysis of covariance, principal component analysis and classical test theory (Holmes-Smith, P 2000). In addition, SEM is also known as path analysis with latent variables and is now a regularly used method for representing dependency (arguably "causal") relations in multivariate data in behavioural and social sciences (McDonald & Ringo Ho 2002).

A structural equation model or path model, depicts the structural relationships among constructs (Sharma 1996). In other words, it is a model of relationships among variables (Hayduk 1987), and is a statistical methodology that takes a confirmatory (i.e. hypothesis-testing) approach to the analysis of a structural theory relating to some phenomenon with two important aspects (1) the causal processes under study are represented by a series of structural equations, and (2) these structural relations can be modelled pictorially to enable a clearer conceptualization of the theory under study (Byrne 2001, 2006). When compared to other multivariate techniques, it has four significantly benefits over those techniques (Byrne 2001, 2006).

1) SEM takes a confirmatory approach rather than an exploratory approach to the data analysis, although SEM can also address the latter approach. SEM lends itself well to the analysis of data for the purposes of inferential statistics. On the other hand, most other multivariate techniques are essentially descriptive by nature (e.g. exploratory factor analysis) so that hypothesis testing is possible but is rather difficult to do.

2) SEM can provide explicit estimates of error variance parameters, but traditional multivariate techniques are not capable of either assessing or correcting for measurement error.

3) Data analysis using SEM procedures can incorporate both unobserved (i.e. latent) and observed variables, but the former data analysis methods are based on observed measurements only.

4) SEM methodology has many important features including modelling multivariate relations, and for estimating point and/or interval indirect effects

whilst there are no widely and easily applied alternative methods for these kinds of features.

Because of these outstanding features, SEM was considered to test the research model against the data in order to help to generate the model in this study. There are three important general strategic frameworks for testing structural equation models (Jöreskog 1993):

1) Strictly confirmatory (SC)
2) Alternative model (AM)
3) Model generating (MG)

This research is based on the third strategy, which is model generating. Model generating (MG) is the most common of the three scenarios because the researcher could postulate and reject a theoretically derived model on the basis of its poor fit to the sample data, and could proceed in an exploratory (rather than confirmatory) fashion to modify and re-estimate the model. The primary focus is to locate the source of misfit in the model and to determine a model that better describes the sample data.

For a strictly confirmatory approach (SC), the researcher postulates a single model based on theory, collects the appropriate data, and then tests the fit of the hypothesized model to the sample data. The researcher either rejects or fails to reject the model based on the results of the test; no further modifications to the model are made. This is not commonly found in practice because with the many costs associated with the collection of data, it would be a rare researcher indeed who could afford to terminate his or her research on the basis of a rejected hypothesized model.

An alternative model (AM) approach has been relatively uncommon in practice, since, after proposing several alternative (i.e., competing) models, all of which are grounded in theory following analysis of a single set of empirical data, the researcher selects one model as most appropriate in representing the sample data.

By using SEM, the hypothesized model can be tested statistically in a simultaneous analysis of the entire system of variables to determine the extent to which it is consistent with the data. If the goodness of fit is adequate, the model argues for the plausibility of the postulated relations among variables; if it is inadequate, the tenability of such relations is rejected. However, despite the fact that a model is tested in each round, the whole approach is model generation rather than model testing (Byrne 2001, 2006).

In particular, SPSS version 14.0 was used to input and conducted preliminary analyses of data (see Chapter 7) together with an SEM software package called AMOS[1] version 6.0. This was used to test and generate the technology acceptance model of this research (see Chapter 8).

6.11.3 Multiple-Group Analysis Using AMOS

In order to investigate the impact of moderators on the influence of predictors toward dependent variables, AMOS' multiple-group analysis was used. Arbuckle (2005) suggests the purpose, advantages and how to interpret the analysis results in respect of performing a single analysis of several groups (simultaneous multiple-group analysis). The main purpose of a multiple-group analysis is to find out the extent to which groups differ(Arbuckle 2005):

1) Whether the groups all have the same path diagram with the same parameter values.

2) Whether the groups have the same path diagram but with different parameter values for different groups.

3) Whether each group need a different path diagram.

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[1] AMOS is an acronym for 'Analysis of Moment Structures' or the analysis of mean and covariance structures. AMOS computes parameter estimates so that the resulting implied moments are closest in terms of discrepancy function to the sample moments (Arbuckle 2005).

The method of performing a single analysis for several groups has two advantages (Arbuckle 2005):

1) It provides a test for the significance of any differences found among groups.

2) If there are no differences among groups or if the group differences concern only a few model parameters, the simultaneous analysis of several groups provides more accurate parameter estimates than would be obtained from separate single group analyses.

By using automatic constraints in multiple-group analysis, AMOS will generate a hierarchy of models in which each model contains all the constraints of its predecessor. Other than an unconstrained model (in which there are no cross-group constraints at all), AMOS will generate another five models, each with a different set of cross-groups. The default settings in AMOS will generate the following nested hierarchy of five models (see Table 6.10) (Arbuckle 2005).

Model	**Constraints**
Model 1: Measurement weights	Measurement weights (factor loadings) are equal across groups.
Model 2: Structural weights	All of the above and structural weights are equal across groups.
Model 3: Structural covariances	All of the above and structural covariances are equal across groups.
Model 4: Structural residuals	All of the above and structural residuals are equal across groups.
Model 5: Measurement residuals	All of the above and measurement residuals are equal across groups.

Table 6.10 Hierarchy of Five Models Generated by AMOS (Arbuckle 2005)

An unconstrained model is a model in which there are no cross-group constraints at all. If the p value of the unconstrained model is greater than 0.05, the model fits the data across groups quite well. We accept the hypothesis that all groups have the same path diagram (the model is correct for all groups, the same model holds for each of several populations), possibly with different parameter values for different populations

(Arbuckle 2005). In the other words, the parameter values of one group can be different from another group (Jöreskog 1971). Despite the fact that all groups have the same path diagram, it is not necessary that the parameters have the same values across groups. Therefore, the next step is to investigate whether each of several groups has the same parameter values.

From the Model fit, the Chi-square statistic (CMIN) table (see Chapter 8 - measure of fit) shows the likelihood ratio chi-square statistic for each fitted model (tested against the saturate model). If the p value for each model is greater than 0.05, this means that the data do not depart significantly from the model. Furthermore, if at each step up the hierarchy (see Table 6.10) from the unconstrained model to the measurement residuals model, the increase in chi-square is never much larger than the increase in degrees of freedom (a non-significant chi-square, p value greater than 0.05), the model up the hierarchy is preferable otherwise, the model up the hierarchy is worse (a significant chi-square, p value less than 0.05)(Arbuckle 2005).

For example, if the p value of model 1 (constrained only on measurement weights) is greater than 0.05, the chi-square fit statistic is acceptable. But we have to look at the model comparison between an unconstrained model and model 1, assuming an unconstrained model is correct. If the chi-square difference between an unconstrained model and model 1 give a non significant chi-square (p value greater than 0.05) then the model 1 estimates are preferable over an unconstrained model estimates. We accept the hypothesis that the estimated measurement weights are equal across groups, and the model fits the data very well. In other words, model 1 which specifies a group-invariant factor pattern is supported by the data (Arbuckle 2005).

Furthermore, for the structure weights model (model 2) (in model comparison-assuming a measurement weights model is correct), if the p value is greater than 0.05, the chi-square difference is not significant. There appears to be no significant evidence that there are cross groups differences regarding parameter values (measurement weights and structure weights), otherwise, there appears to be significant evidence that parameter values differ among groups. If the *p value* of the structure weights model is less than 0.05, it indicates that there appears to be significant difference among groups, and the model (assuming all parameters are equal) has to be rejected at any conventional significance level (Arbuckle 2005). In

Chapter 8, data analysis and interpretation was based on the strategy of multiple-group analysis and its interpretation as described in this topic.

6.11.4 Bootstrapping Procedures and Bollen-Stine Bootstrap Method

AMOS version 6.0 has the analysis function of bootstrapping which is a versatile method for estimating the sampling distribution of parameter estimates (Arbuckle 2005). The bootstrapping of AMOS incorporates the Bollen-Stine bootstrap Method which is used only for testing *model fit* under non-normality. In other words, it is a bootstrap modification of the model chi-square, used to test model fit, adjusting of distributional misspecification of the model such as adjusting for lack of multivariate normality. The bootstrapping procedure calculates a new critical chi-square value (adjusted chi-square) against which the original obtained chi-square is compared and an adjusted p-value is then computed. The number of bootstrap samples is typically in the range of 250 to 2000 (Bollen & Stine 1992). In this research, it is necessary to use this Bollen-Stine bootstrap method in the situation of non-normality.

6.11.5 Sample Size Requirements

The minimum requirement of sample size may be different depending on statistical techniques used; details are presented in Table 6.11.

Statistical Analysis	Minimum Sample Size
T-Test	• Sample size (n) of 30 up for each group (Pallant 2005)
Structural Equation Model (SEM)	• Sample size as small as 50 found to provide valid results (Hair et al. 2006). • Recommended minimum sample sizes of 100-150 to ensure stable Maximum likelihood estimation (MLE) solution (Hair et al. 2006). • Sample size in a range of 150-400 are suggested (Hair et al. 2006).

Table 6.11 Statistical Techniques with Minimum Sample Size Requirements

6.12 Data Management for Multivariate Analysis

Data management is necessary before proceeding to the data analysis stage. In terms of data management, it was essential to examining the data by checking the data file for the errors previously mentioned (Pallant 2005). Then further steps were examining the data in order to clean the data to a format most suitable for multivariate analysis by using missing data analysis and outlier detection. The final steps in examining the data involved testing for the assumptions underlying the statistical bases for multivariate analysis. The major testing was multivariate normality (Hair et al. 2006).

6.12.1 Missing Data

The responses from the questionnaire survey have already been filtered and only usable questionnaires used in the data file, but some missing data values existed in the data file.

In multivariate analysis, valid values on one or more variables are usually not available. According to Hair et al. (2006) the general impact of missing data (particular in survey research) in multivariate analysis is (1) missing data will impact on the reduction of the sample size available for analysis from an adequate sample to an inadequate sample if the remedies for missing data are not applied, (2) from an important perspective, any statistical results based on data with a non-random missing data process could be biased if the missing data lead to erroneous results.

Other than the general impact of missing data, Arbuckle (2005) further determines the problem of missing data in Structural Equation Modelling using AMOS, in respect of computing some fit measures, requires fitting the saturated and independence models in addition to the researcher model. There is no problem with complete data but if there are missing values, an attempt to fit these models requires extensive computation. The problem is mainly with the saturated model and it may be impractical to fit this model because of the large number of parameters. Moreover, some missing data value patterns can make it impossible to fit the saturated model even if it is possible to fit the researcher model.

Usually with incomplete data, AMOS tries to fit the entire saturated model, independence model and the researcher model. However, if AMOS fails to fit the independence model, fit measures such as Goodness-of-Fit-Index (CFI) (see Chapter 8) that depend on the fit of the independence model, cannot be computed. Moreover, if AMOS cannot fit the saturated model, the usual chi-square statistic cannot be computed. Other than this, with incomplete data, AMOS cannot compute the modification indices. The modification index is a tool to help improving the model fitting to the data. It helps to evaluate many potential modifications in a single analysis and provides suggestions for model modifications that are likely to decrease the chi-square values (Arbuckle 2005). Consequently, it is necessary to remedy missing data before SEM data analysis in this research.

There is a four steps process for identifying missing data and applying remedies (Hair et al. 2006):

1) Determine the type of missing data
2) Determine the extent of missing data, analyse cases and variables
3) Diagnose the randomness of the missing data processes
4) Select the Imputation method

The imputation method is the process of estimating the missing values based on valid values of other variables or cases in the sample.

Missing data is a common occurrence and sometimes can be ignored. The term "ignorable missing data" is then used. This means that the specific remedies for missing data are not needed because the allowances for missing data are inherent in the techniques used (Little & Rubin 2002; Schafer 1997). We can apply specialised techniques for ignorable missing data (Hair et al. 2006). With the requirement of AMOS for complete data (no missing values) as mentioned, missing data could not be classified as "ignorable". Thus it is necessary to proceed to the second step to determine the extent of missing data.

Hair et al. (2006) suggests that direct means of assessing the extent of missing data are by tabulating (1) the percentage of variables with missing data for each case, and (2) the number of cases with missing data for each variable. This table was generated by SPSS missing data analysis (see Appendix I - Part C (Univariate Statistics)). This simple process identifies not only the extent of missing data but any exceptionally high levels of missing data that occur for individual cases or observations.

In general, for survey research 20 percent is a reasonable amount of missing data that does not jeopardise the representativeness of the sample (Converse & Schuman 1974). The non-response error threatens the survey's unique characteristic compared to other research methods, that is the statistical inference from sample to population (Groves & Lyberg 1988). Hair et al. (2006) also suggests that variables or cases with 50% or more missing data should be deleted. However, missing data under 10% for an individual case or observation can generally be ignored except when the missing data occurs in a specific non-random fashion. Variables with as little as 15% missing data are candidates for deletion, but higher levels of missing data (20% to 30%) can often be remedied.

After missing data analysis using SPSS, it was found that the percentage of each variable as missing data is less than 5% - around 0.2% to 4.0% and can be generally ignored (see Appendix I - Part C (Univariate Statistics)). Nevertheless, according to the requirement of AMOS as previously stated, the missing data cannot be ignored under any circumstances.

In step 3, in terms of diagnosing randomness of the missing data processes in step 3, there are four techniques specifically designed for missing data analysis in SPSS version 14.0:

1) Listwise - displays the means, correlation matrix, and covariance matrix, omitting cases that have missing values in any variable under consideration (listwise deletion).

2) Pairwise - displays for each pair of quantitative variables of the number of pairwise non-missing values, and the pairwise mean, variance, covariance, and correlation. Each computation is performed using all values for which both variables have non-missing values.

3) Expectation maximisation (EM) - displays means, correlation matrix, and covariance matrix, computed using an EM algorithm. The EM method estimates missing values by an iterative process which has an E step to calculate expected values of parameters and an M step to calculate maximum likelihood estimates.

4) Regression - displays means, correlation matrix, and covariance matrix, computed from estimates of missing values derived from a regression

algorithm. This research used these four techniques to compare the results of missing data analysis.

As mentioned, it is necessary to ascertain whether the missing data process occurs in a completely random manner. When the sample size is small, it may not be necessary to perform a calculation, and the researcher may be able to visually see such patterns or perform a set of simple calculations. But in this case, the sample size is rather large (455 cases), thus it is essential to use some statistical programs to diagnostic the missing data (Hair et al. 2006).

Two levels of randomness of the missing data process are taken into consideration: (1) a first level, Missing At Random (MAR), requires special methods to accommodate a non-random component such as model base approach; (2) a second level, Missing Completely At Random (MCAR) is sufficiently random to accommodate any type of missing data remedy (Little & Rubin 2002). The second level is better than the first level in terms of the generalisability to the population (Hair et al. 2006).

Even though all four techniques were used to diagnose the randomness of missing data in step 3, the results generated from the EM technique are the only ones that presented a Little's MCAR test: **Chi-Square = 1342.053, Degree of Freedom (DF) = 1345, Sig. = 0.518** (see Appendix I - Part C (EM - Missing Data Analysis)). This indicated that no significant differences were found between the pattern of missing data on all variables and the pattern expected for a random missing data process. It can be concluded that the missing data can be classified as MCAR. As a result, it indicated that the widest range of potential remedies could be used.

There are four imputation methods with rules for selecting these methods suggested by Hair et al.(2006):

1) Imputation methods using only valid data - the methods are complete data, all available data.

2) Imputation methods using known replacement values - such as case substitution method.

3) Imputation by calculating replacement values - the methods are mean substitution, and regression imputation.

4) Model-based methods for missing at random (MAR) missing data processes - the method is model-based methods.

The rules for selecting the imputation methods are:

1) Under 10%: when missing data is this low, any of the imputation methods can be applied except the complete case method which is the least preferred.

2) 10% to 20%: for missing completely at random (MCAR) data, the all-available, hot deck case substitution, and regression methods are most preferred but for missing at random (MAR) data the model-based methods is the most preferred.

3) Over 20%, if it is considered necessary to impute missing data when the level is over 20%, the preferred methods are the regression method for MCAR situation and the model-based methods when MAR missing data occur.

Although with respect to the low extent of missing data (under 10% for an individual case or observation in this research), this could generally be ignored, as mentioned, AMOS needs data to be complete in order to analyse data, so it was necessary to complete data.

In addition, the regression method of imputation was selected to be used to calculate the replacement values based on the first and second rules above because the pattern of the missing data is classified as MCAR (missing completely at random). The advantages of regression imputation are (Hair et al. 2006):

1) It employs actual relationships among the variables.
2) Replacement values are calculated based on an observation's own values on other variables.
3) Unique set of predictors can be used for each variable with missing data.

Disadvantages of this method are (Hair et al. 2006):

1) It reinforces existing relationships and reduces generalisability.

2) It must have sufficient relationships among variables to generate valid predicted values.
3) It understates variance unless an error term is added to the replacement value, and (4) replacement values may be out of range.

In addition, this method is best used for (Hair et al. 2006):

1) Moderate to high levels of missing data.
2) Relationships sufficiently established so as to not impact generalisability.
3) Software availability (such as by using SPSS' missing data analysis).

Finally, after handling missing data by using SPSS' *regression imputation method*, those variables that would be used in SEM data analysis were completed and free of missing data, and the data was ready to be further investigated.

6.12.2 Multivariate Outliers

With respect to examining the data in order to manage it before data analysis, the step after missing data analysis is multivariate outlier detection. Outliers are observations (cases) with a unique combination of characteristics identifiable as distinctly different from the other observations. A unique characteristic is judged to be an unusually high or low value on a variable, or a unique combination of values across several variables that make the observation stand out from the others. Outliers cannot be categorically characterised as either beneficial or problematic but should be considered within the context of the analysis and should be evaluated by the types of information they may provide. Beneficial outliers may be indicative of characteristics of the population that would not be discovered in the normal course of analysis. In contrast, problematic outliers are not representative of the population, are counter to the objectives of the analysis and can seriously distort statistical tests (Hair et al. 2006).

In testing multivariate outliers, SPSS was used. It is necessary to calculate the Mahalanobis distance which is the distance of a particular case from the centroid of the remaining cases, where the centroid is the point created by the means of all the variables (Tabachnick & Fidell 2001). Mahalanobis (D^2) measure is a mean of multivariate outlier detection to measure the multidimensional position of each observation compared with the centre of all observations on a set of variables. In multivariate methods that are best suited for examining a complete variate, such as the independent variables in regression or the variables in factor analysis, the threshold levels for the D^2/df measure should be conservative, resulting in values of 2.5 (small samples - 80 or fewer observations) versus 3 or 4 in larger samples (Hair et al. 2006). In this study, there was no evidence of outliers because the D^2/df measure was equal to 3.08 and did not exceed the threshold value of 4 (maximum $D^2 = 61.68$, degree of freedom (*df*) = 20, $D^2/df = 3.08$). In this regard, although, some cases demonstrated the characteristics of outliers, they were not extreme cases according to the value of D^2/df which did not exceed the threshold value. Thus it was not necessary to delete them from the sample (Pallant 2005).

6.12.3 Multivariate Normality

The earlier data management steps for missing data analysis and outlier detection attempted to clean the data to a format suitable for multivariate analysis. The final data management steps in association with examining the data involved testing the data for compliance with the statistical assumptions underlying the multivariate techniques and deals with the foundations upon which the techniques make statistical inferences and results. Some robust techniques are less affected when violating certain assumptions, but in all cases complying with some of the assumptions critically determines a successful analysis (Hair et al. 2006).

The most fundamental assumption in multivariate analysis is assuming multivariate normality. Normality is correspondence to the normal distribution which is the benchmark for statistical methods (Hair et al. 2006). Many statistical techniques assume that the distribution of scores on the dependent variable is normal. Normal is used to describe a symmetrical, bell-shaped curve, which has the greatest frequency of scores in the middle, with smaller frequencies towards the extremes (Gravetter & Wallnau 2000).

Assessing the impact of violating the normality assumption, the severity of non-normality is based on two dimensions (1) the shape of the offending distribution and (2) the sample size. It can be said that the extent to which the variable's distribution is non-normal should be considered together with the sample size.

The distribution, if it differs from the normal distribution, can be described by two measures Kurtosis and skewness (Hair et al. 2006). Normality can be assessed to some extent by obtaining skewness and kurtosis values. The skewness value provides an indication of the symmetry of the distribution. Kurtosis provides information about the "peakedness" of the distribution (Pallant 2005), or the flatness of the distribution compared with the normal distribution (Kenny & Keeping 1962). Negative kurtosis values indicate a flatter distribution while positive values denote a peaked distribution. A positive skew denotes a distribution shifted to the left where as a negative skewness reflects a shift to the right. In general, skewness 1 indicates moderate skewness (Weisstein 2004). In addition, the multivariate Kurtosis statistic indicates the extent of departure from multivariate normality. Values less than 1 are negligible, values from one to ten indicate moderate non-normality while values greater than 10 indicate severe non-normality (Holmes-Smith, Cunningham & Coote 2006).

The skewness values in this research were not larger than 1.5 and kurtosis were not larger than 2. The results of the investigation presented rather moderate skewness and moderate non-normality. Although the scores presented both positive and negative skewness and kurtosis, neither of them was extreme. Pallant (2005) indicates that many scales and measures used in social sciences have scores that are skewed either positively or negatively. This does not present a problem with the scale but rather reflects the underlying nature of the construct being measured. In this study, for example, the score of usage behaviour of the Internet in other tasks is negatively skewed because academics agreed more than disagreed that they used the Internet in other tasks, so the scores were rather skewed negatively, but not much.

Sample size has the effect of increasing statistical power by reducing sampling error. The larger sample sizes reduce the negative effects of non-normality (Hair et al. 2006; Pallant 2005). However, normality can have serious effects in small samples (less than 50 cases), but the impact effectively diminishes when sample sizes reach 200 cases or more (Hair et al. 2006).

In the case of non-normality in this research, it is theoretical justified to use the powerful Bollen-Stine bootstrap method to produce the Bollen-Stine p value to be as an alternative p-value in consideration (Bollen & Stine 1992).

6.12.4 Multicollinearity

Some multivariate techniques work effectively when the dependent variables are only moderately correlated such as MANOVA. When the dependent variables are highly correlated this is referred to as multicollinearity. Correlations up around 0.8 or 0.9 are perhaps reason for concern (Pallant 2005) but Hayduk (1987) suggests concern for values greater than 0.7 or 0.8. If any of these has been found, it is essential to consider removing one of the strongly correlated pairs of dependent variables or alternatively combining them to form a single measure (Pallant 2005). Some of the dependent variables for this research are highly correlated (see Table 6.2). There was evidence of multicollinearity of dependent variables so it is essential to consider removing one of them from data analysis. This will be achieved when conducting construct reliability and discriminant validity analysis (see Chapter 8).

After finishing the step of investigating multivariate normality, it is now possible to further move to the data analysis stage. Data analysis by using SPSS version 14.0 for preliminary data analysis will be discussed in Chapter 7, and in Chapter 8 will be presented the test of discrimiant validity and SEM data analysis using AMOS version 6.0.

6.13 Generalisability of the Findings

Generalisability refers to the probability that the results of the research findings apply to other subjects, other groups, other settings and other conditions (Sekaran 2003; Ticehurst & Veal 2000). In other words, generalisation is concerned with the application of research results to cases or situations beyond those examined in the study. It is the extent to which you can come to conclusions about a population based on information about a sample (Hussey & Hussey 1997; Vogt 1993). This is a standard aim in quantitative research and is normally achieved by statistical sampling procedures (Silverman 2001, 2005). Gummesson (1991) argues that using statistics to generalise from a sample to a population is just one type of generalisation. In terms of wider generalisability, the research sampling design has to be logically developed, and a number of other meticulous details in the data collection methods need to be followed. A more elaborate sampling design would doubtless increase the generalisability of the results. Since in this study all individual subjects in the population are surveyed because of the rather small size, and the sample size is big enough (455 cases), therefore, the result of the research findings can be generalised to the population. In addition, the findings of this research may be generalised to a broader scope other than only Thai Business Schools in the Thai Public University Sector. It may be generalised not only to the Thai Public University Sector but also to the Private University Sector in the country.

6.14 Ethics and Business research

Ethics in business research refers to a code of conduct or expected societal norm of behaviour while conducting research. Ethical conduct should also be reflected in the behaviour of the researchers who conduct the investigation, the participants who provide the data, the analysts who provide the results and the presentation of the interpretation of the results and suggests alternative solutions. Thus ethical behaviour pervades each step of the research process including data collection, data analysis and reporting and even dissemination of information on the Internet. How the subjects (Thai business academics) are treated and how confidential information is safeguarded, are all guided by business ethics (Sekaran 2000).

I have already concentrated on various aspects of ethics consideration. One of the primary responsibilities of the researcher was treating the information given by the respondents as strictly confidential and guarding their privacy. The purpose of the research was explained to respondents before conducting the survey by presenting them covering letters. I was concerned not to violate the self-esteem and self-respect of the subjects as well. Moreover, I also kept in mind that no one should be forced to respond to the survey, and informed consent of the subjects should be the goal of the researcher. Finally, there should be absolutely no misrepresentation or distortion in reporting the data collected during the study (Sekaran 2000). This research has been conducted considering ethical responsibility in accordance with the general principles of research ethics briefly concluded by Ticehurst and Veal (2000) that (1) no harm should befall the research subjects, (2) subjects should take part freely, and (3) based on informed consent. For preliminary information gathering, before conducting semi-structured interviews, academics informed their consent by allowing tape-recording, and the purpose of the research had been explained together with the confidentiality of the information given.

Regarding ethical behaviour of the respondents, once the subjects have committed to participate in a study, they should cooperate fully in those tasks. Moreover, the respondents have obligations to be truthful and honest in their responses. They should avoid misrepresentation or giving information knowing it to be untrue (Sekaran 2000).

With respect to interviewing in this research in the stage of preliminary information gathering before the main survey, it was found that all interviewees were prepared to cooperate and this motivated the interviewer to continue conducting interviews with more enthusiasm.

In the main survey, it was found that respondents were interested to respond to the questionnaire survey because it related to present technology that they currently deal with. It seemed that this technology may help to promote their professional practice, professional development and their quality of working life.

6.15 Summary

In this chapter were presented the methodology and methods used in this research including preliminary information gathering, the development, pre-tests, pilot study, reliability and validity of the instrument (questionnaire), data collection and data analysis process. The research instrument was pre-tested twice, once in Thailand, once in Australia, and the pilot study was conducted in Thailand. The instrument was shown to be reliable and valid after the pilot study.

Data collection included a discussion of population, sample size, the survey procedure, the response rate, and problem encountered in collecting data. In the data analysis section, the statistical techniques used in data analysis were examined for their purpose and benefits of uses in this study. The minimum sample size requirements and how to organise and clean data were investigated. In data management for multivariate analysis, the requirements of multivariate analysis were examined and discussed. Finally issues of generalisability and ethical issues were taken into account. The results of the data analysis via these statistical techniques will be discussed in Chapter 7 and 8.

CHAPTER 7
PRELIMINARY DATA ANALYSIS

7.1. Introduction

The aims of preliminary data analysis in this chapter are to test and present the results of (1) the reliability of the instrument based on internal consistency of the measures by testing the Cronbach's alpha together with inter-item correlation , (2) the convergent validity of the constructs, (3) the descriptive analysis associated with academic demographic data, and background of Internet usage, (4) the extent to which academics used and intended to use the Internet, (5) how to motivate them to make full use of the Internet, (6) to what extent using the Internet affected their professional practice, professional development and quality of working life; (7) whether there are significant differences between two groups including gender, age, education level, academic position, and experience. This preliminary data analysis will be achieved by using descriptive statistical techniques and T-tests. The results from data analysis in this chapter would fulfil three research objectives of this study:

1) To investigate the extent to which academics use and intend to use the Internet in their work - research objective no. 3.

2) To investigate how to motivate academics to make full use of the Internet in their work - research objective no. 4.

3) To investigate to what extent using the Internet helps improve academics' professional practice, professional development and quality of working life - research objective no.5.

7.2 Reliability Analysis

All internal consistency reliabilities based on Cronbach's alphas for measurement items (all interval scales) are better than those in the pilot survey. Almost all of them are considered to be good (greater than 0.80), only a few are just acceptable (in 0.7 range)(see Table 7.1). Because all reliability tests are quite high (0.80 up), they indicate the items in each set (concept) are positively correlated to one another (Sekaran 2003). In other words, items in each set are independent measures of the same concept, and therefore, indicate accuracy in measurement in the main survey.

Another internal consistency measure, for the survey, is the inter-item correlation values, almost all of which exceed 0.30, with only some of them less than 0.30 (see Table 7.1). It is recommended that the item-to-total correlations exceed 0.50 and the inter-item correlation exceed 0.30 (Robinson, Shaver & Wrightsman 1991). As suggested by Cohen (1988), correlation (r) = 0.10 to 0.29 (small correlation, both positive and negative correlation), r = 0.30 to 0.49 (medium correlation), and r = 0.50 to 1.0 (large correlation). These results support the results of Cronbach's alpha coefficient in that the questionnaire in the main survey was a reliable measurement tool.

7.3 Validity Analysis

Convergent validity (correlational analysis), is one way of establishing construct validity for this research other than discriminant validity which will be discussed and presented in details in chapter 8. Convergent validity assesses the degree to which two measures of the same concept are correlated. High correlations indicate that the scale is measuring its intended concept (Hair, Black, Babin, Anderson & Tatham 2006). The inter-item correlation values of the indicators in each construct were quite high (higher than 0.50) (except some inter-item correlation values in some categories). Item-total correlations were quite high as well and only some of them were less than 0.50 (see Table 7.1). Items with low inter-item correlation values will be investigated again to check what should be done about them for SEM analysis (see Chapter 8). Some of the values of inter-item correlation and item-total correlation for the survey were better than those in the pilot survey (see Chapter 6). These results indicate the convergent validity of the instrument.

7.4 Demographic Data

Before analysing data using descriptive statistics relating to demographic data, general analysis were conducted including minimum, maximum, frequency, percent, mean, standard deviation, skewness and kurtosis. These descriptive statistics are presented in Appendix II – Part A.

Measurement Items (Interval Scale)	Items	Cronbach's Alpha	Reliability Results	Inter-Item Correlation	Item-Total Correlation
Perceived Usefulness (PU)	4	0.906	good	0.677-0.784	0.753-0.807
Perceived Ease of Use (PEOU)	4	0.942	good	0.760-0.834	0.838-0.893
Social Influence (SI)	5	0.907	good	0.410-0.816	0.535-0.547
Facilitating Conditions (FC)	4	0.841	good	0.471-0.781	0.611-0.734
Self-Efficacy(SE)	4	0.712	acceptable	0.154-0.527	0.399-0.632
Usage Behaviour					
-Teaching(TEACH)	5	0.756	acceptable	0.236-0.623	0.463-0.606
-Other tasks (OTASK)	5	0.812	good	0.299-0.674	0.452-0.693
-All work	11	0.840	good		
Behaviour Intention					
-Teaching (BITEACH)	5	0.850	good	0.371-0.710	0.606-0.746
-Other tasks (BIOTASK)	5	0.850	good	0.429-0.749	0.536-0.745
-All work	11	0.910	good		
Usage Behaviour (Frequency of use)					
-Teaching	5	0.780	acceptable	0.234-0.690	0.513-0.618
-Other tasks	5	0.831	good	0.371-0.736	0.547-0.712
-All work	11	0.874	good		
Behaviour Intention (Frequency of Use)					
-Teaching	5	0.869	good	0.379-0.791	0.616-0.774
-Other work	5	0.910	good	0.505-0.849	0.625-0.855
-All work	11	0.927	good		
Motivation to make Full Use of the Internet	7	0.839	good	0.249-0.797	0.435-0.694
Overall PP and PD and QOW					
-Professional Practice (PP)	5	0.898	good	0.508-0.816	0.632-0.804
-Professional Development (PD)	3	0.915	good	0.729-0.832	0.792-0.871
-Quality of Working life	5	0.821	good	0.286-0.727	0.502-0.695

Table 7.1 Summary of Cronbach's Alphas, Inter-Item Correlation, and Item-to-Total Correlation in the Main Survey

The characteristics of academics within Business Schools were based on gender, age, education level, and academic position as presented in Table 7.2. As is evident, the majority of academics who responded to the survey were female (60.5%) (see Table 7.2). It is interesting to find out that females played important roles in providing knowledge to business students in Thailand. It should be more interesting to further study in the future whether gender will have any affect toward providing knowledge to business students. In other words, according to the perception of those students, either male or female academics are better associated with providing knowledge to their business students.

Characteristics	Group	Cases	Percentage (%)
Gender	1)Male	173	39.5
	2)Female	265	60.5
Age	1)20-29 years	102	22.7
	2)30-39 years	180	40.0
	3)40-49 years	111	24.7
	4)50 years up	57	12.7
Age group	1)Younger	282	62.7
	2)Older	168	37.3
Education Level	1)Bachelor Degree	17	3.8
	2)Master Degree	369	82.9
	3)Doctoral level	59	13.3
Academic Positions	1)Lecturer	332	74.4
	2)Assistant Professor	64	14.3
	3)Associate Professor	48	10.8
	4)Professor	2	0.4

Table 7.2 Demographic Characteristics of Academics

A substantial number of academics were in the age range 30-39 years (40%), 40-49 years (24.7%), 20-29 years (22.7%), and 50 years up (12.7%). They were grouped into younger (20-39 years) and older subjects (40 years and above), in order to find the big picture of whether there were any differences between younger subjects and older subjects according to the study of Venkatesh et al. (2003). It can be seen that younger subjects was the larger group (62.7%) compared to older subjects (37.3%) (see Table 7.2).

Regarding education level, the majority graduated at Masters degree level (82.9%) compared to Doctoral degree level (13.3%), and Bachelor degree level (3.8%)(see Table 7.2). This result indicates a lack of Doctoral degree level academics in Thai

Business Schools. Although, the government has provided many scholarships to academics in the Thai Public University Sector there are still not enough to fulfil academic demand to increase their education to Doctoral degree level. In Thai tradition, most academics wish to study at Doctoral level aboard in the USA, Great Britain, or Australia. This will be 4 or 5 times more expensive than studying within the country.

The highest percentage of academic positions were lecturer (74.4%), compared to assistant professor (14.4%), associate professor (10.8%), and professor (0.4%)(see Table 7.2). This indicates that only 25.5% of academics have higher academic positions than lecturer. In Thailand, most academics usually spend most of their time in teaching in classes or administrative tasks, and less in research or writing books or journal articles which are the basic requirements of receiving higher academic positions.

7.5 Background of Internet Usage

The investigation of the background of Internet usage will be divided into two parts:

1) Personal Internet usage
2) Internet services and Internet access method

7.5.1 Personal Internet Usage

1) Years in using the Internet

At the time of the survey, academics who had used the Internet for about 6-10 years (58.5%) were in the majority, compared to those who had used the Internet more than 10 years (20.9%), 1-5 years (19.8%), and less than 1 year (0.9%)(see Table 7.3). It can be noticed that this group of people (used 6-10 years), started to use the Internet at the time it became popular in Thailand (around 1996), and have continued using the Internet up until now.

2) Frequency of Internet usage

It was unexpected to find that the greatest frequency of Internet usage (61.5%) was "several times a day", the second rank (14.5%) was "about once a day", while the rest used the Internet less often (see Table 7.3).

3) Self-assessment

The highest percentage of academics (69.3%) assessed themselves as having moderate Internet experience. Only 19.7% assessed themselves as having high experience, and only 11.0% assessed themselves as low experience (see Table 7.3).

4) Adequacy of Internet usage

The majority of academics thought that they used the Internet enough (48.9%) which was just higher than those who thought that they did not use the Internet enough (47.8%). Only 3.3% of them thought that they had used the Internet too much (used almost all the time) (see Table 7.3).

Description	**Category**	**Cases**	**Percentage (%)**
Years in using the Internet	1) Less than 1 year	4	0.9
	2) 1-5 years	90	19.8
	3) 6-10 years	266	58.5
	4) More than 10 years	95	20.9
Frequency of Internet usage at present	1) Don't use at all	1	0.2
	2) Use about once each	5	1.1
	month	3	0.7
	3) Use a few times a month	21	4.6
	4) Use about once each week	35	7.7
	5) Use a few times a week	38	8.4
	6) Use five to six times a	66	14.5
	week	280	61.5
	7) Use about once a day	6	1.3
	8) Use several times a day		
	9) Other		
Self-assessment	1) Low experience	50	11.0
	2) Moderate experience	314	69.3
	3) High experience	89	19.7
Adequacy of using the Internet	1) Not enough	217	47.8
	2) Enough	222	48.9
	3) Too much	15	3.3

Table 7.3 Background of Personal Internet Usage

7.5.2 Internet Service and Internet Access Method

The web-browser that they used most was Microsoft Internet Explorer (95.1%). Internet services they used most were (1) websites (43.4%), (2) both websites and email (37.9%), and (3) email (7.7%). They mostly accessed the Internet at (1) their office (60.9%) in doing their work, (2) both at home and office (21%), and (3) at home (6.6%).

With respect to the Internet access method at their office, they used their university networks (92.1%), and wireless (6%). On the other hand, in relation to using the Internet in doing their work at home, they used dial-up (45.5%), broadband (31.8%) and wireless (11.4%) (see Table7.4).

Service of the Internet	**Category**	**Cases**	**Percentage (%)**
Web-browser	1) Microsoft Internet Explorer	426	95.1
	2) Netscape Navigator	5	1.1
	3) Other	17	3.8
Service of the Internet use most	1) The World Wide Web (WWW) or Websites	197	43.4
	2) Email	35	7.7
	3) Websites and Email	172	37.9
	4) Not sure	26	5.7
	5) Hardly used	24	5.3
Location where accessing the Internet most	1) At my office	276	60.9
	2) At my home	30	6.6
	3) Both at office and at home	95	21.0
	4) Not sure	36	7.9
	5) Hardly used	16	3.5
Internet Access Method at Office	1) University Network	417	92.1
	2)Wireless	27	6.0
	3)Other	9	2.0
Internet Access Method at Home	1) Broadband	142	31.8
	2) Dial-up	203	45.5
	3) Wireless	51	11.4
	4) Other	50	11.2

Table 7.4 Internet Service and Internet Access Method

7.6 Cross-Tabulation

1) Gender Cross –Tabulation

Not only were there more younger female subjects (61.4%) than younger male subjects (age 20-39 years), but there were also more older female subjects (59%) than older male subjects (age 40 years up). This may help to provide supplementary information about who played important roles in teaching and teaching related tasks in the Thai business educational system. It is clear that not only younger female academics but also older female academics play important roles in business education in the Thai Public University Sector (see Appendix II - Part B).

Males (17.2%) have Doctoral degrees compared to only 10.8% of females. It should be noted that 30.1% of males assessed themselves as high experience which was much more than their counterpart (13.3%). On the other hand, 74.5% of females assessed themselves as moderate experience (see Appendix II – Part B).

Males (57.2%) thought that they used the Internet enough, which was more than females (42.6%). On the other hand, 38.2% of males thought that they did not use the Internet enough, which was less than females (54.7%) (see Appendix II – Part B).

2) Age Cross-Tabulation

More older academics (age 40 years up) (25%) have Doctoral degrees compared to only 5.9% of younger academics. More younger subjects also indicated that they had high Internet experience (25.2%), while for older subjects was only 10.2%.

Lastly, 51.1% of younger subjects (age 20-39 years) indicated that they currently used the Internet enough while 52.4% of older subjects (age 40 years up) indicated that they did not use the Internet enough (see Appendix II - Part B).

7.7 Cultural Aspects

Four cultural aspects were investigated. These consisted of level of reading and writing, Thai language, e-university plan, and Research University plan.

1) Level of reading and writing

An investigation of academic perception about whether their reading and writing habits were an obstacle to using the Internet indicated that the majority (86.3%) thought that their habits in reading and writing were not an obstacle in using the Internet while 13.7% thought that their habits in reading and writing were an obstacle in using the Internet (see Table 7.5).

2) Thai language

The investigation of whether Thai language was an obstacle in using the Internet resulted from the fact that Thai people usually use Thai language in everyday life while English is a foreign language. When they needed information from the Internet they have to search the English websites because there are insufficient Thai databases to support the demands of Thai academics. Thai academics normally follow the western style (particularly that of the U.S.) in establishing the teaching curriculum within universities. Thai academics therefore use English text books in teaching or preparing teaching materials or use English materials (e.g. e-journal) to support teaching and teaching related tasks. The results were against the expectations of the researcher derived from preliminary interviews (a couple of interviewees thought that Thai language was an obstacle in using the Internet). The results indicated that the majority of Thai academics (68.3%) thought that Thai language was not an obstacle in using the Internet while 31.7% thought that Thai language was an obstacle in using the Internet (see Table 7.5).

Cultural Aspects	**Group**	**Cases**	**Percentage (%)**
Level in reading and writing	1) "My reading and writing habit is not an obstacle in using the Internet"	360	86.3
	2) "My reading and writing habit is an obstacle in using the Internet"	57	13.7
Thai language	1) "Thai language is not an obstacle in using the Internet"	254	68.3
	2) "Thai language is an obstacle in using the Internet"	118	31.7
E-university	1) Acknowledged E-university Plan	296	78.9
	2) Unacknowledged E-university Plan	79	21.1
Research University	1) Acknowledged Research University Plan	389	88.2
	2) Unacknowledged Research University Plan	52	11.8

Table 7.5 Four Cultural Aspects

3) E-university Plan

This investigation showed that 78.9% of Thai academics acknowledged the e-university plan of their university while 21.1% of academics did not acknowledge the e-university plan (see Table 7.5).

4) Research University Plan

The majority of academics (88.2%) acknowledged that their universities have a plan to become research oriented university in the future while 11.8% of academics did not acknowledge this plan (see Table 7.5).

7.8 Actual Internet Usage and Intention to Use

For this study, academic work (Rosenfeld, Reynolds & Bukatko 1992) was categorised into two major groups. The first group was teaching and teaching related tasks including:

1) Teaching in class (Task 1)
2) Providing personal web-base for facilitating teaching (Task 2)
3) Preparing teaching materials (Task 3)
4) Enhancing teaching knowledge (Task 4)
5) Providing student contact and giving advice (Task 5)

The second group was other tasks including:

1) Searching for information for research (Task 6)
2) Administrative tasks (Task 7)
3) Personal tasks (Task 8)
4) Enhancing personal knowledge (Task 9)
5) Using email for personal contact (Task 10)

7.8.1 Internet Usage and Intention to Use on Average

Academics self-reported that they had hardly used the Internet ("used a few times a month") for task 1 (mean = 3.49) (teaching in class) and task 2 (mean = 3.49) (providing a personal web-base for facilitating teaching), but they intended to use it more ("a few times a week") in the future (mean = 4.84 for task 1, and mean = 5.09 for task 2). However, for five tasks (task 4, 6, 8, 9, and 10) which were enhancing teaching knowledge, searching for information for their research, personal tasks, enhancing personal knowledge, and using email for personal contact, they intended to use the Internet slightly more than now. They already used the Internet for these five tasks rather often ("five to six times a week") (see Table 7.6).

7.8.2 Majority of Internet Usage and Intention to Use

Overall, the majority of academics (24.4%) currently used the Internet in all tasks "about once a day" and the number of academics (30.2%) who intended to use the Internet more in all tasks is higher (see Table 7.7).

For those academics who use the Internet "several times a day", the majority (29%) currently used the Internet for enhancing personal knowledge (task 9), while 26.3% used email for personal contact (task 10), and 25.1% used the Internet for enhancing teaching knowledge (task 4).

Items based on the following measurement scales *1= Do not use at all 2= Use about once each month 3= Use a few times a month 4= Use about once each week 5= Use a few times a week 6= Use five to six times a week 7= Use about once a day 8= Use several times a day*	**Task**	**Usage (Mean)**	**Intention (Mean)**
Group 1) Self-Report regarding frequencies of using and intention to use the Internet in teaching and teaching-related tasks			
1. teaching in classes	1	3.49	4.84
2. accessing my personal web-base for facilitating teaching	2	3.49	5.09
3. preparing teaching materials	3	5.21	5.83
4. enhancing my teaching knowledge	4	6.02	6.38
5. using email for student contact and giving my advice	5	4.64	5.84
Group 2) Self-report regarding frequencies of using and intention to use the Internet in OTHER WORK			
6. searching information for my research	6	5.73	6.40
7. assisting administrative tasks	7	4.98	5.82

8. personal tasks	8	6.08	6.16
9. enhancing personal knowledge	9	6.32	6.48
10.using email for personal contact	10	6.15	6.20
Overall, I use/intend to use the Internet in all of my work		6.17	6.46

Table 7.6 Frequencies (Mean) of Internet Usage and Intention to Use

Academics intention to use the Internet, were a little bit difference from usage behaviour. The majority of academics (29.4%) intention to use the Internet for enhancing personal knowledge (task 9) was the same as usage behaviour, but 27.9% intended to use the Internet most for their research (task 6), and 26.5% intended to use the Internet for enhancing teaching knowledge (task 4). Notably, they tended to change their behaviour by paying more attentions to academic activities in the University such as research (see Table 7.7).

Notably, about 24.8% of academics "did not use the Internet at all" for teaching in class (task 1), and 23.9% of them did not use a personal website for facilitating teaching at all (task 2). Fortunately, they intended to use the Internet more in teaching and teaching related tasks and in other tasks (see Table 7.7).
Collectively, academics did not use the Internet very much in either teaching in classes or teaching related tasks (except enhancing teaching knowledge) but they used the Internet more in other tasks. However, no matter how often academics currently used the Internet in their work; they intended to use it more often in all of their work in the future. They intended to take task 3 to task 10 at least "five to six times a week", and task 1 and 2 "a few times a week" (see Table 7.7).

Items based on the following measurement scales 1= *Do not use at all 2= Use about once each month 3= Use a few times a month 4= Use about once each week 5= Use a few times a week 6= Use five to six times a week 7= Use about once a day 8= Use several times a day*	**Task**	**Usage (Scale)**	**Percent (%)**	**Intention (Scale)**	**Percent (%)**
Group 1) Self-Report in teaching and teaching-related tasks					
1. teaching in classes	1	1	24.8	5	25.5
2. accessing my Personal Web-Base for facilitating teaching	2	1	23.9	5	23.0
3. preparing teaching materials	3	5	19.8	7	22.0
4. enhancing my teaching knowledge	4	8	25.1	8	26.5

5. using Email for student contact and giving my advice	5	4	17.6	6	22.1
Group 2) Self-report in OTHER WORK					
6. searching information for my research	6	8	21.3	8	27.9
7. assisting administrative tasks	7	4	19.9	6	20.3
8. personal tasks	8	8	23.8	6	24.3
9. enhancing personal knowledge	9	8	29.0	8	29.4
10. using email for personal contact	10	8	26.3	8	23.1
Overall, I use/intend to use the Internet in all of my work		7	24.4	7	30.2

Table 7.7 Majority of Internet Usage and Intention to Use

7.9 How to Make Full Use of the Internet

Most academics indicated that they still have not made full use of the Internet in their work but intended to use the Internet more in all types of work in the future (mean = 5.31). Regarding motivations to make full use of the Internet in all types of work, academics suggested three motivations (see Table 7.8):

1) If good facilities were available to support usage (e.g. good computer hardware and software, good communication network etc.)(mean = 5.86).
2) University' policy was to be a research oriented university (mean = 5.67).
3) University' policy was to be an e-University (mean = 5.59).

The motivation to make full use of the Internet in all of academic' work. 1= strongly disagree, 2= quite disagree, 3= slightly disagree, 4 neutral, 5= slightly agree, 6= quite agree, 7 strongly agree	**Mean**
1. Overall, I still have not made full use of the Internet, so I Intend to use the Internet more in all type of my work in the future.	5.31
2. If technicians are available when I have difficulties.	4.75
3. If updated Internet trainings are available when necessary.	4.80
4. If good facilities (e.g. good computer hardware and software, good communication network etc.) are available.	**5.86**
5. Because of my strong intention for student contacts in order to decrease a gap between my students.	5.42
6. The university' policy to be as a Research Oriented University in the future.	**5.67**

7. The university' policy to be as an e-University in the future.	**5.59**

Table 7.8 Motivations to Make Full Use of the Internet

7.10 Professional Practice

Academics agreed that using the Internet helped improve their professional practice (6.01), and in particular helped in preparing teaching materials (mean = 5.89) and helped them to improve their research (mean = 6.01). Nevertheless, they were not quite fully agreed that using the Internet help them to improve teaching in class (5.69), and improve administrative tasks (5.59)(see Table 7.9).

Internet usage affected academics' professional practice 1 = strongly disagree, 2= quite disagree, 3= slightly disagree, 4 neutral, 5= slightly agree, 6= quite agree, 7 strongly agree	**Mean**
1. Using the Internet help me to improve teaching in classes.	5.69
2. Using the Internet help me to improve teaching related- tasks e.g. preparing teaching materials etc.	5.89
3. Using the Internet help me to improve my research.	6.01
4. Using the Internet help to improve my administrative tasks.	5.59
5. Overall, using the Internet help me to improve my professional practice.	6.01

Table 7.9 Internet Usage Affected Academics' Professional Practice

7.11 Personal Development

Academics agreed that Internet usage affected their personal development (6.09) as well by helping improve their academic knowledge (mean =6.21) and their personal knowledge (mean = 6.22) (see Table 7.10).

Internet usage affected academics' personal development	**Mean**
1 = strongly disagree, 2= quite disagree, 3= slightly disagree, 4 neutral, 5= slightly agree, 6= quite agree, 7 strongly agree	
1. Using the Internet help improving my academic's knowledge.	6.21
2. Using the Internet help improving my personal knowledge.	6.22

3. Overall, using the Internet help improving my personal development.	6.09

Table 7.10 Internet Usage Affected Academics' Personal Development

7.12 Quality of Working Life

Academics indicated that the Internet helped them improve quality of working life (5.96), particularly by (1) saving expense by getting information free of charge from e-journals for example (5.81), and (2) saving expense in communication with others by using email (5.97). In contrast, they were less certain that using the Internet helped them to have more time for leisure (4.91). Moreover, they were not quite fully agreed that using the Internet help them to have more time for a creative thinking (5.57) (see Table 7.11).

Internet usage affected academics' quality of working life	**Mean**
1 = strongly disagree, 2= quite disagree, 3= slightly disagree, 4 neutral, 5= slightly agree, 6= quite agree, 7 strongly agree	
1. Using the Internet help me to have more time for a creative thinking.	5.57
2. Using the Internet help me to have more time for leisure.	4.91
3. Using the Internet help me to save expense such as I can get information from e-Journals with free of charge, get information from various Websites for free etc.	5.81
4. Using email to communicate with others help me to save my expense.	5.97
5. Overall, using the Internet help improving my quality of working life.	5.96

Table 7.11 Internet Usage Affected Academics' Quality of Working Life

The next step is to use statistical techniques to compare groups. A statistical technique used in this research is the independent sample T-test, but before using this, a number of assumptions underlying its use were tested, and it was found that they were not violated (see Chapter 6). One of the most important assumptions is normal distribution. In a lot of research, particularly in the social sciences, scores on the dependent variable are not normally distributed, it is fortunate that most of the techniques are reasonably robust or tolerant of violations of this assumption. In this study, the sample size was large enough (n = 30 up), therefore if there were any violations, these would not cause any major problems (Gravetter & Wallnau 2000; Stevens 1996). Another important assumption is testing of homogeneity of variance that assumes that samples are obtained from populations of equal variances. This means that the variability of scores for each group is similar. This study used the Levene test for equality of variances in SPSS. T-tests provided with two sets of results, the second set were used when there were any violations of the assumption.

7.13 Differences between Two Groups

In this research, it was questioned whether there were any significant differences in the mean scores of six categories (42 items) between groups. These were:

1) Self-reporting of current Internet usage (frequency of use)(11 items).
2) Self-reporting of intention to use the Internet (frequency of intention to use)(11 items).
3) How to make full use of the Internet in work (7 items).
4) Internet usage affect on professional practice (5 items).
5) Internet usage affect on personal development (3 items).
6) Internet usage affect on quality of working life (5 items).

Five characteristics of academics were examined including gender, age, education level, academic position, and experience. In order to answer these questions, the independent-sample T-test was used. This is one of the most useful parametric tests associated with testing the hypothesis to see whether there is a significant difference between the two groups. Summary of T-Tests (associated with total number of items that were significantly different) was presented in Table 7.12.

7.13.1 Gender

Males (173 cases) and females (265 cases) were investigated in these six categories. The T-test results indicated that significant differences between males and females were found in three categories (total 6 out of 42 items = 14.3%) (see Table 7.12).

1) Current Internet usage (2 items)
2) Intention to use the Internet (2 items)

3) How Internet usage affected quality of working life (2 items)

The significant differences of the mean scores of Internet usage - 2 items (teaching in classes, and used email for student contact and giving advice) and intention to use - 2 items (teaching in classes, and providing a personal web-base for facilitating teaching) of male subjects were higher than those of female subjects, and male subjects thought that using the Internet helped them to have more time for creative thinking and for leisure than females (see Table 1 in Appendix II – Part C). The rest did not have significant differences.

Number of items / **Category**	**Total**	**Gender**	**Age**	**Education**	**Position**	**Experience**
1) Current Internet usage	11	2	8	1	5	9
2) Intention to use	11	2	4	3	-	9
3) How to make full use of the Internet	7	-	-	3	-	3
4) Professional Practice	5	-	-	-	-	2
5) Professional development	3	-	-	-	-	-
6) Quality of working life	5	2	3	-	-	3
Total	42	6	15	7	5	26
Percentage of difference (%)	100	14.3	35.7	16.7	11.9	61.9

Table 7.12 Summary of T-Tests (Total number of items that were significantly different in each category)

7.13.2 Age

For age, two groups were investigated: (1) younger subjects (20-39 years) (282 cases) and (2) older subjects (40 years up) (168 cases). Older subjects were seen more in the administrative level and the younger subjects are expected to have more experience in using the Internet than older subjects because the Internet became popular in Thailand only 15 years ago which in the generation of younger subjects. The T-test results indicated significant differences between younger and older subjects were found in three categories (15 out of 42 items = 35.7%) including:

1) Current Internet usage (8 items)
2) Intention to use the Internet (4 items)
3) How Internet usage affected quality of working life (3 items).

No significant differences were found in other categories (see Table 2 in Appendix II – Part C).

In addition, the mean scores of the three categories for younger subjects were higher than those of older subjects (see Table 2 in Appendix II – Part C). The findings indicated that not only do younger subjects use and intend to use the Internet more than older subjects, but younger subjects also paid more attention to using the Internet help them improve their quality of working life, particularly in association with creative thinking, and saving expense than older subjects.

7.13.3 Education Level

Two groups of education level: Master degree subjects (369 cases), and Doctoral degree subjects (59 cases) were examined. The group of bachelor degree subjects was not investigated because the sample size was too small (17 cases).

The T-test results indicated significant differences between master degree subjects and doctoral degree subjects in three categories (7 out of 42 items = 16.7%) (see Table 3 in Appendix II – Part C). As expected, not only were these significant differences of the mean scores of Internet usage (1 items) and intention to use (3 items) of doctoral subjects, these were higher than those of master degree subjects (see Table 3 in Appendix II – Part C) but doctoral degree subjects also acknowledged the importance of the availability of good facilities, research university plan, and e-university plan more than master subjects in motivating them to make full use of the Internet in their work.

7.13.4 Academic Position

The four groups of academics were lecturer (332 cases), assistant professor (64 cases), associate professor (48 cases), and professor (2 cases). Because of three small groups, it is more suitable to combine these groups into a group called higher position. Only two group of academic positions were examined: lecturer subject (332 cases) and higher position subjects (114 cases). Although in Thailand, lecturer is not regarded as an academic position; in this research it is convenient to consider it along with assistant professor, associate professor, and professor to determine any differences between them. The results indicated the number of items where there were significant differences between lecturer subjects and higher position subjects was rather low and found in only one category (current Internet usage) (5 out of 42 items = 11.9%) (see Table 4 in Appendix II – Part C).

I had always expected that academics in higher position would use the Internet more than lecturers but the findings were against this expectation. The significant differences of the mean scores of current Internet usage (5 items) of lecturer subjects were higher than those of higher academic positions. This means that lecturer subjects used the Internet more often than those in higher academic positions. In particular, they used the Internet more (1) for teaching in class; (2) enhanced teaching knowledge; (3) personal tasks; (4) using email for personal contact ; and (5) overall, using the Internet in all work (see Table 4 in Appendix II – Part C).

7.13.5 Experience

Experience comprised three groups: low experience (50 cases), moderate experience (314 cases) and high experience (89 cases). Only two groups of experience were investigated: moderate and high experience because the sample size of the first group was too small (50 cases) for analysis. The results clearly showed that the number of items that were significantly different between these two groups was high (26 items out of 42 items = 61.9%) and were found in five categories (see Table 7.12).
The significant differences indicated that the mean scores of Internet usage and intention to use the Internet of high experience users were higher than those of moderate experience users as expected. Moreover, the mean scores of high experience were higher than those of moderate experience in association with their

perceptions about using the Internet helped improving their professional practice and quality of working life. On the other hand, the mean scores of moderate experience subjects were higher than those of high experience in relation to their acknowledgments about still have not made full use of the Internet and intention to use it more in all type of work, and the availability of technicians and training were more important to them than to those of high experience (see Table 5, Table 6 and Table 7 in Appendix II – Part C).

7.14 Summary

This chapter started with the reliability and validity analysis of the survey instrument. The results were satisfactory and confirmed that the instrument was reliable and valid. The findings associated with the descriptive analysis of academic characteristics and background of Internet usage indicated that the majority of academics were female (60.5%), aged in the range of 30-39 years (40%), most having graduated at master degree level (82.9%), and most were lecturers (74.4%). Regarding background of Internet usage the majority of academics had used the Internet for about 6-10 years (58.5%), most of them used it several times a day (61.5%), mostly they assessed themselves as moderate experience (69.3%), and most of them thought that they used the Internet enough (48.9%). They accessed the Internet at their office (60.9%) and using the university network (92.1%).

Most academics used the Internet ("use several times a day") for (1) enhancing personal knowledge (29.0%), (2) using email for personal contact (26.3%) and (3) enhancing teaching knowledge (25.1%). In addition, most of them intended to use the Internet several times a day for (1) enhancing personal knowledge (29.4%), (2) research (27.9%), and (3) enhancing teaching knowledge (26.5%). Academics thus did not much use the Internet either in teaching in classes or in providing a personal web-base for facilitating teaching, but fortunately they intended to use more in the future.

After using t-test to investigate the difference between two groups, the results indicated that male subjects used and intended to use the Internet more often than females with respect to a few items of significant difference, and more male subjects than female subjects thought that using the Internet helped them to have more time for creative thinking and for leisure.

Regarding age, the findings indicated that not only did younger subjects use and intend to use the Internet more than older subjects but younger subjects also paid more attention to using the Internet help them improve their quality of working life especially in association with creative thinking, and saving expense than older subjects.

For education level, not only did Doctoral degree subjects use and intend to use the Internet more often than master degree subjects in 4 items but they also acknowledged the importance of the availability of good facilities, research university plans, and e-university plans than Master subjects in motivating them in making full use of the Internet in their work.

In relation to academic position, the findings were against the expectation. The results suggested that lecturer subjects used the Internet more often than those in higher positions in 5 items. Particularly they used the Internet more for teaching in class, enhancing teaching knowledge, personal tasks and using email for personal contacts.

In addition, it was as expected that not only did high experience subjects use and intend to use the Internet more often than moderate experience subjects but they also acknowledged that using the Internet helped improve their professional practice and quality of working life. Moderate experience subjects indicated that they still have not made full use of the Internet but that they intend to use it more in all aspects of their work. Moreover, the availability of technicians and good facilities were more important to them in motivating them to make full use of the Internet than those of high experience.

Further analysis using SEM with AMOS will be presented in Chapter 8, in relation to assessing the relationship between predictors and usage behaviour and behaviour intention, which is the core of this research in accordance with the research model in Chapter 5.

CHAPTER 8

TECHNOLOGY ACCEPTANCE MODELLING

8.1. Introduction

The characteristics of academics together with how and to what extent academics used and intended to use the Internet in their work were identified in Chapter 7. The extent of difference in usage and intention to use the Internet were captured. There are important questions associated with determining the reasons behind their usage behaviour and intention. This chapter will investigate what significant determinants influence academics' behaviour as these determinants are expected to play important roles in explaining their behaviours.

In order to answer these questions, a proposed research model (see Chapter 7) will be tested, and modified in this chapter with careful consideration associated with the goodness of fit of the model to the data. Consequently a specific model of technology acceptance that best fits the data will be generated. The model being generated and its interpretation may help promote Internet usage in academic work and consequently help improve academics' professional practice, professional development and finally quality of their working life.

The next step is to investigate the impact of moderators on the generated model. To examine whether gender, age, education level, academic position, experience, and four cultural aspects impact on the influence of the predictors toward behaviour. The causal relationships of determinants (predictors) and behaviour could best be analysed by using Structural Equation Modelling (SEM) (Hair, Black, Babin, Anderson & Tatham 2006; Schumacker & Lomax 1996). Because of this, SEM will be used to analyse the data and it therefore helps to generate the models using AMOS software version 6.0. This provides users with powerful and easy-to-use software. It creates more realistic models than using standard multivariate statistics or multiple regression models alone. By using AMOS, users can specify, estimate, assess, and present the model in an intuitive path diagram to show hypothesised relationships among variables (Arbuckle 2005).

8.2 Constructs of the Research Model

The proposed research model comprises nine latent constructs. A latent construct can not be measured directly but can be represented or measured by one or more variables (indicators). An observed (measured) variable is a specific item or question, obtained either from respondents in response to questions in a questionnaire or from some type of observation. Measured variables are used as the indicators of latent constructs. In other words, indicators are associated with each latent construct and are specified by the researcher (Hair et al. 2006).

Nine latent constructs include five exogenous constructs and four endogenous constructs. An exogenous construct is a latent, multi-item equivalent of an independent variable. It is a construct that is not affected by any other construct in the model. Endogenous constructs are latent, multi-item equivalents to dependent variables. They are constructs that are affected by other constructs in the model (Hair et al. 2006; Sharma 1996).

In this study, how to consider what items belongs to a specific latent construct was based on the literature. Each construct comprises at least four items (indicator/observed variables) and no more than five items. For example, a perceived usefulness latent construct (PU) consists of 4 items (indicators/observed variables) including pu1, pu2, pu3, and pu4 according to the literature. In addition, a teaching in class latent construct (TEACH) consists of 5 items (indicators) including tclass, tweb, tmateria, tknowled, temail (see Table 8.1). These codes together with their meanings are presented in a coding sheet in Appendix I - Part B.

In SEM, a two-step approach is recommended by Anderson and Gerbing (1988) rather than a single-step approach. Firstly, the measurement models are evaluated to ensure that the items used to measure each of the constructs is adequate. The second step is carried out only after the measurement models are shown to be proper measures of the constructs. The second step involves the assessment of the structural model which shows the relationships between the constructs. By using this two-step approach, the typical problem of not being able to localise the source of poor model fit associated with the single-step approach is overcome (Kline 1998). The single-step approach involves assessing measurement and structural models simultaneously (Singh & Smith 2001).

Construct	Number of Items	Items	Codes /Name of Constructs	Definitions of the Constructs
1*	4	pu1-pu4	PU	Perceived usefulness
2*	4	peou1-peou4	PEOU	Perceived ease of use
3*	5	si1-si5	SI	Social Influence
4*	4	Fc1-fc4	FC	Facilitating Conditions
5*	4	Se1-se4	SE	Self-Efficacy
6**	5	tclass, tweb, tmateria, tknowled, temail	TEACH	Usage behaviour in teaching and teaching related tasks
7**	5	oresearc, oadmin, operson, operknow, oemail	OTASK	Usage behaviour in other tasks
8**	5	bitclass, bitweb, bitmater, bitknow, bitemail	BITEACH	Behaviour intention in teaching and teaching related tasks
9**	5	Bioresea, bioadmin, bioperso, bioperkn, bioemail	BIOTASK	Behaviour intention in other tasks

Table 8.1 Nine Constructs in the Research Model

* = Exogenous Latent Construct
** = Endogenous Latent Construct

These nine constructs were measured by a total of 41 items (21 items for exogenous constructs (independent variables) and 20 items for endogenous constructs (dependent variables) (see Table 8.1). This research analysed the data based on the two-step approach in order to overcome the typical problem of not being able to localise the source of poor model fit in relation to the single-step approach (Kline 1998).

Before proceeding to SEM data analysis, it is necessary to test the reliability and validity of the construct. Reliability and validity are separate but closely related conditions (Bollen 1989). More importantly, reliability does not guarantee validity and validity does not guarantee reliability. A measure may be consistent (reliable) but not accurate (valid). On the other hand, a measure may be accurate but not consistent

(Holmes-Smith, Cunningham & Coote 2006). Both important measures will be discussed and presented in the next two topics.

8.3 Construct Reliability

Reliability is the consistency of measurements. Construct reliability measures the internal consistency of a set of measures rather than the reliability of a single variable. It captures the degree to which a set of measures indicate the common latent construct. An advantage of construct reliability is that it is based on estimates of model parameters. The measure has wide applicability because it can be computed for the construct (s) in a model regardless of whether the researcher is estimating a congeneric measurement model, confirmatory factor analysis or path model with latent variables (Holmes-Smith, Cunningham & Coote 2006). In general, researchers report at least one of three model-based estimates of reliability (Bollen 1989). These measures include:

1) The squared multiple correlations (SMC) for the observed variables.

2) Construct reliability.

3) The variance extracted estimate.

In this study, the SMC was used to measure the construct reliability. The SMC is referred to an item reliability coefficient. It is the correlation between a single indicator variable and the construct it measures. The SMC for an observed variable is the square of the indicator's standardised loading. For example, if the standardised loading for an observed variable is 0.80, the corresponding squared multiple correlation is 0.64 and the error variance is 0.36 accordingly. The SMC of a good observed variable should exceed 0.50 although a SMC of 0.30 indicates an acceptable indicator variable. A SMC of 0.50 is roughly equivalent to a standardised load of 0.70 (Holmes-Smith, Cunningham & Coote 2006).

Most SMCs of the 21 observed variables (indicators) that belong to the five exogenous latent constructs (PU, PEOU, SI, FC, and SE) exceeded 0.50 (see Table 8.2). Five indicators were considered and deleted from SEM analysis *se4 = 0.430, se3 = 0.196, si5 =, 0.331, fc1 = 0.420, fc2 = 0.440* ***(see Table 8.2 in bold) in order to***

improve the model fit to the data. The rest showed the good and acceptable reliability of indicator variables (see meanings of observed variables in a coding sheet in Appendix I – Part B).

	SMC Estimate
se4	**.430**
fc3	.762
fc4	.757
se1	.574
se2	.463
se3	**.196**
si3	.803
si4	.761
si5	**.331**
fc1	**.420**
fc2	**.440**
peou2	.796
peou3	.856
peou4	.840
si1	.747
si2	.687
pu1	.609
pu2	.698
pu3	.805
pu4	.715
peou1	.815

Table 8.2 Squared Multiple Correlations (SMC) of 21 Indicators in Five Exogenous Latent Constructs

In addition, most SMCs of the 20 observed variables of the four endogenous latent constructs (TEACH, OTASK, BITEACH, and BIOTASK) exceeded 0.50 (see Table 8.3). Eight of them were less than 0.50, and were deleted from SEM data analysis to improve the model fit. These deleted indicators were **bioadmin = 0.341, bitemail = 0.450, bitclass = 0.368, oresearc = 0.450, oadmin = 0.240, temail = 0.240, tclass = 0.151, and tweb = 0.211.** The rest showed good and acceptable reliability of indicator variables (see meanings of observed variables in a coding sheet in Appendix I – Part B).

	SMC Estimate
bioemail	.571
bioresea	.530
bioadmin	**.341**
bioperso	.648
bioperkn	.697
bitemail	**.450**
bitclass	**.368**
bitweb	.542
bitmater	.722
bitknow	.612
oemail	.588
oresearc	**.450**
oadmin	**.240**
operson	.713
operknow	.654
temail	**.240**
tclass	**.151**
tweb	**.211**
tmateria	.599
tknowled	.531

Table 8.3 Squared Multiple Correlations (SMC) for 20 Indicators in Four Endogenous Constructs

8.4 Discriminant Validity

Validity is the accuracy of a measure, and exists when the measure is a perfect representation of the variable intended to measure (Holmes-Smith, Cunningham & Coote 2006). Structural equation modelling techniques can be used to estimate discriminant validity (Anderson & Gerbing 1988). Discriminant validity reflects the extent to which the constructs in a model are different. It is very important to assess this validity where the constructs are interrelated. Large correlations between latent constructs (greater than 0.80 or 0.90) suggest a lack of discriminant validity (Holmes-Smith, Cunningham & Coote 2006). In addition, this research used pattern and structure coefficients in determining whether constructs in the measurement models are empirically distinguishable. Pattern coefficients are the standardized factor loadings derived from the AMOS analysis. To determine the structure coefficients, the influence of each factor on items not hypothesised to comprise that factor is calculated by multiplying the latent factor correlation by the factor loadings of the item. The structure coefficients are also generated in AMOS output in the "all implied moments" (Holmes-Smith, Cunningham & Coote 2006).

In analysing the discriminant validity, there are nine latent constructs in the research model. In each round of validity analysis, there should be no more than five constructs under investigation (Holmes-Smith, Cunningham & Coote 2006). Because of this, the analysis will be conducted in two discriminant validity analyses:

1) The analysis of five exogenous latent constructs.

2) The analysis of four endogenous latent constructs.

8.4.1 Five Exogenous Latent Constructs

First step before validity analysis of the five exogenous latent constructs, it is recommended to delete one indicator from SEM analysis if the value of sample correlation (the sample correlation is generated by AMOS) between two indicators exceeds 0.80, because it presents multicollinearlity (Holmes-Smith, Cunningham & Coote 2006).

The sample correlations between peou3 and peou4 = 0.869, between peou3 and peou1 = 0.832, between peou1 and peou2 = 0.826, and si3 and si4 = 0.814. One of the indicators in each pair was deleted. Therefore, three more indicators were deleted: peou3, peou1, and si3 (see Table 1 in Appendix III - Part A). In total eight indicators were deleted and only thirteen indicators still existed for further analysis.

In addition, second step before validity analysis is to investigate a standardised residual covariance between two indicators. It is recommended that with a correct model, most standardised residuals should have an absolute value less than 2. A standardised residual covariance between two indicators is the residual covariance between these two indicators divided by an estimate of its standard error. The residual covariance between two indicators is the difference between the sample covariance and the model-implied covariance (Jöreskog & Sörbom 1984). In SEM analysis of five exogenous latent constructs, there is no pair of indicators that present standardised residual covariances exceeding 2 in absolute value (see Table 2 in

Appendix III - Part A). Therefore only thirteen indicators still existed for discriminant validity analysis.

After two steps of investigations, it is ready to examine discriminant validity of the constructs. In validity analysis, it was found that these five latent constructs in the research model *were different* because correlations between latent constructs were not larger than 0.8 or 0.9. The maximum correlation (between PEOU and SE) was 0.71 (see Figure 8.1 and Table 8.4). AMOS provides the construct correlations whenever standardised results are requested (standardised estimate) (Hair et al. 2006). In addition, the pattern and structure coefficients indicated that five constructs in the measurement models are empirically distinguishable (see Table 5 (all implied moments) in Appendix III – Part A). These indicated discriminant validity of the five exogenous latent constructs in the model. The model in Figure 8.1 yields a χ^2 (chi-square) of 98.893, degree of freedom = 55 and p value = 0.000 (Bollen-stine p value = 0.071 which is not significant at the level of 0.05). It indicated that the model fits the data very well. Because chi-square statistic is very sensitive with samples size, it is more appropriated to look at other fit measures. Fortunately, other fit measures also indicate the goodness of fit of the model to the data (CMIN/DF = 1.798, RMSEA = 0.042, TLI = 0.983, CFI = 0.988, NFI = 0.973, GFI = 0.969, AGFI = 0.948) (see Table 8.6 for the reference of fit measures).

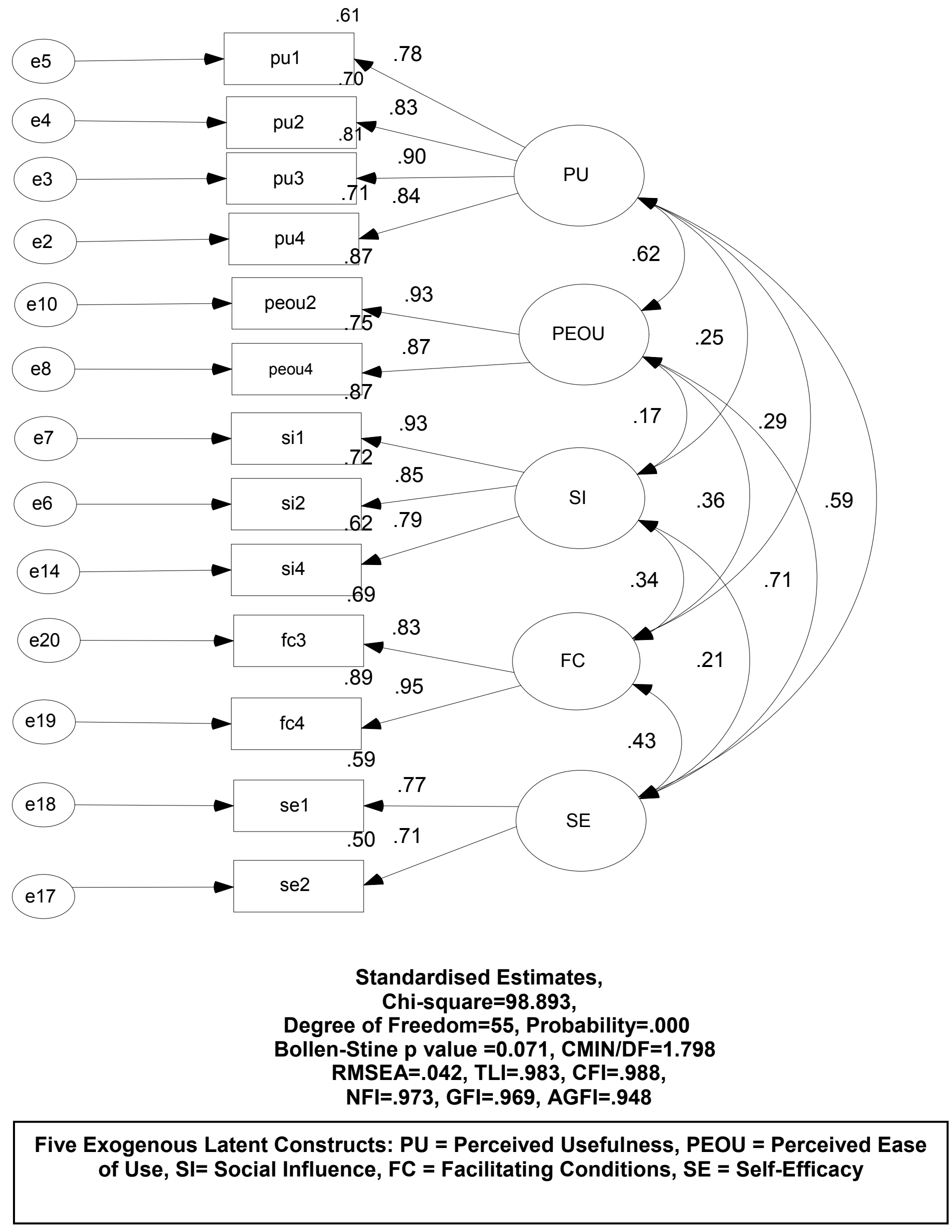


Figure 8.1 Standardised Estimates for Five Exogenous Latent Constructs

			Correlation Estimate
PU	<-->	PEOU	.624
PU	<-->	SI	.247
PU	<-->	SE	.586
PU	<-->	FC	.290
PEOU	<-->	SI	.170
SE	<-->	PEOU	.714
FC	<-->	PEOU	.363
SE	<-->	SI	.214
FC	<-->	SI	.338
SE	<-->	FC	.427

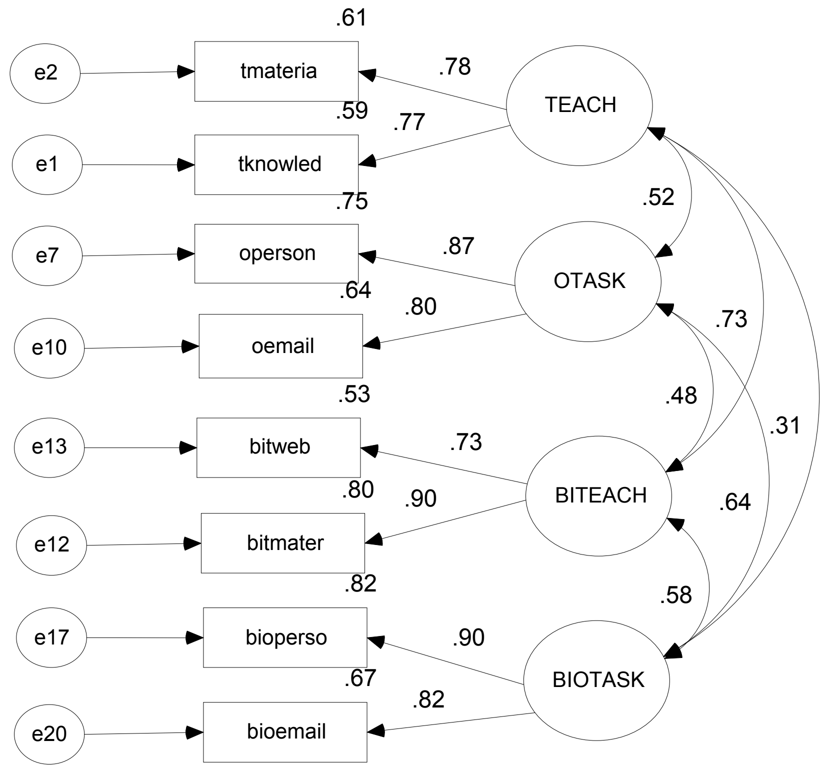
Table 8.4 Correlations for Five Exogenous Latent Constructs

8.4.2 Four Endogenous Latent Constructs

First step of investigation before validity analysis associated with four endogenous latent constructs is to investigate multicollinearlity. It was found that there was no sample correlation value between two indicators exceeds 0.80. This indicated that there was no multicollinearlity between two indicators (see Table 3 in Appendix III – Part A).

Further step before validity analysis is to investigate standardised residual covariances. In association with four endogenous latent constructs, there were six pairs of indicators that presented standardised residual covariances exceeding 2 in absolute value: (1) bitknow and bioresea = 3.783, (2) operknow and bitknow = 3.448, (3) tknowled and bioresea = 3.378, (4) bitknow and bioperkn = 2.810, (5) tknowled and operknow = 2.668 and (6) bioperso and bioemail = 2.010 (see Table 4 in Appendix III – Part A). Therefore, four more indicators including bioresea, bioperkn, bitknow, and operknow were deleted because they were related to many indicators and formed rather high standardised residual covariances (see meanings of these codes in a coding sheet in Appendix III – Part B). Only eight indicators were left for analysis of discriminant validity.

In discriminant validity analysis, it was found that these four constructs in the research model after deleting 12 indicators *were different* because correlations between latent constructs were not larger than 0.8 or 0.9, the maximum correlation (between TEACH and BITEACH) was 0.73 (see Figure 8.2 and Table 8.5). In addition, the pattern and structure coefficients indicated that four endogenous latent constructs in the measurement models are empirically distinguishable (see Table 6 (all implied moments) in Appendix III – Part A). These indicated discriminant validity of four endogenous latent constructs in the model. After deleting these indicators the model fits the data very well. The model in Figure 8.2 yields a χ^2 (chi-square) of 21.338, degree of freedom = 14 and p values = 0.093 (Bollen-stine p value = 0.229 which is not significant at the level of 0.05). It indicated that the model fits the data very well. Other fit measures also indicated the goodness of fit of the model to the data (CMIN/DF = 1.524, RMSEA = 0.034, TLI = 0.991, CFI = 0.996, NFI = 0.987, GFI = 0.988, AGFI = 0.969) (see Table 8.6 for the reference of fit measures).



Standardised Estimates,
Chi-square=21.338,
Degree of Freedom=14
CMIN/DF=1.524,
Probability=.093, Bollen-Stine p value=.229
RMSEA=.034, TLI=.991, CFI=.996,
NFI= .987, GFI=.988, AGFI=.969

Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.2 Standardised Estimates for Four Endogenous Latent Constructs

			Correlation Estimate
TEACH	<-->	OTASK	.521
TEACH	<-->	BITEACH	.731
TEACH	<-->	BIOTASK	.306
OTASK	<-->	BITEACH	.485
OTASK	<-->	BIOTASK	.643
BITEACH	<-->	BIOTASK	.577

Table 8.5 Correlations of Four Endogenous Latent Constructs

After discriminant validity investigations, we are ready to proceed to testing the research model. However, measures of fit this research was based on will be presented next before proceeding to model testings.

8.5. Measure of Fit

Before analysing the structural model, it is necessary to understand how to evaluate the models. Fit measures are grouped into various types and each type has its specific capability in model evaluation, such as measures of parsimony, minimum sample discrepancy function, measures based on the population discrepancy, comparison to a baseline model, and a goodness of fit index (GFI) and related measures (see Table 8.6) (Arbuckle 1999, 2005; Bollen & Long 1993; Browne & Cudeck 1993; Byrne 2001, 2006; Holmes-Smith 2000; MacCallum 1990; Mulaik, James, Van Alstine, Bennett, Lind & Stilwell 1989; Steiger 1990). Nevertheless, Arbuckle (2005) suggests that model evaluation is one of the most difficult and unsettled issues related to structural equation modelling.

1) *Measures of Parsimony*

   A model high in parsimony (simplicity) is a model with relatively few parameters and relatively many degrees of freedom. On the other hand, a model with many parameters and few degrees of freedom is said to be complex or lacking in parsimony. Many fit measures represent an attempt to balance these two conflicting objectives - simplicity and goodness of fit. Degree of freedom (df) is one fit measure used in measures of parsimony.

2) *Minimum Sample Discrepancy Function*

   CMIN (Chi-square statistic (χ^2)) is the minimum value of the discrepancy. In the case of maximum likelihood estimation, CMIN contains the chi-square statistic. The chi-square statistic is an overall measure of how many of the implied moments and sample moments differ. The more the implied and sample moments differ, the bigger the chi-square statistic, and the stronger the evidence against the null hypothesis.

   P value is the probability of getting as large a discrepancy as occurred with the present sample under appropriate distributional assumptions and assuming a correctly specified model. So P is a "*p value"* for testing the hypothesis that the model fits perfectly in the population. Therefore, this is a method to select the model by testing the hypothesis to eliminate any models that are inconsistent with the available data.

CMIN/DF (χ^2 / *df*) is the minimum discrepancy divided by its degrees of freedom; the ratio should be close to 1 for correct models. Although Arbuckle (2005) claimed that it is not clear how far from 1 we should let the ratio get before concluding that a model is unsatisfactory. In contrast, Byrne (2006) suggested that ratio should not exceed 3 before it cannot be accepted. Since the chi-square statistic (χ^2) is sensitive to sample size it is necessary to look at others that also support goodness of fit.

3) *Measures Based on the Population Discrepancy*

The most commonly used is RMSEA which is the population root mean square error of approximation.

4) *Comparison to a Baseline Model*

Three significant indices are NFI, TLI, and CFI. NFI is the normed fit index, while TLI is the Tucker-Lewis coefficient and CFI is the comparative fit index. CFI is truncated to fall in the range from 0 to 1, values bigger than 1 are reported as 1, while values less than 0 are reported as 0.

5) *GFI and Related Measures*

GFI is a goodness- of- fit index for ML (Maximum likelihood) and ULS (Unweighted Least Squares) estimation. AGFI is an adjusted goodness-of-fit index.

Fit Measures	**Fit Measures' Indications**
Chi-square (χ^2)	A p value greater than 0.05 indicates an acceptable fit.
CMIN/DF(χ^2 /df) or (normed chi-square)	A value close to 1 and not exceeding 3 indicates a good fit. A value less than 1 indicates an overfit of the model.
RMSEA	A value about 0.05 or less indicates a close fit of the model. A value of 0.0 indicates the exact fit of the model. A value of about 0.08 or less indicates a reasonable error of approximation.

	A value should not greater than 0.1.
TLI	A value between 0 and 1, but is not limited to this range; a value close to 1 indicates a very good fit. A value greater than 1 indicates an overfit of the model.
CFI	A value between 0 and 1, a value close to 1 indicates a very good fit.
NFI	A value between 0 and 1, 1 indicates a perfect fit.
GFI	A value always less than or equal to 1 and 1 indicates a perfect fit.
AGFI	A value is bounded above by 1 and is not bounded by 0 and 1 indicates a perfect fit.

Table 8.6 Summary of the Fit Measures Used in this Research

There are four groups of fit measures. The fit measures within each group give the same rank of ordering of models (Arbuckle 2005). The first group is RMSEA and TLI, the second groups is CFI, the third group is CMIN and NFI, and the fourth group is GFI, and AGFI. Among the many measures of fit, five popular measures are: Chi-square, normed chi-square (χ^2 / df), goodness of fit index (GFI), Tucker-Lewis Index (TLI), Root Mean-Square Error of Approximation (RMSEA) (Holmes-Smith 2000). However, all fit measures in Table 8.6 are used to evaluate goodness of fit of the models in this research.

8.6. Model Estimation

8.6.1 Unstandardised and Standardised Estimates

In path analysis, both unstandardised and standardised model solutions will be presented. AMOS's default method of computing parameter estimates is called maximum likelihood, and it produces estimates with very desirable properties (Arbuckle 1999, 2005). In an unstandardised model, the regression weights, covariances, intercepts (only when mean structures are analysed) and variances will be displayed in the path diagram. Regression weights represent the influence of one or more variables on another variable (Byrne 2006). In contrast, in a standardised model, the standardised regression weights (i.e. provided mean = 0, variance = 1.0 (Hayduk 1987)), correlation, squared multiple correlations will be displayed. The standardized regression weights and the correlations are independent of the units in which all variables are measured, and will not be affected by the choice of identification constraints (Arbuckle 2005).

8.6.2. Squared Multiple Correlations (SMC)

The fit measures provide information about how well the model fits the data, but the strength of the structural paths in the model is determined by squared multiple correlations (SMC). SMC is the proportion of its variance that is accounted for by its predictors. Simple regression uses a single predictor of the dependent variable, whereas multiple regression uses two or more predictors (Hayduk 1987). Therefore, it is important for this research to consider the SMC of each dependent variable together with fit measures in order to best describe the structural model (Arbuckle 2005). Interpretation of SMC is analogous to the R^2 statistic in multiple regression analysis (Sharma 1996). SMC is a useful statistic that is also independent of all units of measurement (Arbuckle 2005).

8.7. Internet Acceptance Model

The proposed research model (see Figure 8.3), which adapted and incorporated aspects of many theories/models of technology acceptance, presents the possible influence of five latent constructs (exogenous variables) (PU, PEOU, SI, FC, and SE) toward the usage behaviour (TEACH and OTASK) (endogenous variables) and the possible influence of usage behaviour (TEACH and OTASK) toward behaviour intention (BITEACH and BIOTASK) (endogenous variables). Endogenous variables (or dependent variables), depend on other variables, and have single-headed arrows pointing to them. Exogenous variables (or independent variables), do not depend on other variables, and do not have single-headed arrows pointing to them (Arbuckle 2005). The model after testing and modification is called the "Internet Acceptance Model" and may be abbreviated as "IAM" through the rest of this research.

Two steps of SEM data analysis were conducted in this research in relation to testing the proposed research model:

- Step1: Tested the research model by investigating only the determinants and behaviours. This has still not considered the impact of the moderators on the influence of the determinants/predictors. Three groups of hypotheses were tested. The result from this testing and modification is the general model of technology acceptance and it is called in this study an “Internet Acceptance Model” (IAM).

- Step2: Tested the research model by investigating the impact of the moderators on the influence of the determinants/predictors by using multiple-group analysis. Two groups of moderating hypotheses were tested. The results from these testings are the model that presents the impact of moderators.

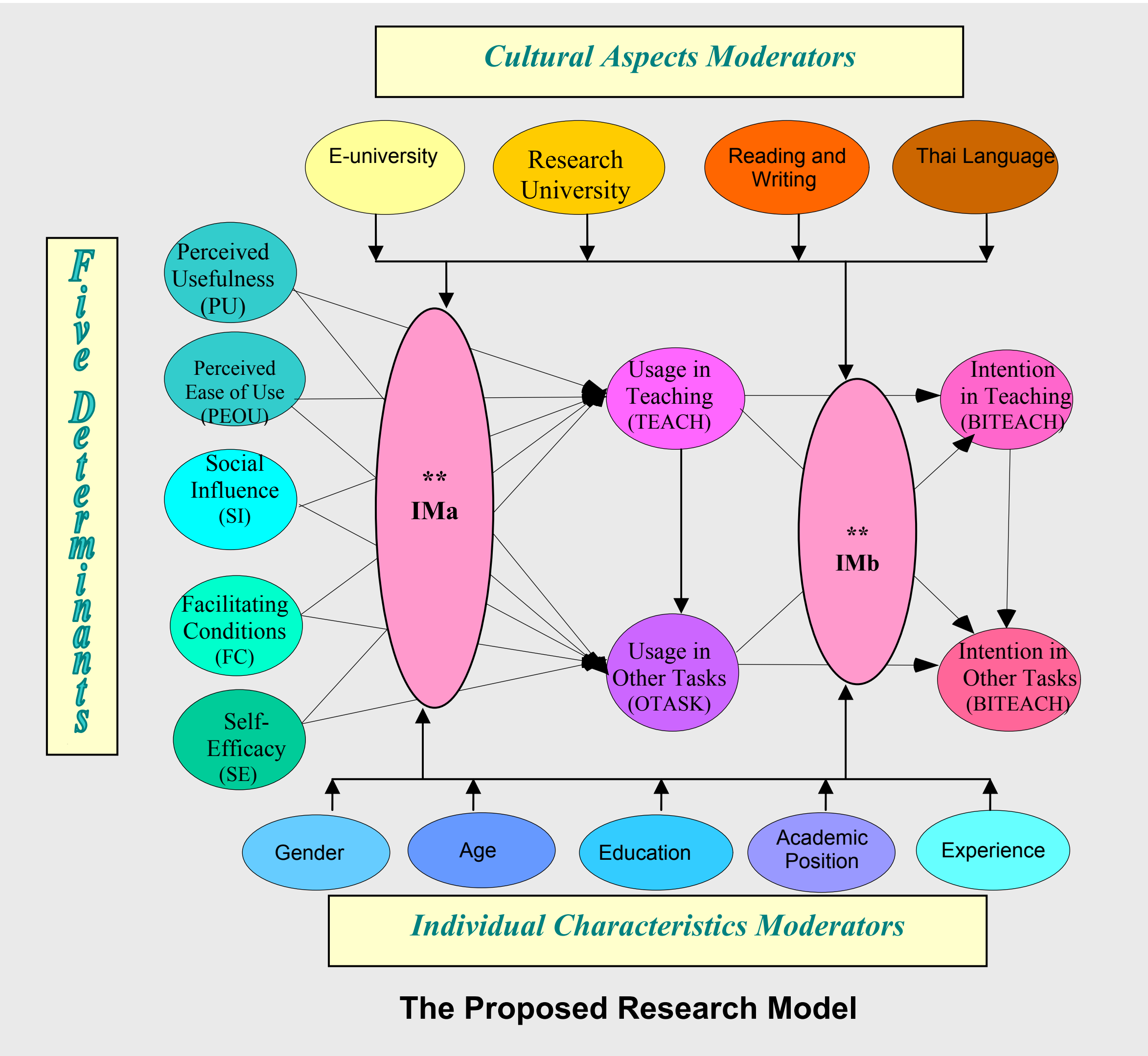


Figure 8.3 The Proposed Research Model

** IMa : The impact of moderators on the direct paths between determinants and usage behaviour

** IMb : The impact of moderators on the paths between usage behaviour and intention

In the first step of SEM data analysis, the hypotheses that were tested for the proposed research model (general model) made up three groups:

1) Determinants and Usage Behaviour in Teaching and Teaching Related Tasks (TEACH)

$H_1$1a: Perceived usefulness (PU) has a significant influence on usage behaviour (TEACH).

$H_1$2a: Perceived ease of use (PEOU) has a significant influence on usage behaviour (TEACH).

$H_1$3a: Social influence (SI) has a significant influence on usage behaviour (TEACH).

$H_1$4a: Facilitating conditions (FC) has a significant influence on usage behaviour (TEACH).

$H_1$5a: Self-efficacy (SE) has a significant influence on usage behaviour (TEACH).

2) Determinants and Usage Behaviour in Other Tasks (OTASK)

$H_1$1b: Perceived usefulness (PU) has a significant influence on usage behaviour (OTASK).

$H_1$2b: Perceived ease of use (PEOU) has a significant influence on usage behaviour (OTASK).

$H_1$3b: Social influence (SI) has a significant influence on usage behaviour (OTASK).

$H_1$4b: Facilitating conditions (FC) has a significant influence on usage behaviour (OTASK).

$H_1$5b: Self-efficacy (SE) has a significant influence on usage behaviour (OTASK).

3) Usage Behaviour and Behaviour Intention

$H_1$6: Usage behaviour in teaching (TEACH) has a significant influence on usage behaviour in other tasks (OTASK).

$H_1 7$: Usage behaviour in teaching (TEACH) has a significant influence on behaviour intention in teaching (BITEACH).

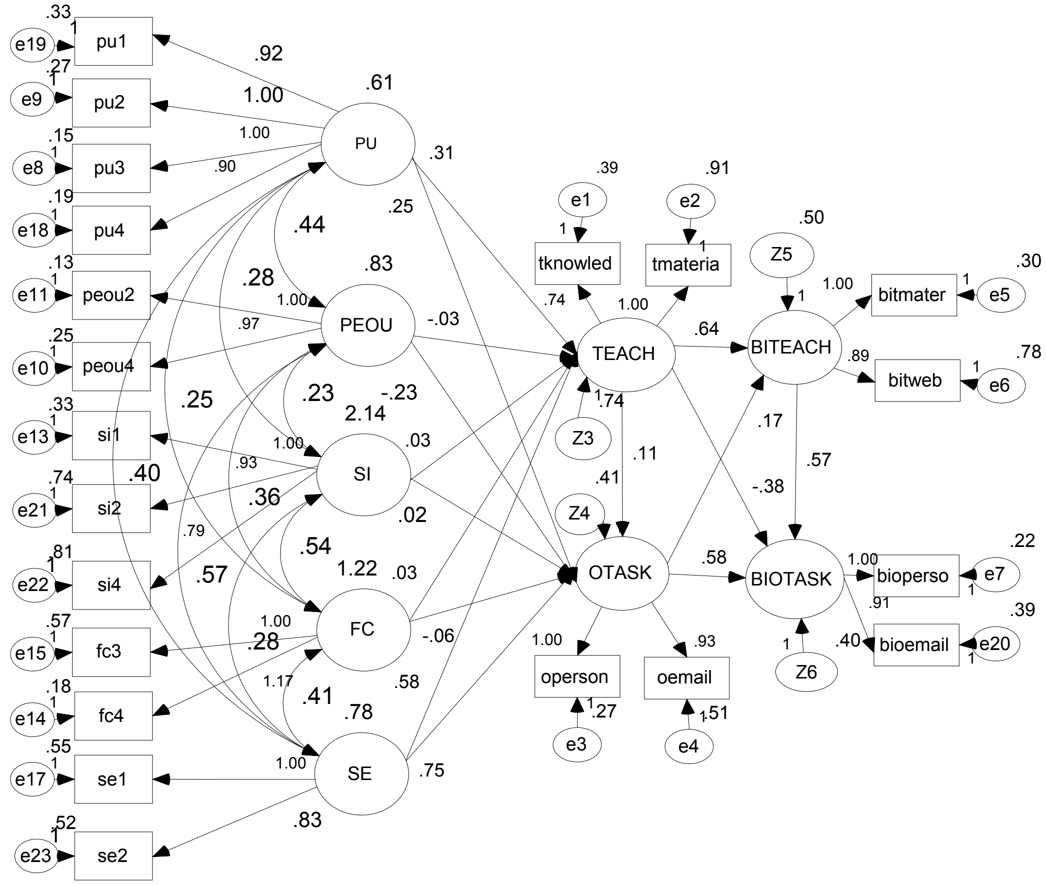
$H_1 8$: Usage behaviour in teaching (TEACH) has a significant influence on behaviour intention in other tasks (BIOTASK).

$H_1 9$: Usage behaviour in other tasks (OTASK) has a significant influence on behaviour intention in teaching (BITEACH).

$H_1 10$: Usage behaviour in other tasks (OTASK) has a significant influence on behaviour intention in other tasks (BIOTASK).

$H_1 11$: Behaviour intention in teaching (BITEACH) has a significant influence on behaviour intention in other tasks (BIOTASK).

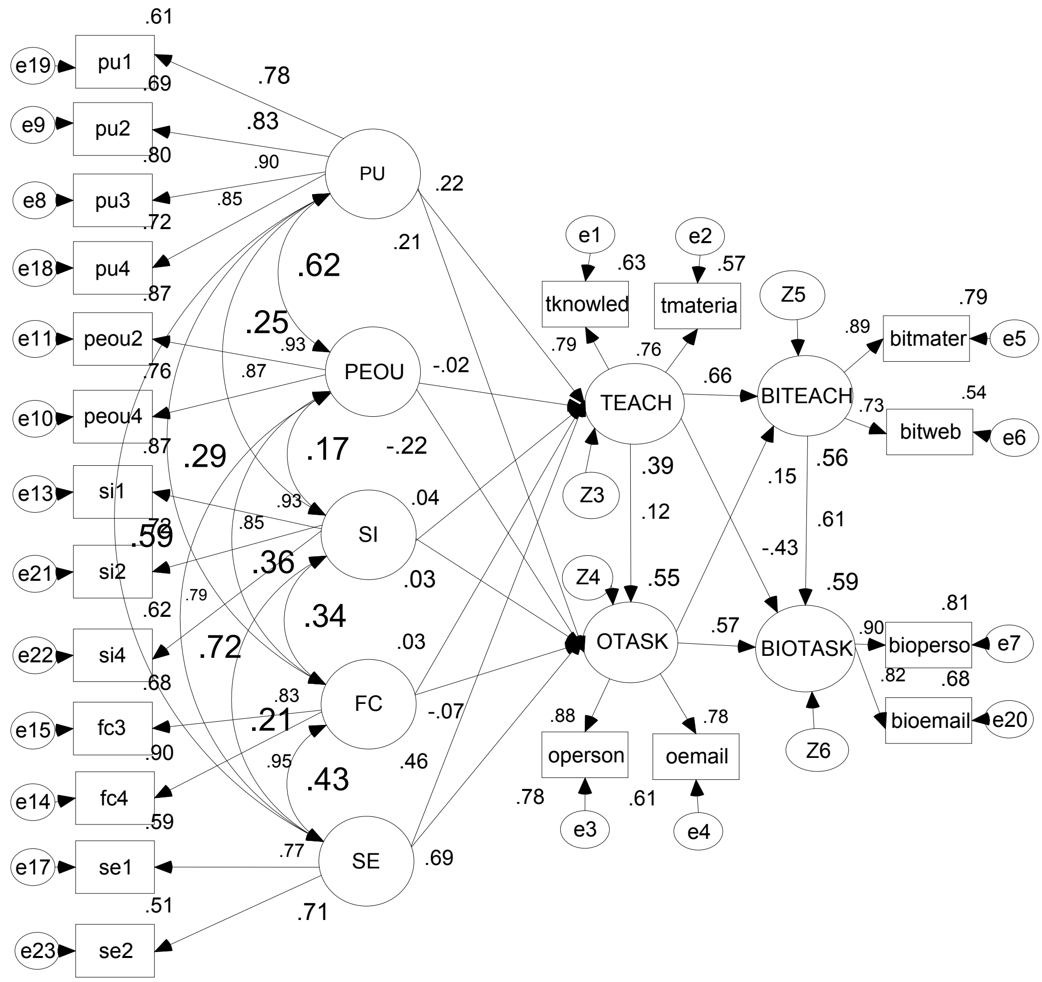
The initial model before a modification is presented in Figure 8.4 with unstandardised estimates and in Figure 8.5 with standardised estimates.



Initial Internet Acceptance Model
Unstandardiised Estimates,
Chi-square=294.322,
Degree of Freedom=163,
CMIN/DF=1.806, Probability=.000,
Bollen-Stine Probability= 0.006 ,
RMSEA=.042, TLI=.970, CFI=.976,
NFI=.949, GFI=.943, AGFI=.920,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.4 Initial Internet Acceptance Model with Unstandardised Estimates



Initial Internet Acceptance Model
Standardized Estimates,
Chi-square=294.322,
Degree of Freedom=163,
CMIN/DF=1.806, Probability=.000,
Bollen-Stine Probability= 0.006 ,
RMSEA=.042, TLI=.970,CFI=.976,
NFI=.949, GFI=.943, AGFI=.920,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.5 Initial Internet Acceptance Model with Standardised Estimates

Clearly the initial model does not fit, because the p value = 0.000 and the Bollen-Stine p value = 0.006 which are both significant at the level of 0.05 (see Figure 8.4, and 8.5). It is necessary to re-specify the model to be a better fit by deciding what items to remove. Parameter summary for the initial model is 102 parameters (see Table 8.7)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	34	0	0	0	0	34
Labeled	0	0	0	0	0	0
Unlabeled	28	10	30	0	0	68
Total	62	10	30	0	0	102

Table 8.7 Parameter Summary for the Initial Internet Acceptance Model

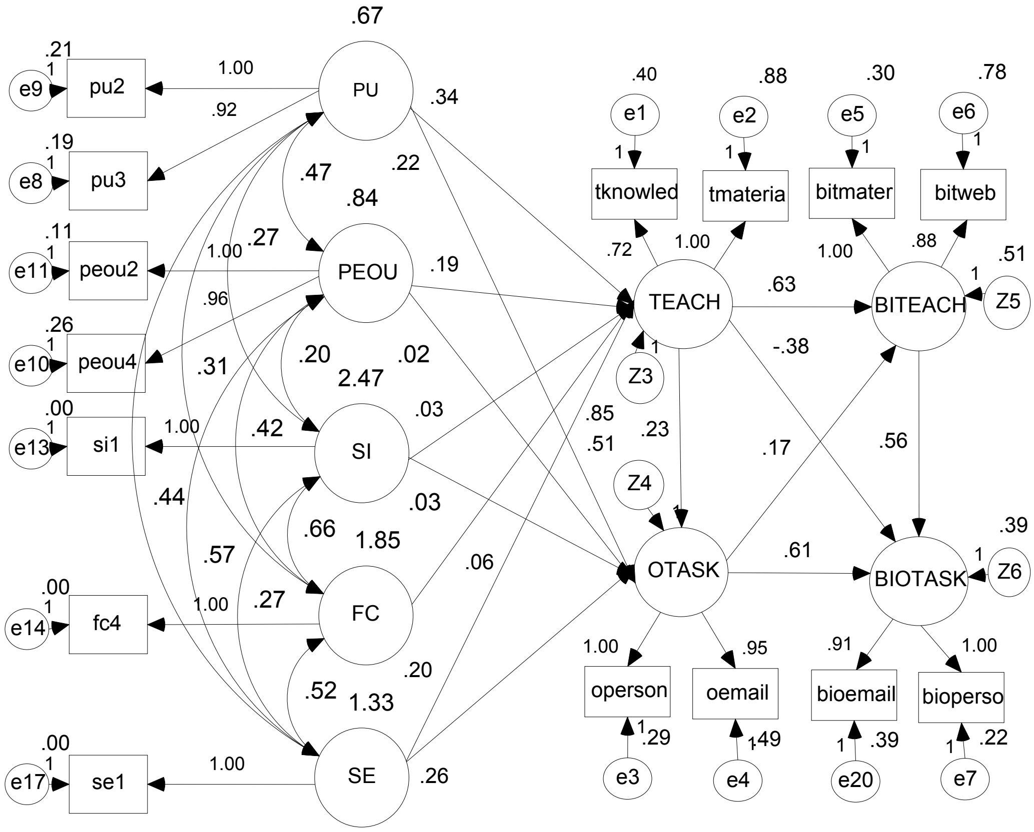
It was found that there is no sample correlation that exceeds 0.8 (see sample correlations in Appendix III – Part B) but two pair of indicators that have standardised residual covariances greater than 2 (in absolute value) are (1) fc3 and bioemail = 2.472, and (2) s2 and bitweb = 2.032 (see standardised residual covariances in Appendix III – Part B). Therefore one of each pair should be deleted (Jöreskog & Sörbom 1984). Two factors were deleted: fc3 and si2 because they were related to many indicators and formed rather high standardised residual covariances (see meanings of these codes in a coding sheet in Appendix III – Part B). After two indicators have been deleted the model still did not fit the data well. In order to localise the source of unfit, further data analysis was made by investigating the modification indices which help to improve the model fit the data. Finally, four indicators were deleted: pu1, pu4, si4 and se2. The path between FC and OTASK was not significant in both steps of SEM analysis (in general model analysis and in multiple-group analysis) and was permanently deleted from the SEM analysis. After these deletions, the model fits the data very well (see Figure 8.6 and 8.7).

The number of parameter estimates in the Internet Acceptance Model (IAM)(after re-specified the model) were rather large (83 parameters) (see Table 8.8) although it was already decreased from the initial model (with some indicators deleted) = 102 parameters (see Table 8.7). Because of the number of parameter estimates, the sample size of 455 cases, and the evidence of non-normality, in order to relax this situation the Bollen-Stine bootstrap method was used in this research. This is a useful technique in AMOS. This technique is a bootstrap modification of the model chi-square, used to test model fit, adjusting of distributional misspecification of the model such as adjusting for lack of multivariate normality. This powerful technique calculates an adjusted p-value (Bollen Stine p value) which is an alternative for a p-value. This technique is used for testing model fit under non-normality (Bollen & Stine 1992).

	Weights	Covariances	Variances	Means	Intercepts	Total

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	28	0	3	0	0	31
Labeled	0	0	0	0	0	0
Unlabeled	21	10	21	0	0	52
Total	49	10	24	0	0	83

Table 8.8 Parameter Summary for the Internet Acceptance Model after Deleting Some Indicators

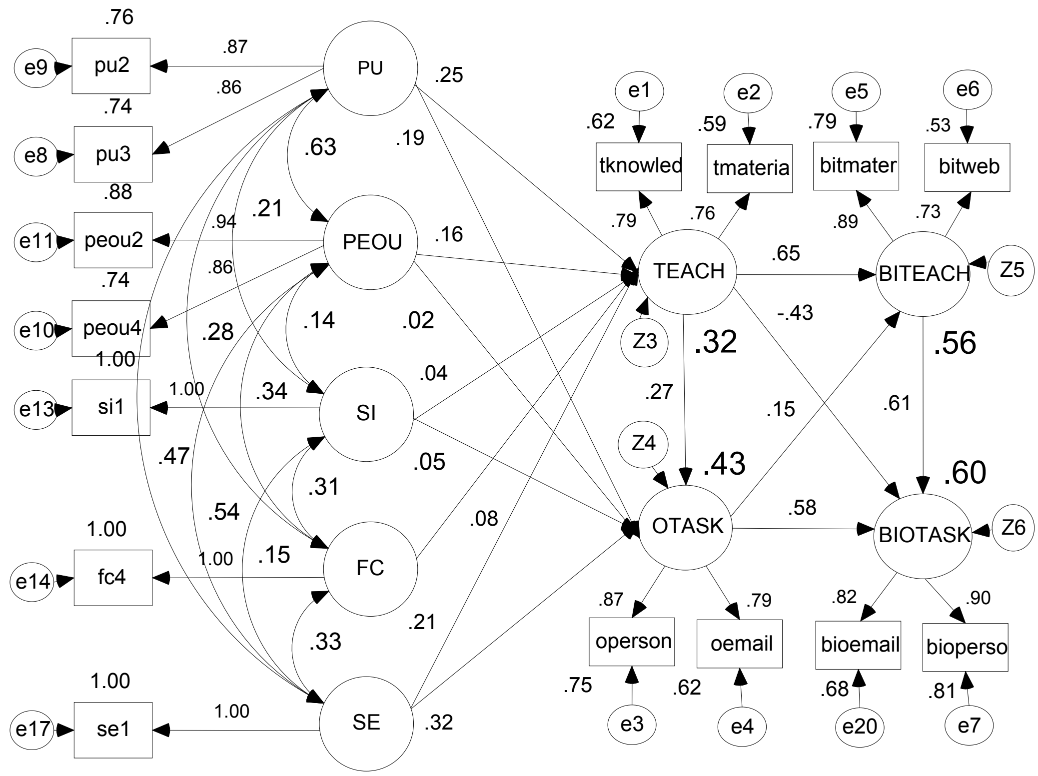


Internet Acceptance Model
Unstandardised Estimates,
Chi-square=107.013,
Degree of Freedom=68,
CMIN/DF=1.574, Probability=.002,
Bollen-Stine Probability= 0.180 ,
RMSEA=.036, TLI=.981,CFI=.988,
NFI=.967, GFI=.970, AGFI=.948,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.6 Internet Acceptance Model with Unstandardised Estimates

In step 1 of SEM analysis, the general model is tested, modified and finally generated to become the general SEM model called the "Internet Acceptance Model". This will have power to explain usage behaviour and predict academic intention to use the Internet in the future. Figure 8.6, is the Internet Acceptance Model (general path diagram) after re-specification with the unstandardised estimates for all cases (455 academics/cases). The unstandardised estimates model demonstrates regression weights, covariances and variances.



Internet Acceptance Model
Standardised Estimates,
Chi-square=107.013,
Degree of Freedom=68,
CMIN/DF=1.574, Probability=.002,
Bollen-Stine Probability= 0.180 ,
RMSEA=.036, TLI=.981, CFI=.988,
NFI=.967, GFI=.970, AGFI=.948,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy **Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.**

Figure 8.7 Internet Acceptance Model with Standardised Estimates

Figure 8.7, is the Internet Acceptance Model (general path diagram) with standardised estimates for all subjects (455 cases). The standardised estimates model demonstrates standardised regression weights, correlations, and square multiple correlations. The standardized regression weights, the correlations, and SMC are independent of the units measured, and they will not be affected by the choice of identification constraints (Arbuckle 2005).

The final modified model in Figures 8.6 and 8.7, yields a χ^2 (chi-square) of 107.013, degree of freedom = 68 and p value = 0.002 (Bollen-Stine p value = 0.180 which is not significant at the level of 0.05), indicating that the model fits the data very well. However, because the chi-square statistic is very sensitive to the sample size it is more appropriate to look at other fit measures. Fortunately, other fit measures also indicate the goodness of fit of the model to the data (CMIN/DF = 1.574, RMSEA = 0.036, TLI = 0.981, CFI = 0.988, NFI = 0.967, GFI = 0.970, AGFI = 0.948) (see Table 8.6 for the reference of fit measures).

The final modified model shows all paths, but only five paths between predictors and usage behaviour are statistically significant at the 0.05 level of significance (path coefficients that are statistically significant only with p value less than 0.05)(see regression weight estimates of significant paths in Table 8.9). In addition, six paths between usage behaviour and behaviour intention are all statistically significant.

			Estimate	S.E.	C.R.	p value
TEACH	<---	PU	.344	.097	3.537	***
TEACH	<---	SI	.030	.035	0.850	.395
TEACH	<---	SE	.204	.056	3.642	***
TEACH	<---	FC	.062	.042	1.469	.142
TEACH	<---	PEOU	.190	.088	2.169	.030*
OTASK	<---	TEACH	.233	.054	4.282	***
OTASK	<---	SE	.259	.044	5.913	***
OTASK	<---	PEOU	.017	.067	0.257	.797
OTASK	<---	PU	.224	.077	2.909	.004***
OTASK	<---	SI	.027	.026	1.059	.289
BITEACH	<---	OTASK	.174	.067	2.593	.010***
BITEACH	<---	TEACH	.627	.066	9.453	***
BIOTASK	<---	BITEACH	.560	.090	6.213	***
BIOTASK	<---	TEACH	-.380	.088	-4.330	***
BIOTASK	<---	OTASK	.606	.067	9.109	***

Table 8.9 Regression Weights for the Internet Acceptance Model

*** A p value is statistically significant at the 0.01 level (two-tailed)

* A p value is statistically significant at the 0.05 level (two-tailed)

It also indicates that there are varying explanations for usage behaviour and behaviour intention. The square multiple correlations of a variable is the proportion of its variance that is accounted for by its predictors (Arbuckle 2005).

Determinants/predictors (PU, PEOU, SI, FC, and SE) account for the variance of dependent variables, with a reasonable explanation for TEACH and OTASK and a high degree of explanation for BITEACH and BIOTASK (see Table 8.10). Five determinants account for:

- 31.6% of the variance of TEACH
- 42.6% of the variance of OTASK
- 55.7% of the variance of BITEACH
- 59.8% of the variance of BIOTASK

	Estimate (SMC)
TEACH	.316
OTASK	.426
BITEACH	.557
BIOTASK	.598

Table 8.10 Squared Multiple Correlations for the Internet Acceptance Model

The standardised regression weights are used since they allow the researcher to compare directly the relative effect of each independent variable on the dependent variable (Hair, Black, Babin, Anderson & Tatham 2006).

Three research hypotheses between predictors and usage behaviour (TEACH and OTASK) are accepted $H_1$1 a-b, $H_1$2a, and $H_1$5a-b, the rest are rejected. This suggests that PU, PEOU, and SE →TEACH, and PU, SE → OTASK. It can be said that perceived usefulness, perceived ease of use, and self-efficacy significantly influenced usage behaviour in teaching. Concurrently, perceived usefulness, and self-efficacy significantly influenced usage behaviour in other tasks, the rest are not statistically significant.

The relative affect (standardised regression weights) between factors and behaviours (TEACH) shows stronger paths (with statistical significance) between PU and TEACH (0.253), SE and TEACH (0.211), and PEOU and TEACH (0.157), SE and

OTASK (0.316) and PU and OTASK (0.193), the rest are rather weaker with non-statistical significance (see Table 8.11).

			Estimate
TEACH	<---	PU	.253
TEACH	<---	SI	.042
TEACH	<---	SE	.211
TEACH	<---	FC	.076
TEACH	<---	PEOU	.157
OTASK	<---	TEACH	.274
OTASK	<---	SE	.316
OTASK	<---	PEOU	.017
OTASK	<---	PU	.193
OTASK	<---	SI	.045
BITEACH	<---	OTASK	.154
BITEACH	<---	TEACH	.654
BIOTASK	<---	BITEACH	.607
BIOTASK	<---	TEACH	-.430
BIOTASK	<---	OTASK	.582

Table 8.11 Standardized Regression Weights for the Internet Acceptance Model

This may suggest that the higher the level of perceived usefulness, self-efficacy, and perceived ease of use toward using the Internet by academics, the greater the extent of the Internet usage in teaching. Moreover, this also suggests that the higher the level of perceived usefulness and self-efficacy of the academics toward using the Internet, the greater the extent of the Internet usage in other tasks. In addition, the higher the level of Internet usage in teaching and in other tasks the greater the extent of behaviour intention to use the Internet in the future.

All hypotheses ($H_1$6-$H_1$11) between usage behaviour and behaviour intention are accepted, which suggests that usage behaviour significantly influences behaviour intention in work. There is enough evidence associated with causal relationship between usage behaviour and behaviour intention. TEACH and BITEACH (0.654), BITTEACH and BIOTASK (0.607), OTASK and BIOTASK (0.582), are positively associated at a higher level. On the contrary, TEACH and OTASK (0.274), OTASK and BITEACH (0.154) are positively associated at a lower level. These indicate that TEACH is a predictor of OTASK, and BITEACH, at the same time, OTASK is a predictor of BITEACH and BIOTASK. These may suggest that the higher the level of Internet usage, the higher the level of intention to use the Internet in the future.

Noticeably, there is one exception, TEACH and BIOTASK (-0.430) are negatively associated, indicating that TEACH is a negative predictor of BIOTASK.

There are also covariances between the factors that are positively correlated with each other (see Table 8.12). All factors are interrelated as expected with statistical significance. For example, PU is highly associated in a positive direction with SE (0.441), this may suggest the higher the self-efficacy of academics in using the Internet, the higher the perception of the usefulness of the Internet (see Table 8.12).

			Estimate	S.E.	C.R.	p value
PU	<-->	PEOU	.470	.048	9.871	***
PU	<-->	SI	.274	.067	4.098	***
PU	<-->	FC	.309	.059	5.267	***
PU	<-->	SE	.441	.053	8.262	***
PEOU	<-->	SI	.199	.071	2.790	.005
PEOU	<-->	FC	.422	.065	6.538	***
PEOU	<-->	SE	.566	.059	9.628	***
SI	<-->	FC	.657	.105	6.267	***
SI	<-->	SE	.274	.086	3.185	.001
FC	<-->	SE	.517	.077	6.682	***

Table 8.12 Covariances for the Internet Acceptance Model

In summary, it can be said that some determinants/predictors (not all) significantly explained usage behaviour, although their capabilities in explaining the variance of usage behaviour in other tasks (OTASK) are stronger than of usage behaviour in teaching (TEACH). In addition their capabilities in explaining the variance of behaviour intention (both BITEACH and BIOTASK) are stronger than of usage behaviour (TEACH and OTASK).

The most important determinants for usage behaviour (TEACH) are PU, SE and PEOU with stronger standardised regression weights being statistically significant. The important determinants for usage behaviour (OTASK) are PU and SE with stronger standardised regression weights and statistically significant.

Determinants (PU, PEOU, SI, FC, and SE) account for 31.6% of the variance of TEACH, 42.6% of the variance of OTASK (indicating a reasonable explanation for TEACH and OTASK). Moreover, these determinants (PU, PEOU, SI, FC, and SE) account for 55.7% of the variance of BITEACH, and 59.8% of the variance of BIOTASK (indicating a high degree of explanation for BITEACH and BIOTASK).

Despite the fact that the Internet Acceptance Model has already been generated, it is necessary to make further investigations to find out whether moderators including gender, age, education level, academic position, and experience, organisational cultural and other cultural aspects affect the influence of all determinants toward usage behaviour and behaviour intention.

8.8 Multiple-Group Analysis

The second step in SEM data analysis is related to multiple-group analysis. In order to find out about the impact of moderators on the influence of determinants toward usage and behaviour intention, two groups of hypotheses would be tested by using AMOS' multiple-group analysis. The objectives of comparing between or among groups are to investigate whether there are any significant differences between or among them. If these groups (such as gender) are not significantly different it may suggest that this gender moderator (two groups: male and female) does not affect the influence of predictors toward behaviour. In doing so, the first step is to find out whether these groups use the same path diagram. If so, then the next step is to test whether there are any differences among groups. Three main categories of moderators are:

- Demographic data (gender, age, education level, academic position, experience).
- Organisational culture (e-university plan, research university plan) (see details in Chapter 5).
- Cultural aspects of Thai people (level of reading and writing, Thai language) (see details in Chapter 5).

As mentioned, the null hypotheses that were tested for moderators (moderating hypotheses) are categorised into two groups: 1) testing whether the influence of five determinants toward usage behaviour are moderated by nine moderators comprising nine hypotheses ($MH_1$1a-$MH_1$9a), and 2) testing whether the influence of usage behaviour toward behaviour intention are moderated by these nine moderators comprising nine hypotheses ($MH_1$1b-$MH_1$9b) (see these hypotheses in Chapter 5).

Next are details of the second step of SEM data analysis by using multiple-group analysis in AMOS. This is hypothesis testings related to nine moderators including (1) gender, (2) age, (3) education level, (4) academic position, (5) experience, (6) E-university plan, (7) Research University plan, (8) level of reading and writing and (9) Thai language. The data analysis results and the interpretations are presented in specific topics (see the technique of interpretation of multiple-group analysis in Chapter 6).

8.8.1 Gender

The investigation of whether the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK) and the influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by gender is performed by testing two moderating hypotheses which state that:

$MH_1$1a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by gender.

$MH_1$1b: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by gender.

In other words, the direct paths between determinants and usage behaviour, and the direct paths between usage behaviour and behaviour intention differ between males (173 cases) and females (265 cases).

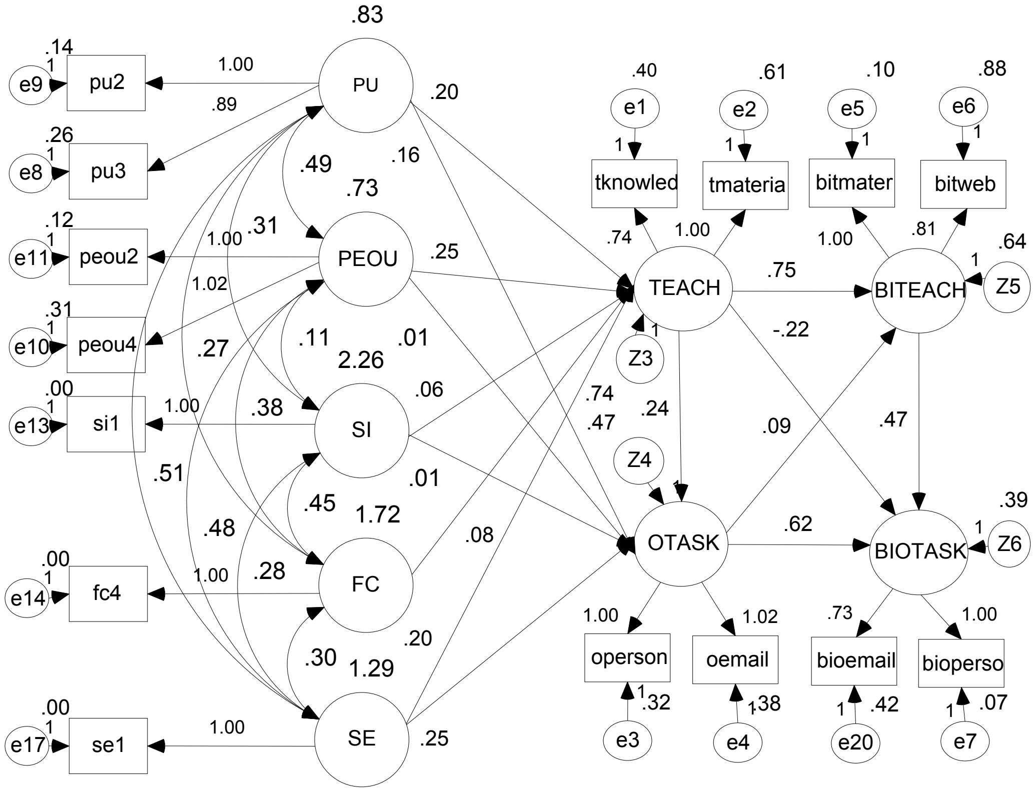
A moderating hypothesis can be tested using multiple-group analysis. In multiple-group analysis a model is estimated in two or more groups simultaneously. Three steps in multiple-group analysis are (Holmes-Smith, Cunningham & Coote 2006):

1) The first step, the parameter estimates are computed separately for both groups.

2) The second step is to estimate the paths in the model for both groups simultaneously. The resulting model is referred to as the baseline model (or the free or unconstrained model) as the estimates of the direct paths are allowed to differ across the two subgroups.

3) The third step is to constrain the parameter estimates in both groups to be equal. The resulting model is referred to as the constrained model. The parameter estimates across both groups are specified as invariant. If the chi-square difference tests reveals a significant difference across the baseline and constrained models, then it might be concluded that the moderating hypothesis is supported (accepted). Notably, this initial test provides evidence that at least one or more of the direct effects differs significantly across the two subgroups. It is further recommended that a series of models should be estimated to identify the specific paths that differ significantly across the two groups.

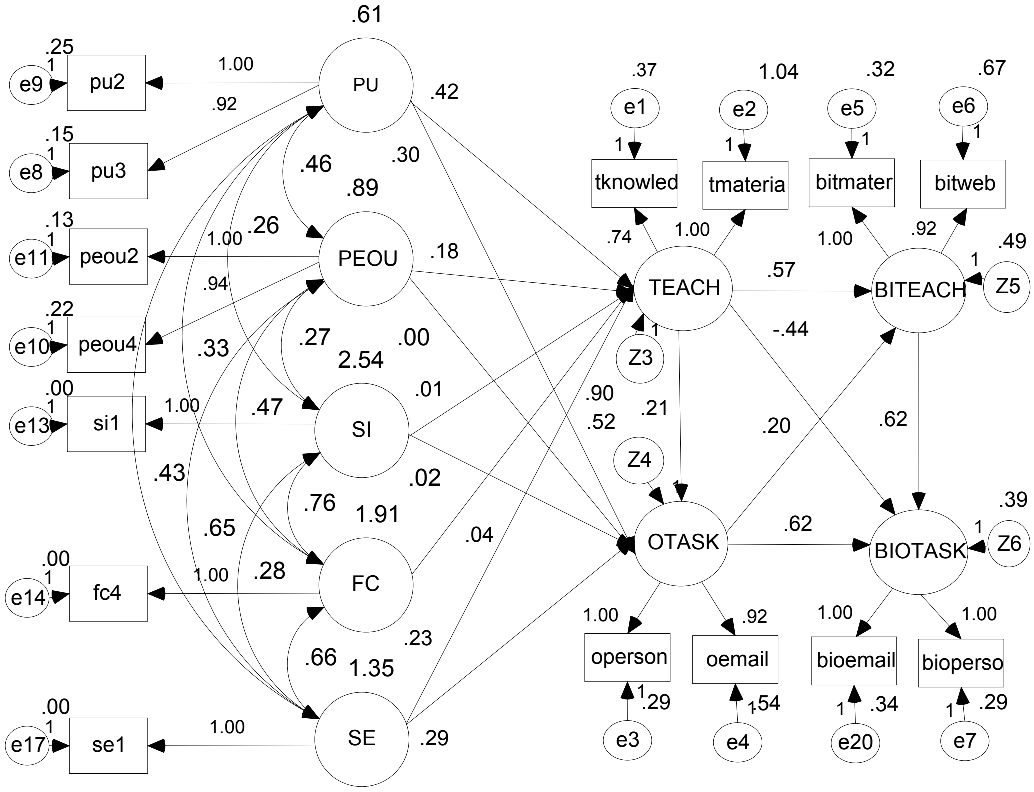
The path diagram of the baseline model (unconstrained model) for male subjects (173 subjects) with unstandardised estimates is presented in Figure 8.8, and the baseline model (unconstrained model) for female subjects (265 subjects) with unstandardised estimates is presented in Figure 8.9.



Male Subjects
Unstandardised Estimates,
Chi-square=163.356,
Degree of Freedom=136,
CMIN/DF=1.201, Probability=.055,
Bollen-Stine Probability= 0.838 ,
RMSEA=.021, TLI=.986, CFI=.991,
NFI=.951, GFI=.954, AGFI=.918,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.8 The Baseline Model (Unconstrained Model)(Multiple-Group Analysis) for Male Subjects with Unstandardised Estimates



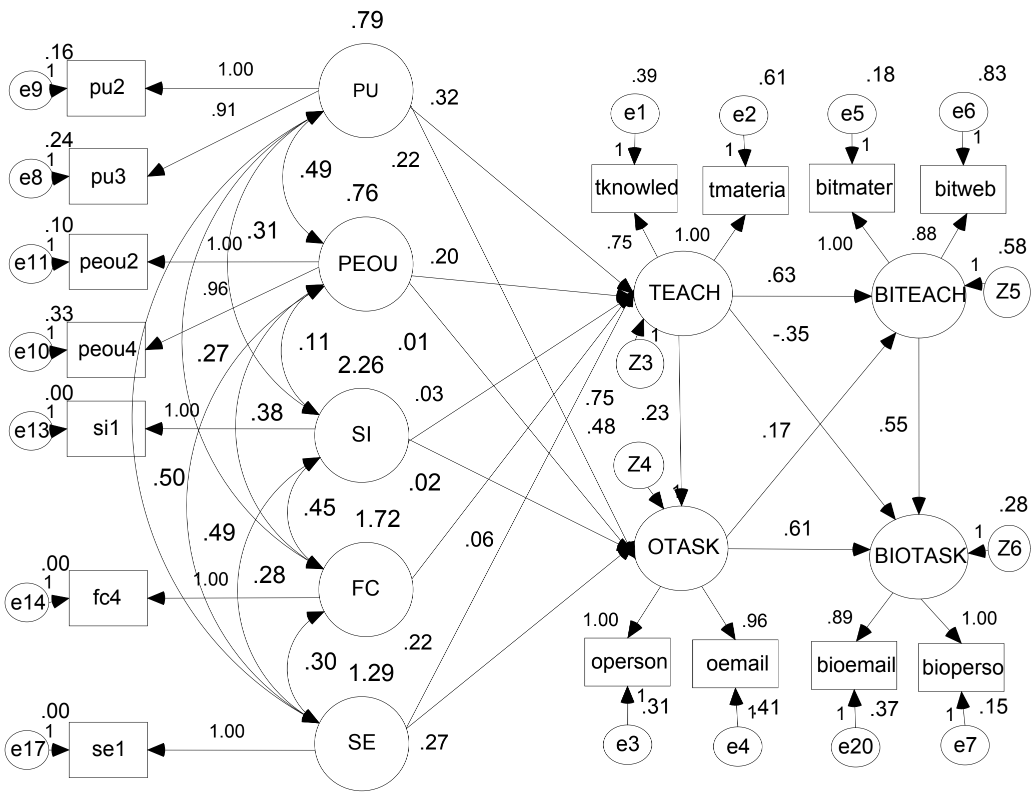
Female Subjects
Unstandardised Estimates,
Chi-square=163.356,
Degree of Freedom=136,
CMIN/DF=1.201, Probability=.055,
Bollen-Stine Probability= 0.838,
RMSEA=.021, TLI=.986, CFI=.991,
NFI=.951, GFI=.954, AGFI=.918,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy   **Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.**

Figure 8.9 The Baseline Model (Unconstrained Model) (Multiple-Group Analysis) for Female Subjects with Unstandardised Estimates

The baseline model (unconstrained model) is generated (in Figure 8.8 and Figure 8.9) and yields a χ^2 (chi-square) of 163.356, degree of freedom = 136, p value = 0.055, Bollen-Stine p value = 0.838 (both p value are not significant at the level of 0.05). It indicates that the model fits the data for both groups very well. Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.201, RMSEA = 0.021, TLI = 0.986, CFI = 0.991, NFI = 0.951, GFI = 0.954, AGFI = 0.918). It consequently indicates that males and females use the same path diagram but possibly difference parameter estimates. Despite the fact that the parameter estimates on the baseline model (unconstrained model) (Figure 8.8 and Figure 8.9) present some differences, are they really significant different? It is thus essential to further investigate whether their parameter estimates are significantly different even though they seem to be different.

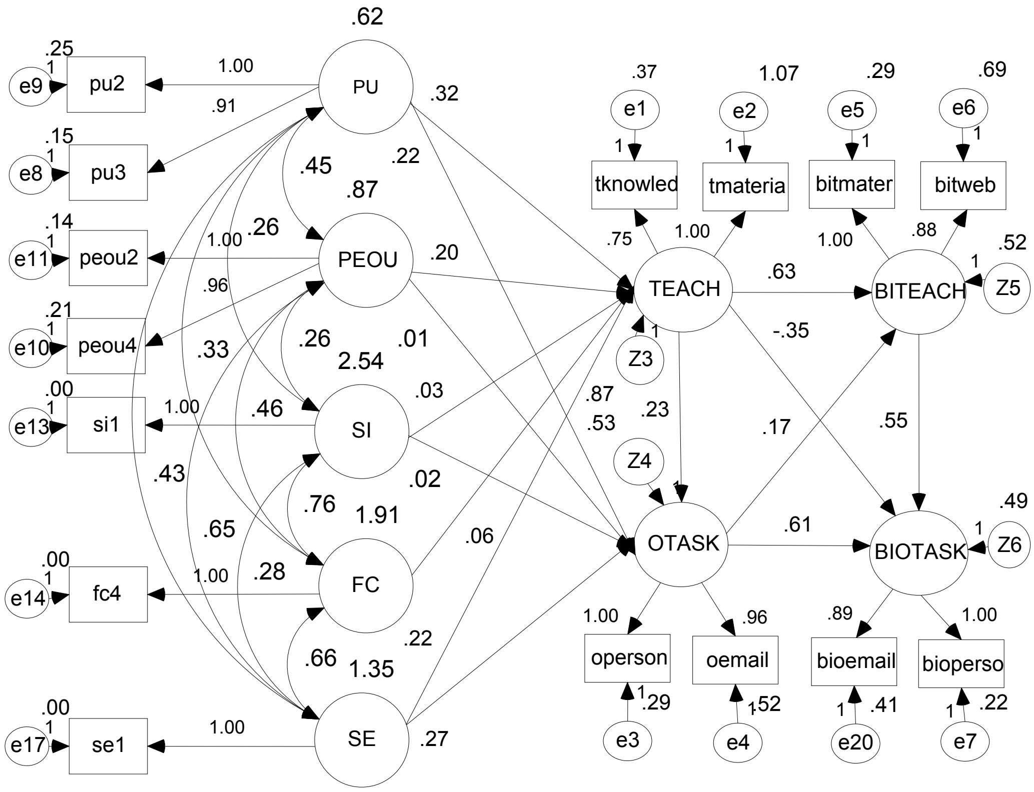
By using multiple-group analysis, the constrained model presents the parameter estimates in measurement and structural weights that were constrained to be equal in both groups. The constrained models (structural weights models) for males and females are presented in Figure 8.10 and 8.11.



Male Subjects
Unstandardised Estimates,
Chi-square=182.191,
Degree of Freedom=157,
CMIN/DF=1.160, Probability=.082,
Bollen-Stine Probability= 0.864 ,
RMSEA=.019, TLI=.989, CFI=.992,
NFI=.945, GFI=.949, AGFI=.922,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.10 The Constrained Model (Structural Weights Model)(Multiple-Group Analysis) (Unstandardised Estimates) for Male Subjects



Female Subjects
Unstandardised Estimates,
Chi-square=182.191,
Degree of Freedom=157,
CMIN/DF=1.160, Probability=.082,
Bollen-Stine Probability= 0.864 ,
RMSEA=.019, TLI=.989, CFI=.992,
NFI=.945, GFI=.949, AGFI=.922,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.11 The Constrained Model (Structural Weights Model)(Multiple-Group Analysis) with Unstandardised Estimates for Female Subjects

The structural weights estimates for males and females are found to be equal which are shown on the structural weight models (in Figure 8.10 and 8.11). The model fits the data for both groups very well, it yields a χ^2 (chi-square) of 182.191, degree of freedom = 157 and p value = 0.082, Bollen-Stine p value = 0.864 (both are not significant at the level of 0.05). Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.160, RMSEA = 0.019, TLI = 0.989, CFI = 0.949, NFI = 0.945, GFI = 0.949, AGFI = 0.922).

There is no difference across the baseline model and the measurement weights model because degree of freedom increases = 6, CMIN increases = 9.295, and p value = 0.158 (which is not significant at the level of 0.05). In addition, the chi-square difference test reveals a non-significant difference across the baseline model and the constrained model. In other words, the result shows improved fit of the constrained model over the baseline model which illustrates with these figures (degree of freedom (df) increases = 21 (157-136), CMIN increases = 18.835 (182.191 -163.356), p = 0.596)(see nested model comparisons in Appendix III – Part C). Therefore, not only both males and females have the same path diagram but they also have no significant differences in relation to structural weights estimates with goodness of fits of the model to the data for both groups. In other words, both groups have the same regression weights.

Thus it can be concluded that two moderating hypotheses are **rejected.** Consequently, the direct paths from determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK), and usage behaviour toward behaviour intention do not differ (in magnitude and /or direction) for males and females.

			Estimate	S.E.	C.R.	p value
TEACH	<---	PU	.316	.094	3.364	***
TEACH	<---	SI	.025	.035	0.727	.467
TEACH	<---	SE	.215	.057	3.795	***
TEACH	<---	FC	.058	.042	1.374	.170
TEACH	<---	PEOU	.203	.089	2.283	.022*
OTASK	<---	TEACH	.230	.055	4.150	***
OTASK	<---	SE	.268	.045	5.913	***
OTASK	<---	PEOU	.014	.069	0.210	.834
OTASK	<---	PU	.225	.075	2.980	.003***
OTASK	<---	SI	.016	.026	0.595	.552
BITEACH	<---	OTASK	.168	.068	2.464	.014*
BITEACH	<---	TEACH	.632	.067	9.401	***
BIOTASK	<---	BITEACH	.550	.082	6.715	***
BIOTASK	<---	TEACH	-.354	.083	-4.277	***
BIOTASK	<---	OTASK	.610	.066	9.279	***

Table 8.13 Regression Weights (Structural Weights Model) for Male and Female Subjects

*** A p value is statistically significant at the 0.01 level (two-tailed)

* A p value is statistically significant at the 0.05 level (two-tailed)

Because there is no difference across groups, we can look at the constrained model (structural weights model) for the significant paths of both groups (see Table 8.13). Five direct paths are statistically significant between determinants and usage behaviour (PU, SE, and PEOU→ TEACH and SE, and PU →OTASK). All six paths between usage behaviour and behaviour intention are statistically significant.

In summary, both hypotheses are rejected which suggests that the influence of determinant (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK), and the influence of usage behaviour toward behaviour intention are not moderated by gender. In other words, the direct paths between (1) determinants and usage behaviour, (2) usage behaviour and behaviour intention do not differ across males and females. Perceived usefulness (PU), perceived ease of use (PEOU), and self-efficacy (SE) play important roles in determining using the Internet in teaching in class (TEACH), and only perceived usefulness (PU) and self-efficacy (SE) significantly determined using the Internet in other tasks (OTASK).

8.8.2 Age

The sample was separated into two groups: younger and older subjects. There are 282 younger academics (ages between 20-39 years) who are developing their professional practice and may be more familiar with the technology than another group. The older group has 168 subjects (ages 40 years up) who may be at the management level and may not be familiar with the technology as the previous group because the Internet just started around 15 years ago.

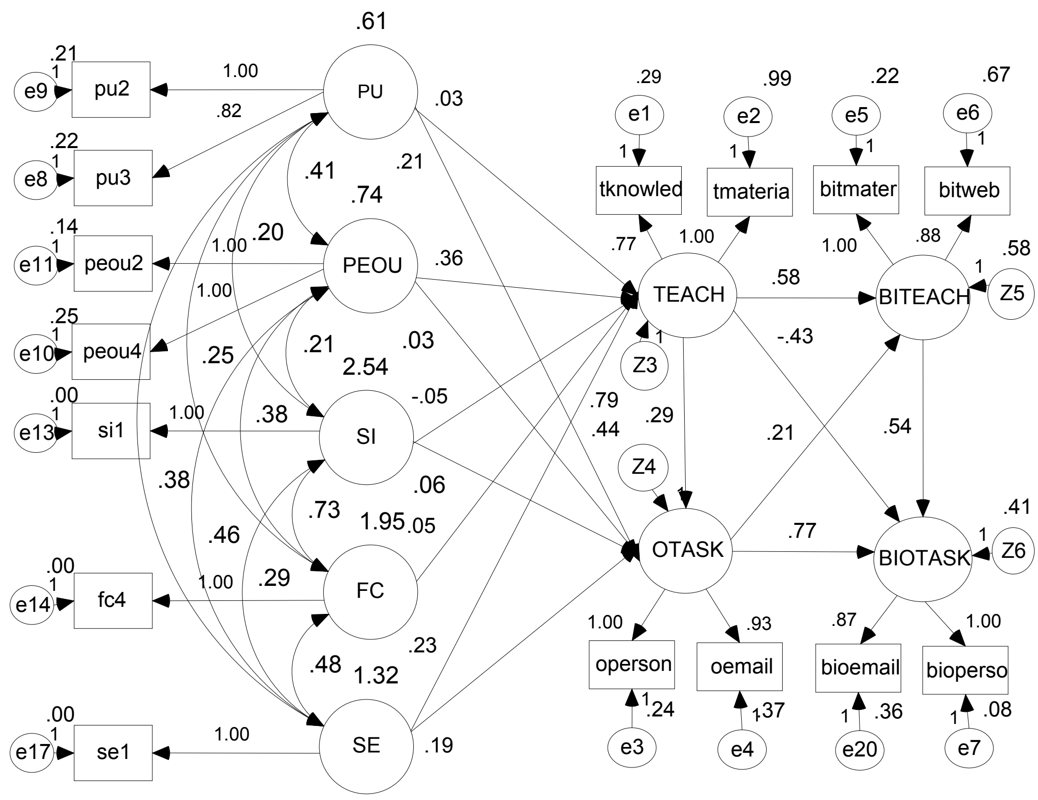
The investigation of whether the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK) and the influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by age by testing two moderating hypotheses which state that:

$MH_1$2a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by age.

$MH_1$2b: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by age.

In other words, the direct paths between determinants and usage behaviour, and the direct paths between usage behaviour and behaviour intention differ between younger and older subjects.

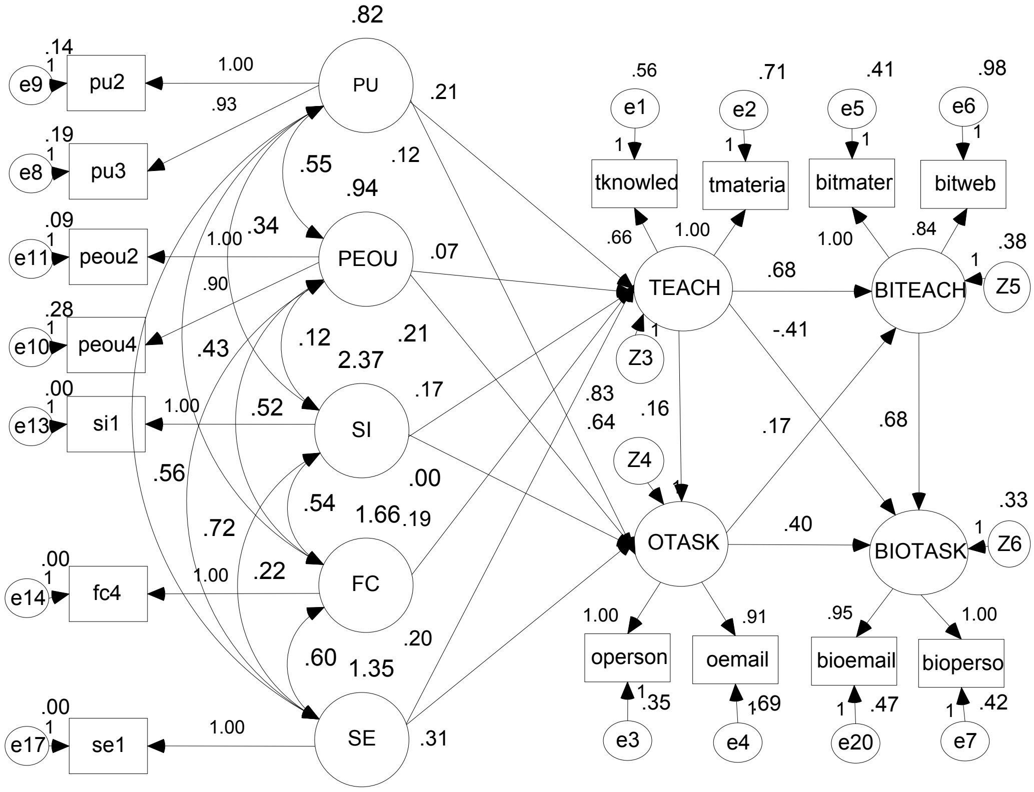
The path diagram of the baseline model (unconstrained model) for younger subjects (282 subjects) with unstandardised estimates is presented in Figure 8.12, and the baseline model (unconstrained model) for the older subjects (168 subjects) with unstandardised estimates is presented in Figure 8.13.



Younger Subjects
Unstandardised Estimates,
Chi-square=168.319,
Degree of Freedom=138,
CMIN/DF=1.220, Probability=.040,
Bollen-Stine Probability= 0.798,
RMSEA=.022, TLI=.985, CFI=.990,
NFI=.949, GFI=.953, AGFI=.918,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.12 The Baseline Model (Multiple-Group Analysis) for Younger Subjects with Unstandardised Estimates



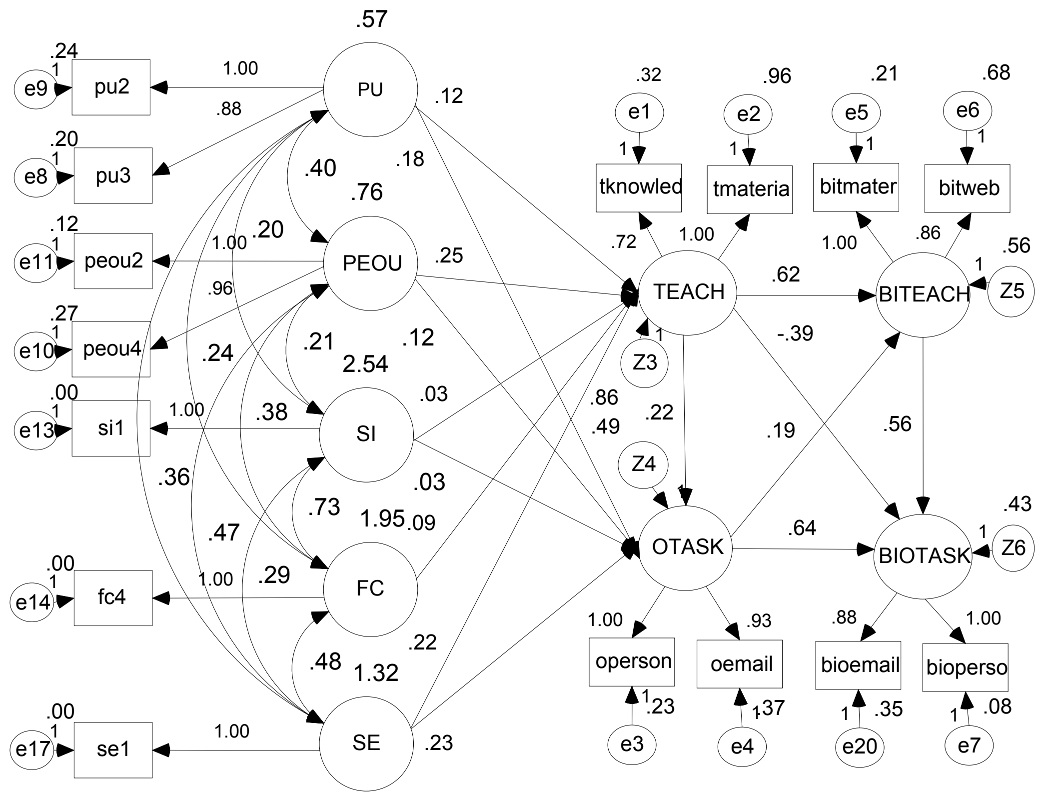
Older Subjects
Unstandardised Estimates,
Chi-square=168.319,
Degree of Freedom=138,
CMIN/DF=1.220, Probability=.040,
Bollen-Stine Probability= 0.798,
RMSEA=.022, TLI=.985, CFI=.990,
NFI=.949, GFI=.953, AGFI=.918,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.13 The Baseline Model (Multiple-Group Analysis) for Older Subjects with Unstandardised Estimates

From multiple-group analysis, the baseline model (unconstrained model) is generated (in Figure 8.12 and Figure 8.13) and yield a χ^2 (chi-square) of 168.319, degree of freedom = 138 and p value = 0.040 (which is significant at the level of 0.05), Bollen-Stine p value = 0.798 (which is not significant at the level of 0.05). This indicates that the model fits the data for both groups very well. Other evidence supports the goodness of fit of the model to the data (CMIN/DF = 1.220, RMSEA = 0.022, TLI = 0.985, CFI = 0.990, NFI =0.949, GFI = 0.953, AGFI = 0.918) (see fit measures in Table 8.6). It consequently indicates that younger and older subjects use the same path diagram but possibly difference parameter estimates. Despite the fact that the parameter estimates on the baseline model (unconstrained model) (Figure 8.12 and Figure 8.13) present some differences it is necessary to further investigate whether their parameter estimates are significantly different.

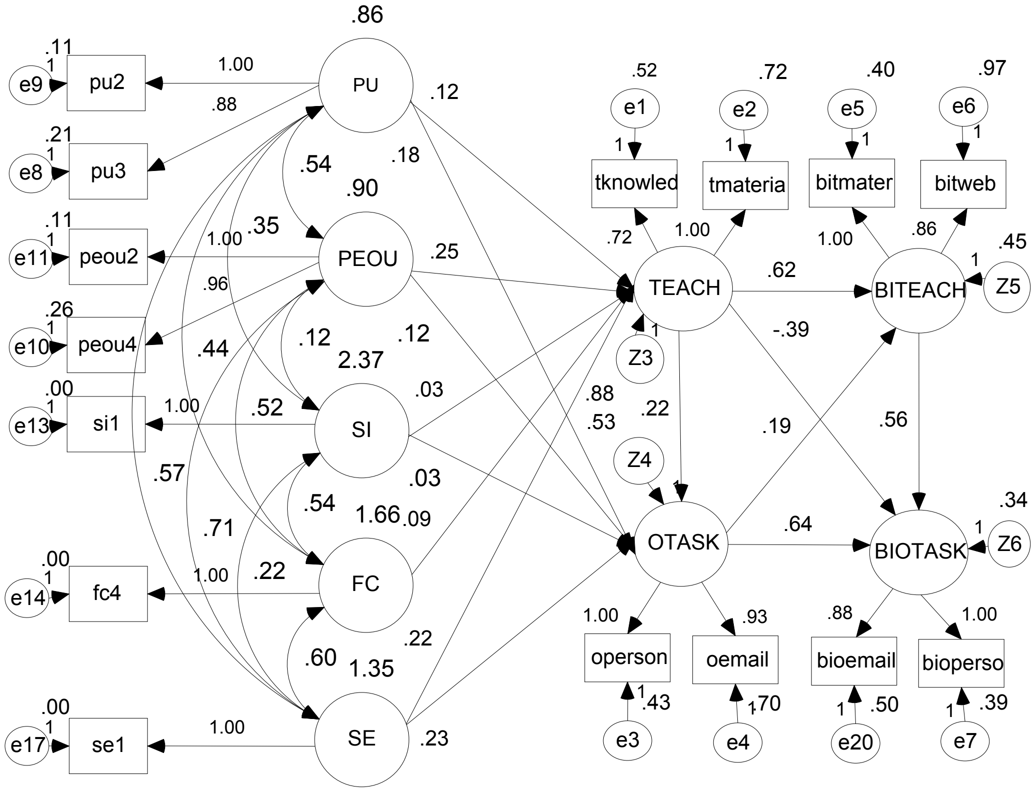
The constrained models (structural weights models) for males and females are presented in Figure 8.14 and 8.15. The constrained model constrained the parameter estimates in measurement and structural weights to be equal in both groups.



Younger Subjects
Unstandardised Estimates,
Chi-square=203.540,
Degree of Freedom=158,
CMIN/DF=1.288, Probability=.008,
Bollen-Stine Probability= 0.583,
RMSEA=.025, TLI=.981, CFI=.985,
NFI=.939, GFI=.945, AGFI=.916,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.14 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Younger Subjects



Older Subjects
Unstandardised Estimates,
Chi-square=203.540,
Degree of Freedom=158,
CMIN/DF=1.288, Probability=.008,
Bollen-Stine Probability= 0.583,
RMSEA=.025, TLI=.981, CFI=.985,
NFI=.939, GFI=.945, AGFI=.916,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.15 The Structural Weights Model (Multiple-Group Analysis (Unstandardised Estimates) for Older Subjects

The model fits the data for both groups very well, it yields a χ^2 (chi-square) of 203.540, degree of freedom = 158 and p value = 0.008 (which is significant at the level of 0.05), Bollen-stine p value = 0.583 (which is not significant at the level of 0.05). Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.288, RMSEA = 0.025, TLI = 0.981, CFI = 0.985, NFI = 0.939, GFI = 0.945, and AGFI = 0.916)(see Figure 8.14 and Figure 8.15).

There is no difference across the baseline model and the measurement weights model because degree of freedom increases = 6, CMIN increases = 3.544, and p value =

0.738 (which is not significant at the level of 0.05). On the other hand, the chi-square difference test reveals a significant difference across the baseline model and the constrained model according to these figures: the degree of freedom increases = 20 (158-138), and the CMIN increases = 35.221(203.540-168.319), and p value = 0.019 (which is significant different)(see nested model comparisons in Appendix III – Part C). This result indicates that although both groups can use the same path diagram, they have a significant difference in structural weights estimates. This initial test provides evidence that at least one or more of the direct effects differs significantly across the two subgroups. It is recommended to estimate a series of models to identify the specific paths that differ significantly across the two groups (Holmes-Smith, Cunningham & Coote 2006).

After an initial test, further investigations have been made by analysing a series of models. In this study, because there are 15 direct paths in the model, 15 rounds of investigations/analyses have been undertaken (executing the model 15 times, each time investigating the significant difference of each direct path). When finishing these analyses, paths that are significant different across the baseline model and structural weights model are identified.

It was found that only four direct paths differ significantly across two groups (see Table 8.14). These direct paths are three direct paths between determinants and usage behaviour (SI, FC → TEACH and SE →OTASK) and one direct path between usage behaviour and behaviour intention (OTASK → BIOTASK).

Thus it can be concluded that both moderating hypotheses ($MH_1$2a, b) are **accepted**. The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK), and the influence of usage behaviour toward behaviour intention were moderated by age. In other words, the direct paths between determinants (PU, PEOU, SI, FC and SE) and usage behaviour (TEACH and OTASK), and the direct paths between usage behaviour and behaviour intention differ across groups (younger and older subjects).

In summary, both hypotheses are accepted which suggests that the influence of (1) determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK), and (2) usage behaviour toward behaviour intention are moderated by age.

In other words, the direct paths between determinants and usage behaviour, and usage behaviour and behaviour intention differ significantly across groups.

It is evident that not only social influence (SI) and facilitating conditions (FC) play important roles in influencing usage behaviour in teaching, but self-efficacy (SE) also plays important role in influencing usage behaviour in other tasks for older subjects than younger subjects. In addition, using the Internet in other tasks (OTASK) influences behaviour intention in other tasks (BIOTASK) more for younger subjects than older subjects.

			Younger Estimate	Older Estimate	Younger p value	Older p value	Path	Sig. Dif
TEACH	<---	PU	.028	.213	.693	.020	a	no
TEACH	**<---**	**SI**	**-.052**	**.173**	**.208**	**.003**	**e**	**yes**
TEACH	<---	SE	.231	.204	***	.038	h	no
TEACH	**<---**	**FC**	**.055**	**.189**	**.269**	**.013**	**g**	**yes**
TEACH	<---	PEOU	.364	.070	***	.595	c	no
OTASK	<---	TEACH	.290	.157	***	.103	j	no
OTASK	**<---**	**SE**	**.192**	**.312**	***	***	**i**	**yes**
OTASK	<---	PU	.208	.124	.017	.287	d	no
OTASK	<---	SI	.058	-.005	.050	.924	b	no
OTASK	<---	PEOU	.028	.213	.693	.020	f	no
BITEACH	<---	OTASK	.213	.165	.019	.073	m	no
BITEACH	<---	TEACH	.584	.682	***	***	k	no
BIOTASK	<---	BITEACH	.539	.676	***	.003	o	no
BIOTASK	<---	TEACH	-.427	-.413	***	.034	l	no
BIOTASK	**<---**	**OTASK**	**.771**	**.404**	***	***	**n**	**yes**

Table 8.14 The Regression Weights for the Baseline Model (Unconstrained Model), Younger Subjects Compared with Older Subjects and the Significant Different between Paths

*** A p value is statistically significant at the 0.01 level (two-tailed)

* A p value is statistically significant at the 0.05 level (two-tailed)

Sig. dif: yes = This path differs significantly across groups.

Sig. dif: no = This path does not differ significantly across groups.

8.8.3 Education Level

The three educational levels of academics are bachelor degree (17 subjects), master degree (369 subjects), and doctoral degree (59 subjects). In multiple-groups analysis, only master degree subjects and doctoral degree subjects are compared simultaneously. The bachelor degree group is not integrated into the analysis because the sample size is too small (17 subjects).

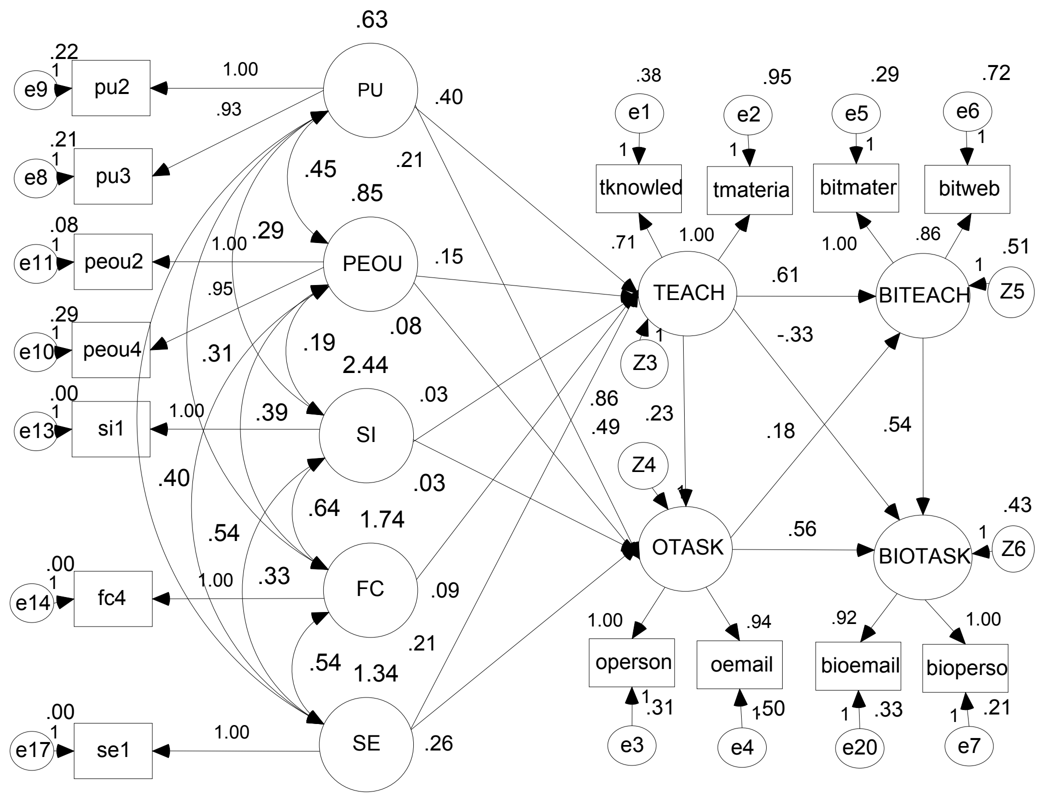
The investigation of whether the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK), and the influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by gender is undertaken by testing two moderating hypotheses which state that:

$MH_1$3a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by education level.

$MH_1$3b: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by education level.

In other words, the direct paths between determinants and usage behaviour, and the direct paths between usage behaviour and behaviour intention differ across master and doctoral degree subjects.

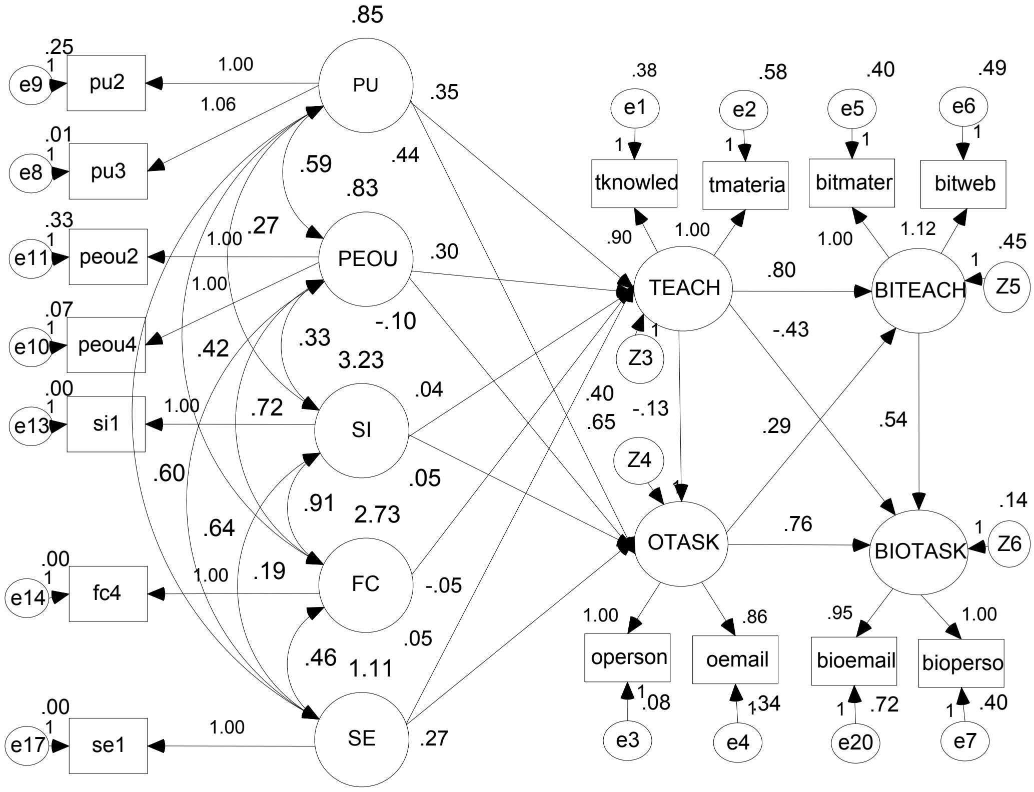
The path diagram of the baseline model (unconstrained model) for master degree subjects (369 subjects) with unstandardised estimates is presented in Figure 8.16, and the baseline model (unconstrained model) for doctoral degree subjects (59 subjects) with unstandardised estimates is presented in Figure 8.17.



Master Degree Subjects
Unstandardised Estimates,
Chi-square=202.285,
Degree of Freedom=136,
CMIN/DF=1.487, Probability=.000,
Bollen-Stine Probability= 0.578,
RMSEA=.034, TLI=.967, CFI=.979,
NFI=.939, GFI=.945, AGFI=.902,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.16 The Baseline Model (Multiple-Group Analysis) for Master Degree Subjects with Unstandardised Estimates

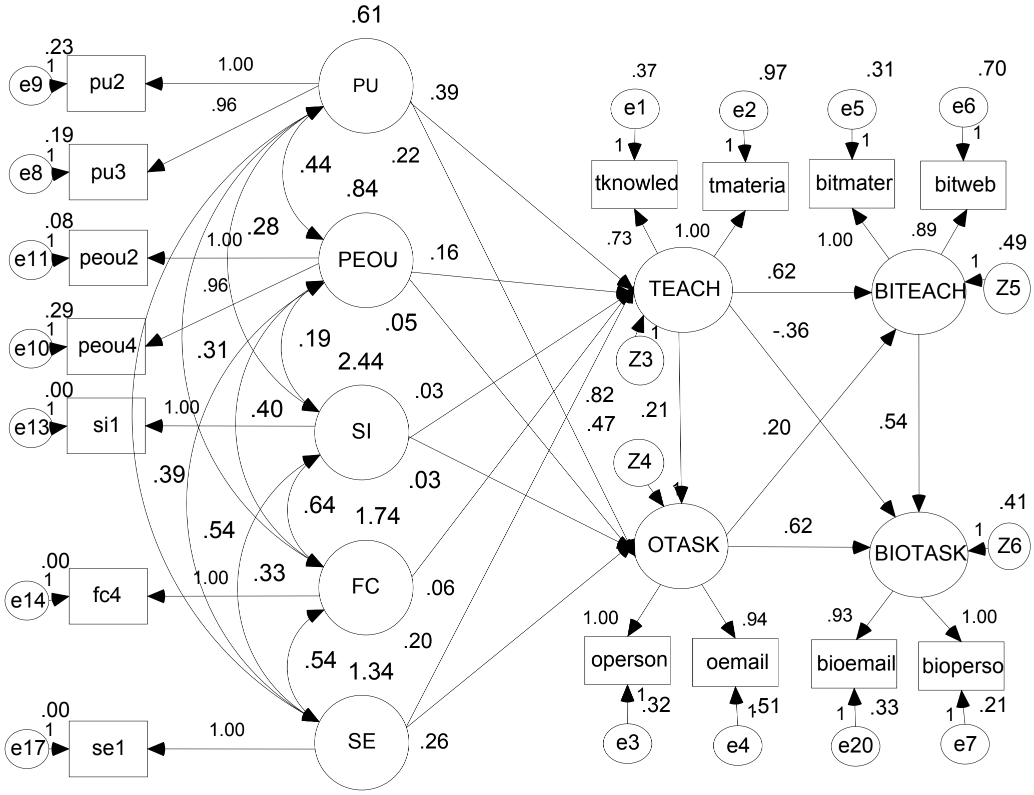


Doctoral Degree Subjects
Unstandardised Estimates,
Chi-square=202.285,
Degree of Freedom=136,
CMIN/DF=1.487, Probability=.000,
Bollen-Stine Probability= 0.578,
RMSEA=.034, TLI=.967, CFI=.979,
NFI=.939, GFI=.945, AGFI=.902,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.17 The Baseline Model (Multiple-Group Analysis) for Doctoral Degree Subjects with Unstandardised Estimates

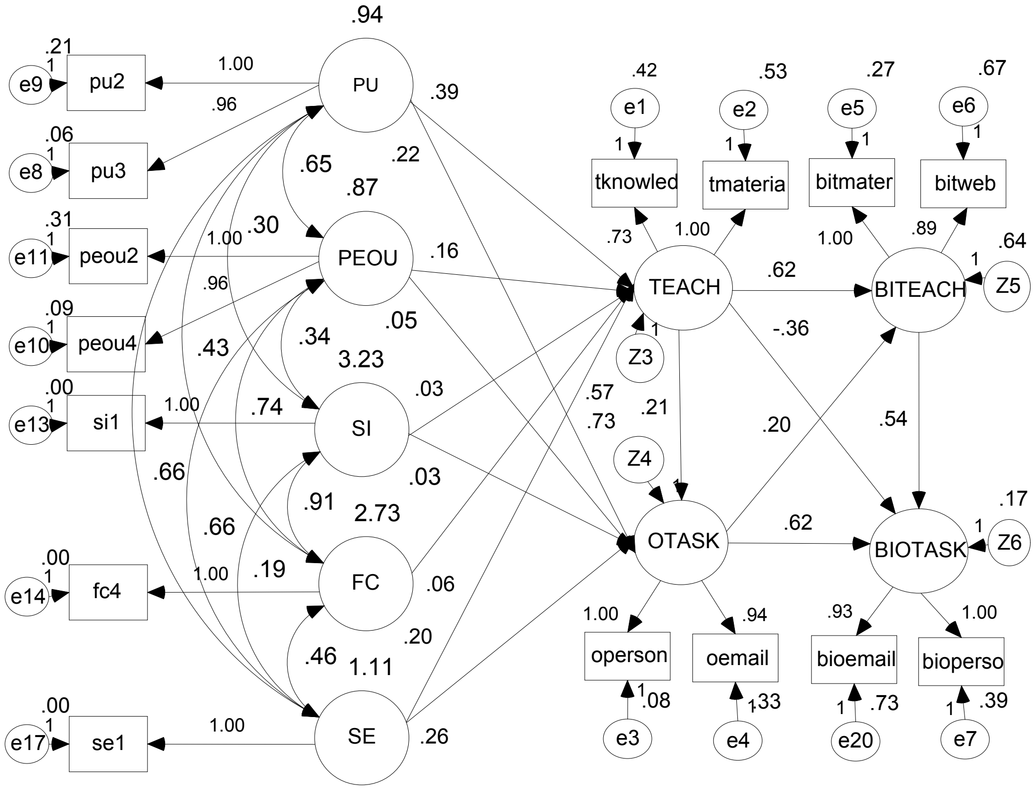
From multiple-group analysis, the baseline model (unconstrained model) is generated (see Figure 8.16 and Figure 8.17) and yields a χ^2 (chi-square) of 202.285, degree of freedom = 136 and p values = 0.000 (which is significant at the level of 0.05), Bollen-Stine p value = 0.578 (which is not significant at the level of 0.05). It indicates that the model fits the data for both groups very well. Other evidence supports the goodness of fit of the model to the data (CMIN/DF = 1.487, RMSEA = 0.034, TLI = 0.967, CFI = 0.979, NFI =0.939, GFI = 0.945, AGFI = 0.902). It consequently indicates that both groups use the same path diagram but possibly different parameter estimates. Further investigation will be made in order to find out whether their parameter estimates differ across groups. The constrained models (structural weights models) for both groups are presented in Figure 8.18 and Figure 8.19).



Master Degree Subjects
Unstandardised Estimates,
Chi-square=223.396,
Degree of Freedom=157,
CMIN/DF=1.423, Probability=.000,
Bollen-Stine Probability= 0.623,
RMSEA=.032, TLI=.971, CFI=.979,
NFI=.932, GFI=.941, AGFI=.909,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.18 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Master Degree Subjects



Doctoral Degree Subjects
Unstandardised Estimates,
Chi-square=223.396,
Degree of Freedom=157,
CMIN/DF=1.423, Probability=.000,
Bollen-Stine Probability= 0.623,
RMSEA=.032, TLI=.971, CFI=.979,
NFI=.932, GFI=.941, AGFI=.909,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.19 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Doctoral Degree Subjects

The model fits the data for both groups very well, it yields a χ^2 (chi-square) of 223.396, degree of freedom = 157, p value = 0.000 (which is significant at the level of 0.05), and Bollen-Stine p value = 0.623 (which is not significant at the level of 0.05). Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.423, RMSEA = 0.032, TLI = 0.971, CFI = 0.979, NFI = 0.932, GFI = 0.941, AGFI = 0.909) (see Figure 8.18 and Figure 8.19).

There is no significant difference across the baseline model and the measurement weights model because degree of freedom increase = 6, CMIN increases = 5.079, and

p value = 0.534 (which is not significant at the level of 0.05). Furthermore, the chi-square difference test reveals a non-significant difference across the baseline model and constrained model because the degree of freedom increases = 21 (157-136), and CMIN increases = 21.111(223.396 - 202.285) and p = 0.452 (which is non-significant)(see nested model comparisons in Appendix III – Part C). Thus it can be concluded that the two moderating hypotheses are **rejected.** The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviours (TEACH and OTASK), and the influence of usage behaviour toward behaviour intention are not moderated by education level. Consequently, the direct paths from determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK and between usage behaviour and behaviour intention do not differ for both groups (see Table 8.15).

			Estimate	**S.E.**	**C.R.**	**p value**
TEACH	<---	PU	.391	.097	4.039	***
TEACH	<---	SI	.028	.034	0.833	.405
TEACH	<---	SE	.196	.056	3.485	***
TEACH	<---	FC	.058	.042	1.396	.163
TEACH	<---	PEOU	.160	.086	1.853	.064
OTASK	<---	TEACH	.214	.057	3.728	***
OTASK	<---	SE	.260	.045	5.835	***
OTASK	<---	PEOU	.051	.067	0.770	.441
OTASK	<---	PU	.222	.080	2.768	.006***
OTASK	<---	SI	.035	.026	1.327	.185
BITEACH	<---	OTASK	.198	.068	2.903	.004***
BITEACH	<---	TEACH	.623	.069	8.980	***
BIOTASK	<---	BITEACH	.537	.086	6.219	***
BIOTASK	<---	TEACH	-.364	.086	-4.217	***
BIOTASK	<---	OTASK	.624	.066	9.415	***

Table 8.15 Regression Weights (Structural Weights Model) for Master Degree and Doctoral Degree Subjects

*** A p value is statistically significant at the 0.01 level (two-tailed)

* A p value is statistically significant at the 0.05 level (two-tailed)

Because there is no difference across groups, we can look at the constrained model (structural weights model) for the significant paths of both groups (see Table 8.15). Four direct paths are statistically significant between determinants and usage behaviour (PU, SE → TEACH and SE, and PU →OTASK). All six paths between usage behaviour and behaviour intention are statistically significant. In other words, perceived usefulness (PU), and self-efficacy (SE) play important roles in determining using the Internet in teaching (TEACH) and in other tasks (OTASK).

It can be noticed that one group has a small sample size: Doctoral degree subjects (59 subjects). It thus requires caution to generalise this finding to the population. While sample size as small as 50 is found to provide valid results, it is recommended that minimum sample size be 100-150 to ensure stable Maximum likelihood estimation (MLE) solution (Hair et al. 2006)(see Chapter 6).

In summary, the two hypotheses are rejected which suggests that the influence of determinants toward usage behaviours and the influence of usage behaviour toward behaviour intention are not moderated by education level. In other words, the direct paths between (1) determinants and usage behaviour and (2) usage behaviour and behaviour intention do not differ across master and doctoral degree subjects. It was found that perceived usefulness (PU) and self-efficacy (SE) play important roles in determining using the Internet in teaching (TEACH) and in other tasks (OTASK).

8.8.4 Academic Position

Usually the positions held by academics are lecturer, assistant professor, associate professor, and professor. For this research, however only two groups are used: lecturer (332 subjects) and higher positions (assistant professor, associate professor, and professor)(114 subjects) because (1) there were a total of only 114 subjects (64 assistant professors, 48 associate professors and 2 professors) that could be grouped together and (2) it is more suitable to compare those with academic positions with those who still do not have any academic positions (lecturer) in order to understand whether their thoughts about using the Internet in their work were different.

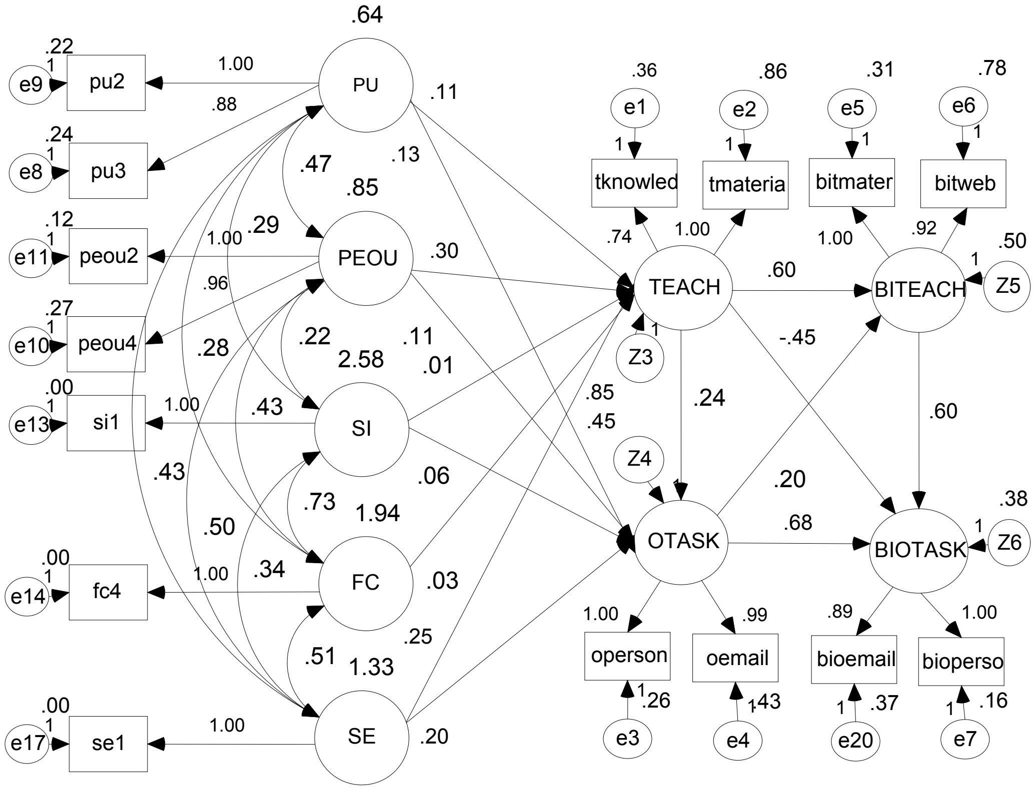
This investigation will help to clarify whether academic position (lecturer and higher positions) will moderate the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK) and usage behaviour (TEACH and OTASK) toward behaviour intention (BITEACH and BIOTASK). The moderating hypotheses are:

$MH_1 4a$: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by academic position.

$MH_1 4b$: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by academic position.

In other words, the direct paths between determinants and usage behaviour, and the direct paths between usage behaviour and behaviour intention differ between lecturer and higher position subjects.

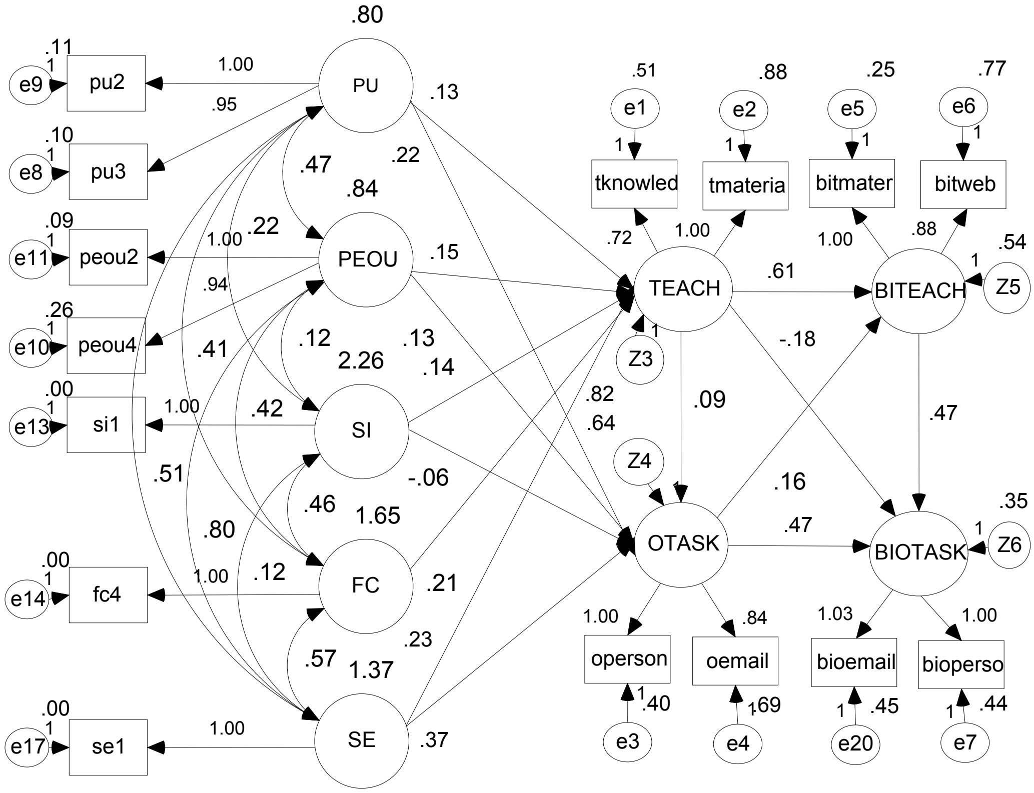
The path diagram of the baseline model (unconstrained model) for lecturer subjects (332 subjects) with unstandardised estimates is presented in Figure 8.20, and the baseline model (unconstrained model) for higher position subjects (114 subjects) with unstandardised estimates is presented in Figure 8.21



Lecturer Subjects
Unstandardised Estimates,
Chi-square=184.881,
Degree of Freedom=138,
CMIN/DF=1.340, Probability=.005,
Bollen-Stine Probability= 0.545 ,
RMSEA=.028, TLI=.977, CFI=.985,
NFI=.945, GFI=.948, AGFI=.909,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.20 The Baseline Model (Multiple-Group Analysis) for Lecturer Subjects with Unstandardised Estimates

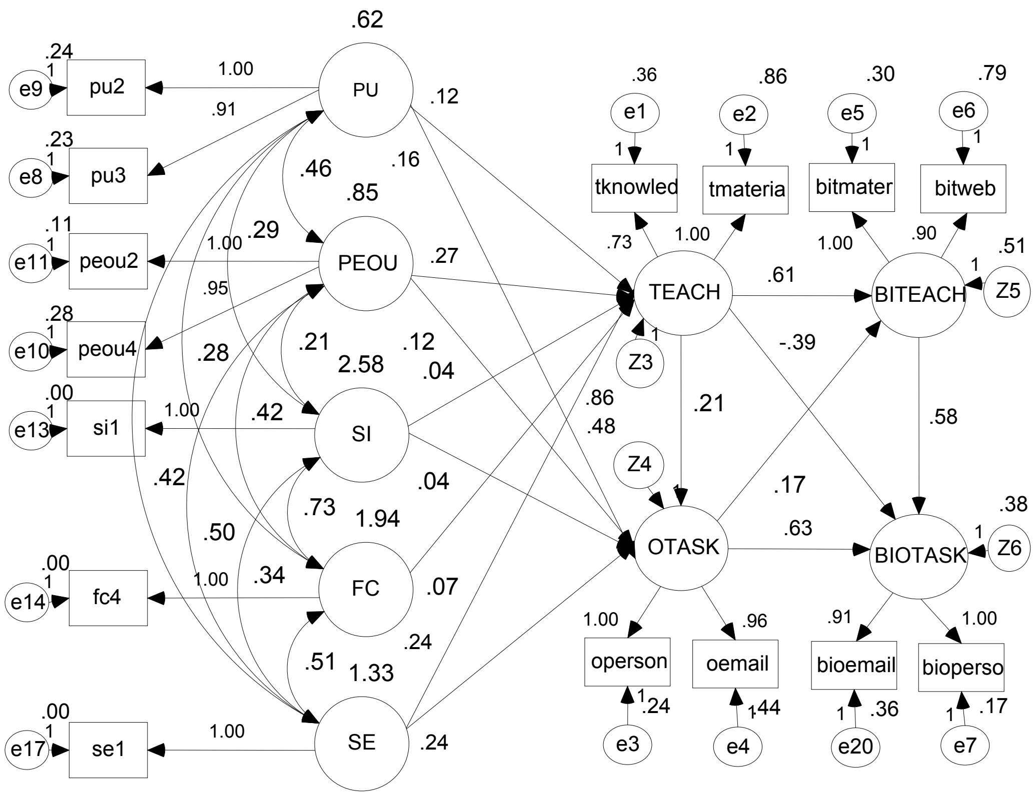


Higher Position Subjects
Unstandardised Estimates,
Chi-square=184.881,
Degree of Freedom=138,
CMIN/DF=1.340, Probability=.005,
Bollen-Stine Probability= 0.545,
RMSEA=.028, TLI=.977, CFI=.985,
NFI=.945, GFI=.948, AGFI=.909,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.21 The Baseline Model (Multiple-Group Analysis) for Higher Position Subjects with Unstandardised Estimates

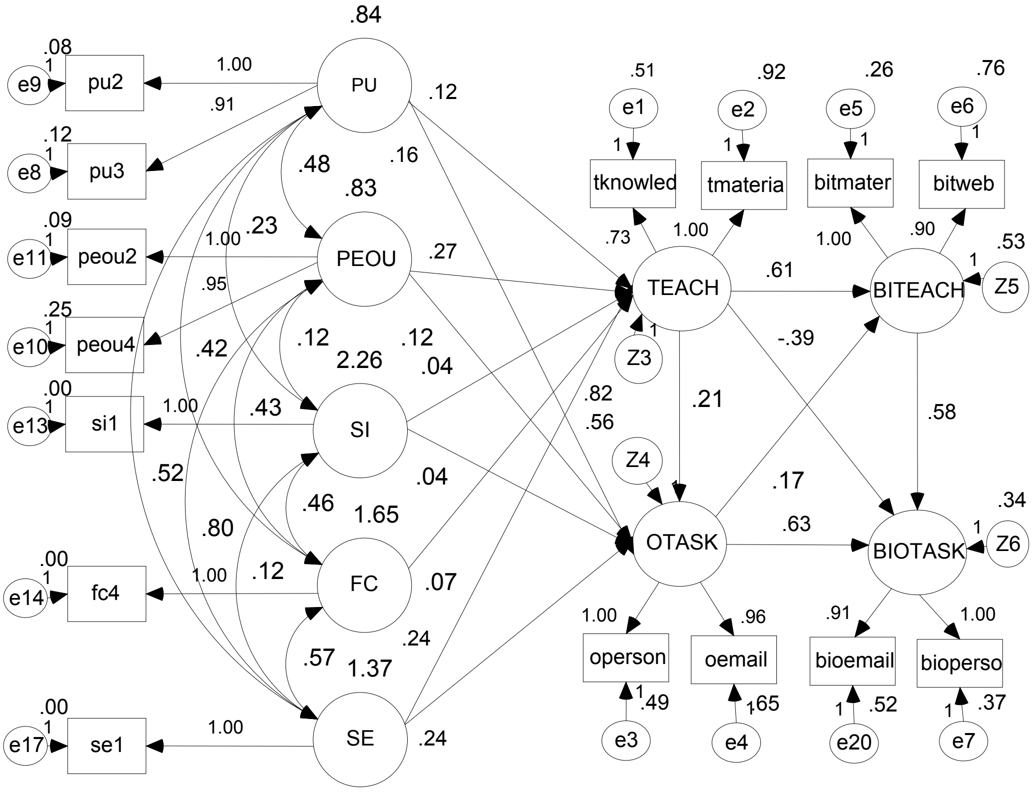
In multiple-group analysis, the baseline model (unconstrained model) is generated (in Figure 8.20 and Figure 8.21) and yields a χ^2 (chi-square) of 184.881, degree of freedom = 138 and p value = 0.005 (which is significant at the level of 0.05), Bollen-Stine p value = 0.545 (which is not significant at the level of 0.05). It indicates that the model fits the data for both groups very well. Other evidence supports the goodness of fit of the model to the data (CMIN/DF = 1.340, RMSEA = 0.028, TLI = 0.977, CFI = 0.985, NFI = 0.945, GFI = 0.948, AGFI = 0.909). It consequently indicates that both groups use the same path diagram but may have difference parameter estimates. Thus, the next investigation is to find out whether their parameter estimates are significantly different. The structural weights models (constrained models) for both groups are presented in Figure 8.22 and Figure 8.23.



Lecturer Subjects
Unstandardised Estimates,
Chi-square=202.275,
Degree of Freedom=158,
CMIN/DF=1.280, Probability=.010,
Bollen-Stine Probability= 0.618 ,
RMSEA=.025, TLI=.981, CFI=.986,
NFI=.940, GFI=.943, AGFI=.914,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.22 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Lecturer Subjects



Higher Position Subjects
Unstandardised Estimates,
Chi-square=202.275,
Degree of Freedom=158,
CMIN/DF=1.280, Probability=.010,
Bollen-Stine Probability= 0.618 ,
RMSEA=.025, TLI=.981, CFI=.986,
NFI=.940, GFI=.943, AGFI=.914,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.23 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Higher Position Subjects

The model fits the data for both groups very well (see Figure 8.22 and Figure 8.23), it yields a χ^2 (chi-square) of 202.275, degree of freedom = 158 and p value = 0.010 (which is significant at the level of 0.05), Bollen-Stine p value = 0.618 (which is not significant at the level of 0.05). Other evidence supports the goodness of fit of the model to the data (CMIN/DF = 1.280, RMSEA = 0.025, TLI = 0.981, CFI = 0.986, NFI = 0.940, GFI = 0.943, AGFI = 0.914).

There is no significant difference across the baseline model and the measurement weights model because degree of freedom increase = 6, CMIN increases = 2.890, and

p value = 0.823 (which is not significant at the level of 0.05). The chi-square difference test reveals a non-significant difference across the baseline model and constrained model (structural weights model) because the degree of freedom increases = 20 (158-138), and CMIN increases = 17.395 (202.275 -184.881), p = 0.627(see nested model comparisons in Appendix III – Part C). Thus it can be concluded that two moderating hypotheses are **rejected.** As a result, the direct paths from (1) determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK), and (2) usage behaviour (TEACH and OTASK) and behaviour intention (BITEACH and BIOTASK) do not differ for both groups. In other words, the influence of determinants toward usage behaviour and the influence of usage behaviour toward behaviour intention are not moderated by academic position.

			Estimate	**S.E.**	**C.R.**	**p value**
TEACH	<---	PU	.123	.055	2.243	.025*
TEACH	<---	SE	.239	.056	4.271	***
TEACH	<---	PEOU	.265	.080	3.335	***
TEACH	<---	SI	.040	.034	1.157	.247
TEACH	<---	FC	.068	.042	1.604	.109
OTASK	<---	SE	.236	.043	5.491	***
OTASK	<---	PU	.160	.071	2.267	.023*
OTASK	<---	TEACH	.208	.053	3.946	***
OTASK	<---	SI	.035	.025	1.391	.164
OTASK	<---	PEOU	.123	.055	2.243	.025*
BITEACH	<---	TEACH	.614	.067	9.216	***
BITEACH	<---	OTASK	.174	.067	2.587	.010*
BIOTASK	<---	BITEACH	.576	.090	6.430	***
BIOTASK	<---	TEACH	-.391	.087	-4.509	***
BIOTASK	<---	OTASK	.635	.067	9.462	***

Table 8.16 Regression Weights (Structural Weights Model) for Lecturer and Higher Position Subjects

*** A p value is statistically significant at the 0.01 level (two-tailed)

* A p value is statistically significant at the 0.05 level (two-tailed)

Since there is no difference across groups, the constrained model (structural weights model) can be investigated for the significant paths for both groups (see Table 8.16). Six direct paths are statistically significant between determinants and usage behaviour (PU, PEOU, SE → TEACH and OTASK). All six paths between usage behaviour and behaviour intention are statistically significant.

In summary, the hypotheses are **rejected** which suggests the influence of determinants toward usage behaviour, and the influence of usage behaviour toward behaviour intention are not moderated by academic position. In other words, the direct paths between (1) determinants and usage behaviour, (2) usage behaviour and behaviour intention do not differ across lecturer and higher position subjects. Perceived usefulness (PU), perceived ease of use (PEOU) and self-efficacy (SE) play important roles in influencing academics for both lecturer and higher position subjects to use the Internet in teaching (TEACH) and in other tasks (OTASK).

8.8.5 Experience

The subjects of this research are academics who have already had Internet experience. The sample was separated into three groups in accordance with academics' self-assessment of experience in using the Internet. The first group is a group of academics who assessed themselves as having "low experience" (50 cases). The second group is a group of academics who assessed themselves as having "moderate experience" (314 cases). The third group is a group of academics who assessed themselves as having "high experience" (89 cases).

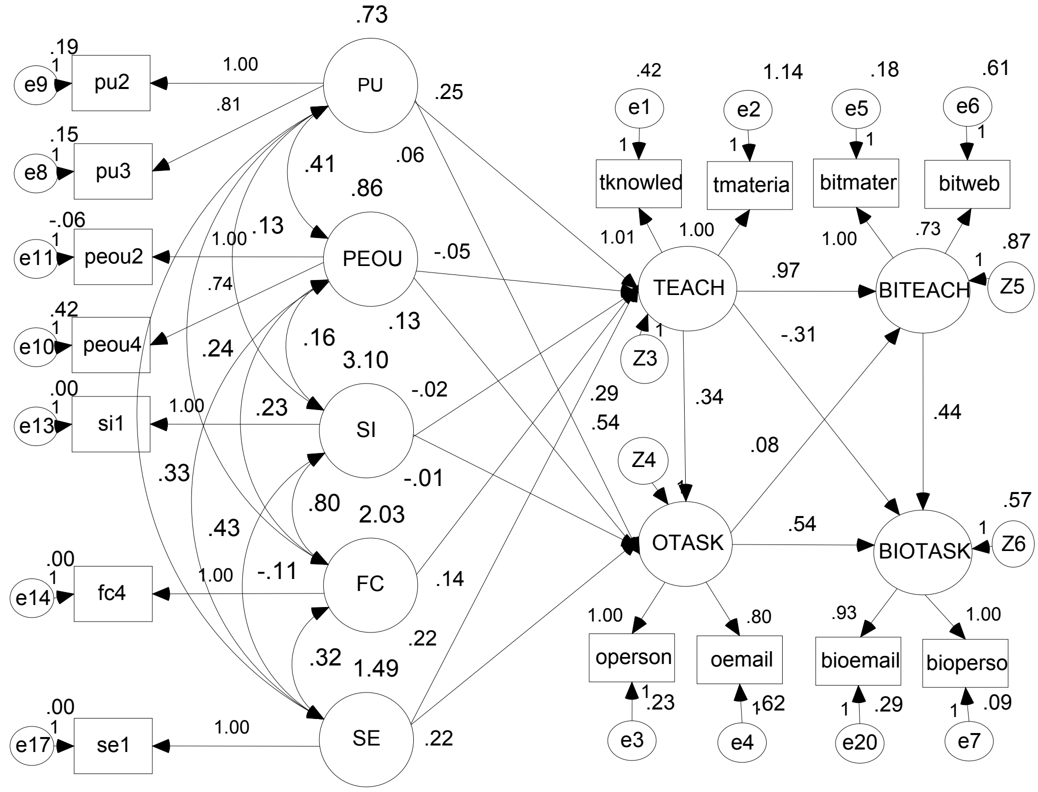
In order to investigate whether differences in experience in using the Internet will moderate the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK), and moderate the influence of usage behaviour (TEACH and OTASK) toward behaviour intention (BITEACH and BIOTASK), the following hypotheses are tested:

$MH_1$5a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by experience.

$MH_1$5b: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by experience.

In other words, the direct paths between determinants and usage behaviour, and the direct paths between usage behaviour and behaviour intention differ across groups (low, moderate and high experience subjects).

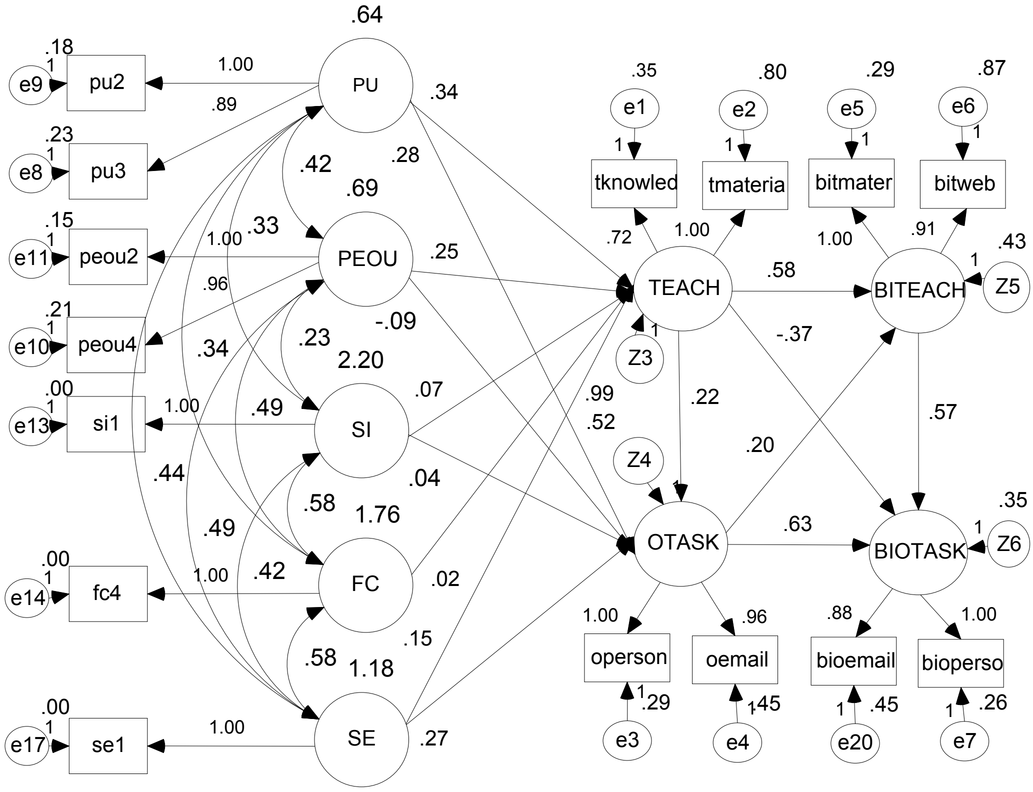
The path diagram of the baseline model (unconstrained model) for low experience subjects (50 cases), moderate experience subjects (314 subjects), and high experience subjects (89 cases) with unstandardised estimates are presented in Figure 8.24, Figure 8.25, and Figure 8.26.



Low Experience Subjects
Unstandardised Estimates,
Chi-square=411.571,
Degree of Freedom=256,
CMIN/DF=1.608, Probability=.000,
Bollen-Stine Probability= 0.187,
RMSEA=.037, TLI=.937, CFI=.949,
NFI=.878, GFI=.889, AGFI=.844,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

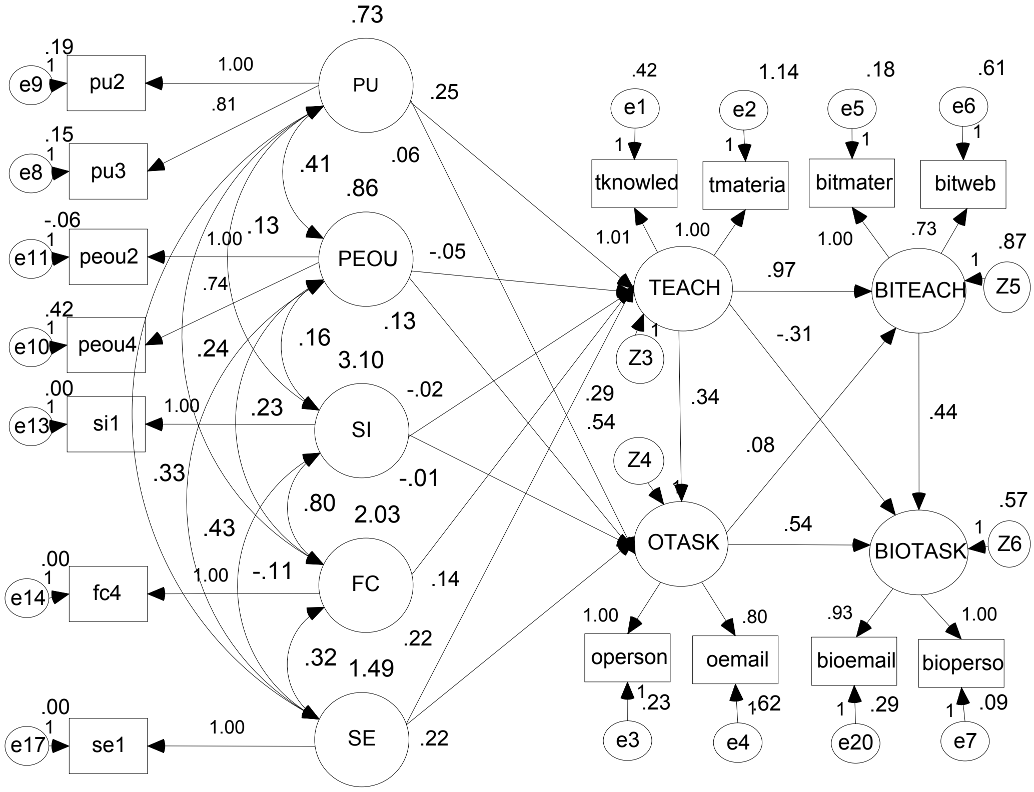
Figure 8.24 The Baseline Model (Multiple-Group Analysis) for Low Experience Subjects with Unstandardised Estimates



Moderate Experience Subjects
Unstandardised Estimates,
Chi-square=411.571,
Degree of Freedom=256,
CMIN/DF=1.608, Probability=.000,
Bollen-Stine Probability= 0.187,
RMSEA=.037, TLI=.937, CFI=.949,
NFI=.878, GFI=.889, AGFI=.844,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.25 The Baseline Model (Multiple-Group Analysis) for Moderate Experience Subjects with Unstandardised Estimates

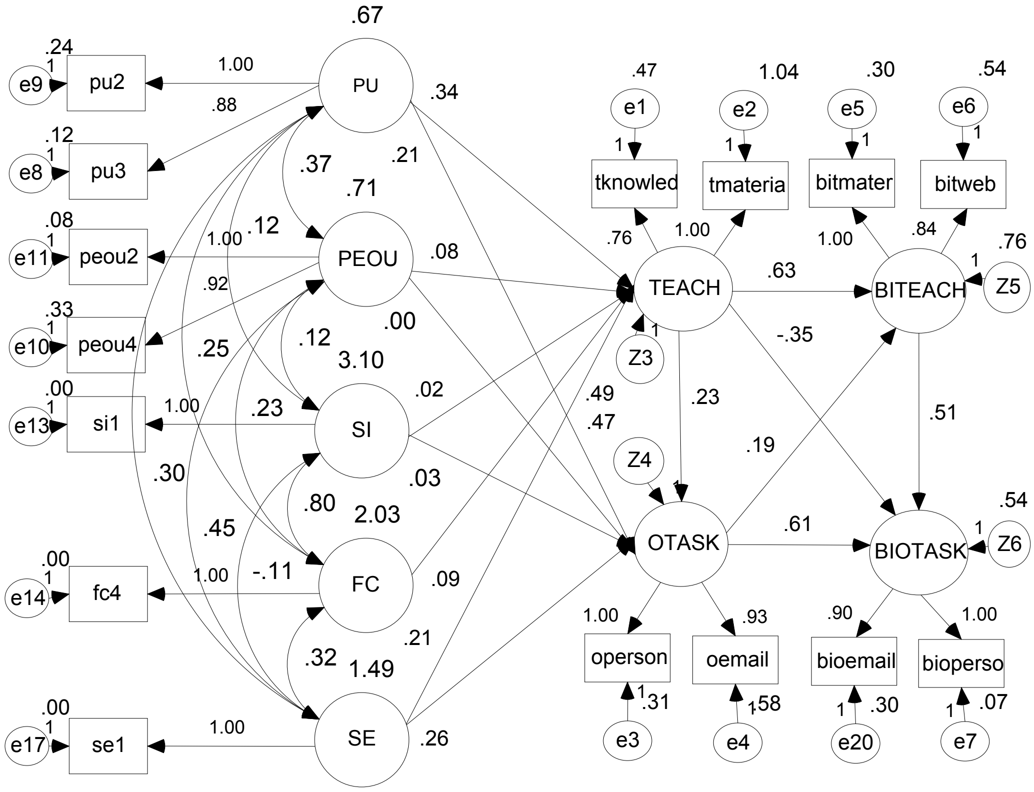


High Experience Subjects
Unstandardised Estimates,
Chi-square=411.571,
Degree of Freedom=256,
CMIN/DF=1.608, Probability=.000,
Bollen-Stine Probability= 0.187,
RMSEA=.037, TLI=.937, CFI=.949,
NFI=.878, GFI=.889, AGFI=.844,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.26 The Baseline Model (Multiple-Group Analysis) for High Experience Subjects with Unstandardised Estimates

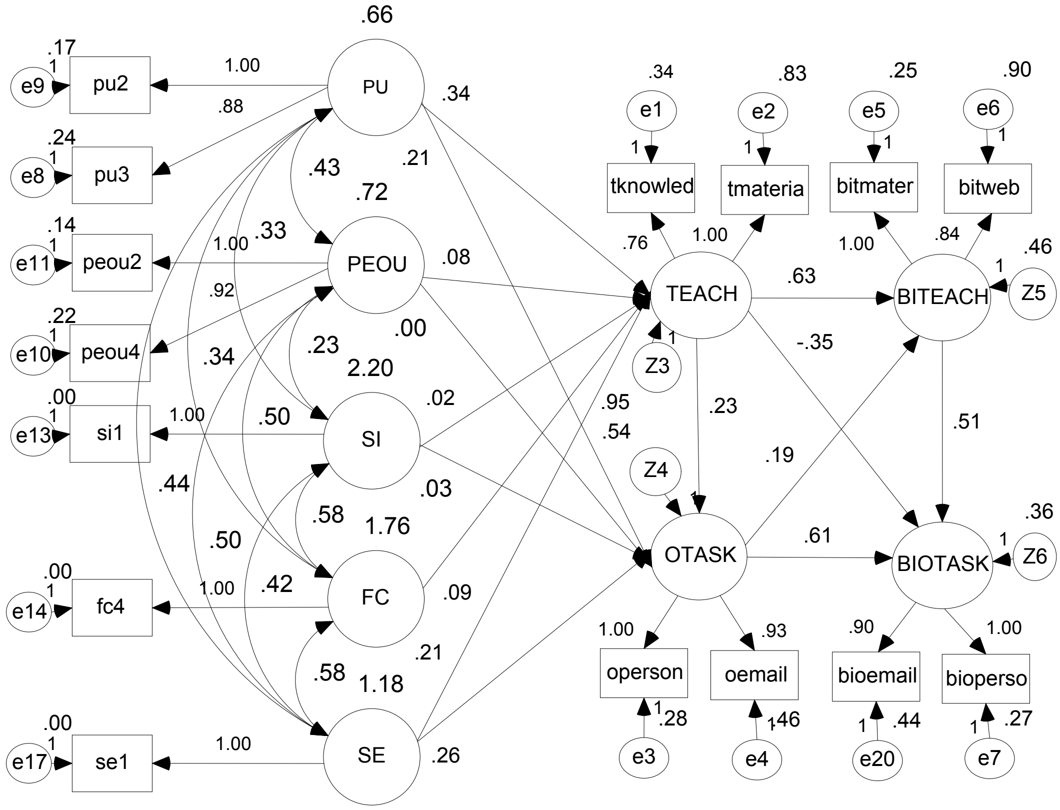
In simultaneous multiple-group analysis, the baseline model (unconstrained model) is generated (in Figure 8.24, Figure 8.25, and Figure 8.26). It yields a χ^2 (chi-square) of 411.571, degree of freedom = 256 and p value = 0.000 (which is significant at the level of 0.05), Bollen-Stine p value = 0.187 (which is not significant at the level of 0.05). It indicates that the model fits the data for three groups very well. Other evidence supports the goodness of fit of the model to the data (CMIN/DF = 1.608, RMSEA = 0.037, TLI = 0.937, CFI = 0.949, NFI = 0.878, GFI = 0.889, AGFI = 0.844). It consequently indicates that all three groups use the same path diagram but possibly with different parameter estimates. Further investigation will be made to find out whether their parameter estimates are significantly different. The constrained models (structural weights models) for all three groups are presented in Figure 8.27, Figure 8.28, and Figure 8.29.



Low Experience Subjects
Unstandardised Estimates,
Chi-square=434.428,
Degree of Freedom=277,
CMIN/DF=1.568, Probability=.000,
Bollen-Stine Probability= 0.213,
RMSEA=.035, TLI=.941, CFI=.949,
NFI=.871, GFI=.883, AGFI=.847,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

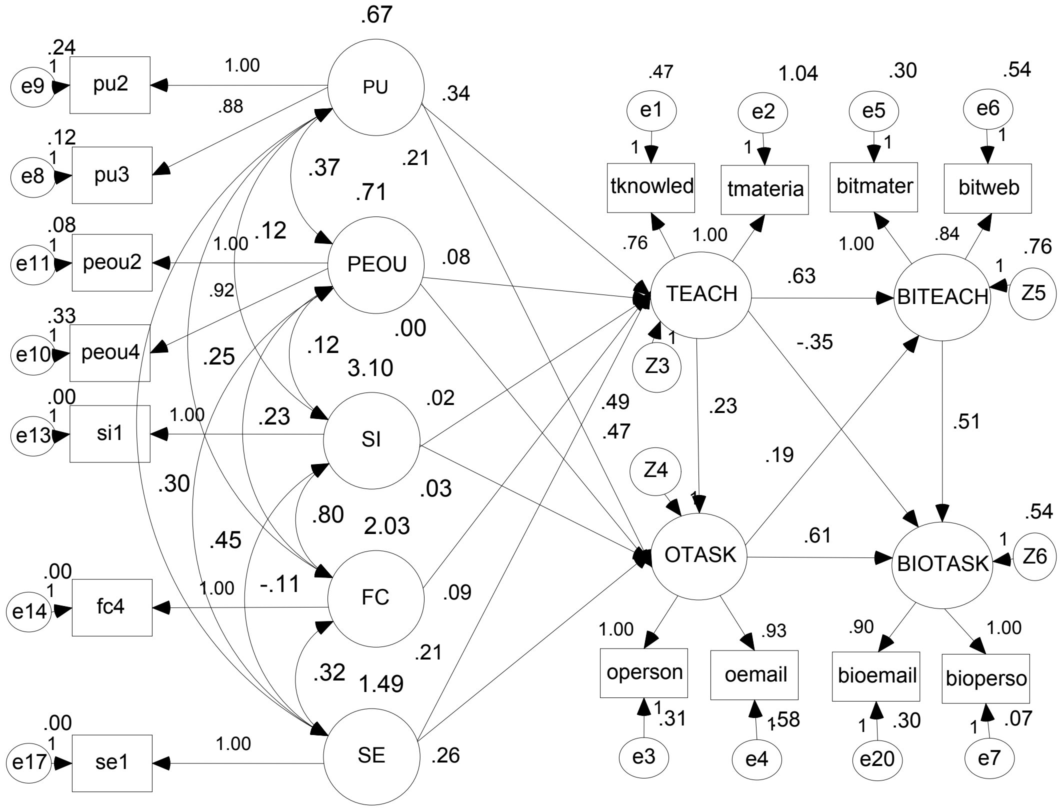
Figure 8.27 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Low Experience Subjects



Moderate Experience Subjects
Unstandardised Estimates,
Chi-square=434.428,
Degree of Freedom=277,
CMIN/DF=1.568, Probability=.000,
Bollen-Stine Probability= 0.213,
RMSEA=.035, TLI=.941, CFI=.949,
NFI=.871, GFI=.883, AGFI=.847,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.28 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Moderate Experience Subjects



High Experience Subjects
Unstandardised Estimates,
Chi-square=434.428,
Degree of Freedom=277,
CMIN/DF=1.568, Probability=.000,
Bollen-Stine Probability= 0.213,
RMSEA=.035, TLI=.941, CFI=.949,
NFI=.871, GFI=.883, AGFI=.847,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.29 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for High Experience Subjects

The model fits the data for all groups very well (see Figure 8.27, Figure 8.28, and Figure 8.29), yields a χ^2 (chi-square) of 434.428, degree of freedom = 277 and p value = 0.000 (which is significant at the level of 0.05), Bollen-stine p value = 0.213 (which is not significant at the level of 0.05). Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.568, RMSEA = 0.035, TLI = 0.941, CFI = 0.949, NFI = 0.871, GFI = 0.883, AGFI = 0.847).

There is no significant difference across the baseline model and the measurement weights model because degree of freedom increase = 6, CMIN increases = 9.587, and

p value = 0.143 (which is not significant at the level of 0.05). The chi-square difference test reveals a non-significant difference across the baseline model and constrained model because the degree of freedom increases = 21 (277-256), and CMIN increases = 22.858 (434.428-411.571), p = 0.352 (which is not significant at the level of 0.05) (see nested model comparisons in Appendix III – Part C). Thus it can be concluded that the two moderating hypotheses are **rejected.** The influence of determinants (PU, PEOU, SI, FC and SE toward usage behaviour (TEACH and OTASK) are not moderated by experience. In addition, the influence of usage behaviour (TEACH and OTASK) toward behaviour intention (BITEACH and BIOTASK) are not moderated by experience. In other words, the direct paths from determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) do not differ across groups. Moreover, the direct paths from usage behaviour toward behaviour intention do not differ across groups.

Whenever there is no difference across groups, we can look at the constrained model (structural weights model) for the significant paths for all groups (see Table 8.17).

	Estimate	**S.E.**	**C.R.**	**p value**
TEACH <--- PU	.341	.090	3.792	***
TEACH <--- SI	.018	.033	.534	.594
TEACH <--- SE	.208	.053	3.922	***
TEACH <--- FC	.088	.041	2.156	.031*
TEACH <--- PEOU	.078	.087	.896	.370
OTASK <--- TEACH	.230	.055	4.171	***
OTASK <--- SE	.262	.044	5.955	***
OTASK <--- PEOU	-.003	.069	-.046	.963
OTASK <--- PU	.205	.075	2.751	.006***
OTASK <--- SI	.028	.026	1.089	.276
BITEACH <--- OTASK	.192	.066	2.883	.004***
BITEACH <--- TEACH	.626	.066	9.491	***
BIOTASK <--- BITEACH	.515	.082	6.290	***
BIOTASK <--- TEACH	-.349	.082	-4.245	***
BIOTASK <--- OTASK	.614	.067	9.185	***

Table 8.17 Regression weights (Structural Weights Model) for Low, Moderate and High Experience Subjects

*** A p value is statistically significant at the 0.01 level (two-tailed)

*   A p value is statistically significant at the 0.05 level (two-tailed)

Five direct paths are statistically significant between determinants and usage behaviour (PU, SE and FC → TEACH and PU, and SE →OTASK). All six paths between usage behaviour (TEACH and OTASK) and behaviour intention (BITEACH and BIOTASK) are statistically significant.

In summary, the hypotheses are rejected which suggests that the influence of (1) determinants toward usage behaviour, and (2) usage behaviour toward behaviour intention are not moderated by experience. In other words, the direct paths between (1) determinants toward usage behaviour and (2) usage behaviour toward behaviour intention do not differ across groups of low, moderate and high experience subjects.

Perceived usefulness (PU), self-efficacy (SE), and facilitating conditions (FC) play important roles in influencing academics to use the Internet in teaching (TEACH) , and only perceived usefulness (PU) and self-efficacy (SE) significantly influence academics (all three groups) to use the Internet in other tasks (OTASK).

Notably, since two groups has a small sample size: low experience group (50 subjects), and high experience group (89 subjects), caution is required before generalising these findings to the population as previously noted.

8.8.6 E-university Plan

In respect of the e-university plan, it is questioned whether or not academics acknowledgement of this plan will have any affect on the influence of the determinants toward usage behaviour, and usage behaviour toward behaviour intention. In order to answer this question, the investigation would be made whether the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK), and the influence of usage behaviour (TEACH and OTASK) toward behaviour intention (BITEACH and BIOTASK) would be moderated by acknowledgement of e-university plan by testing the moderating hypotheses.

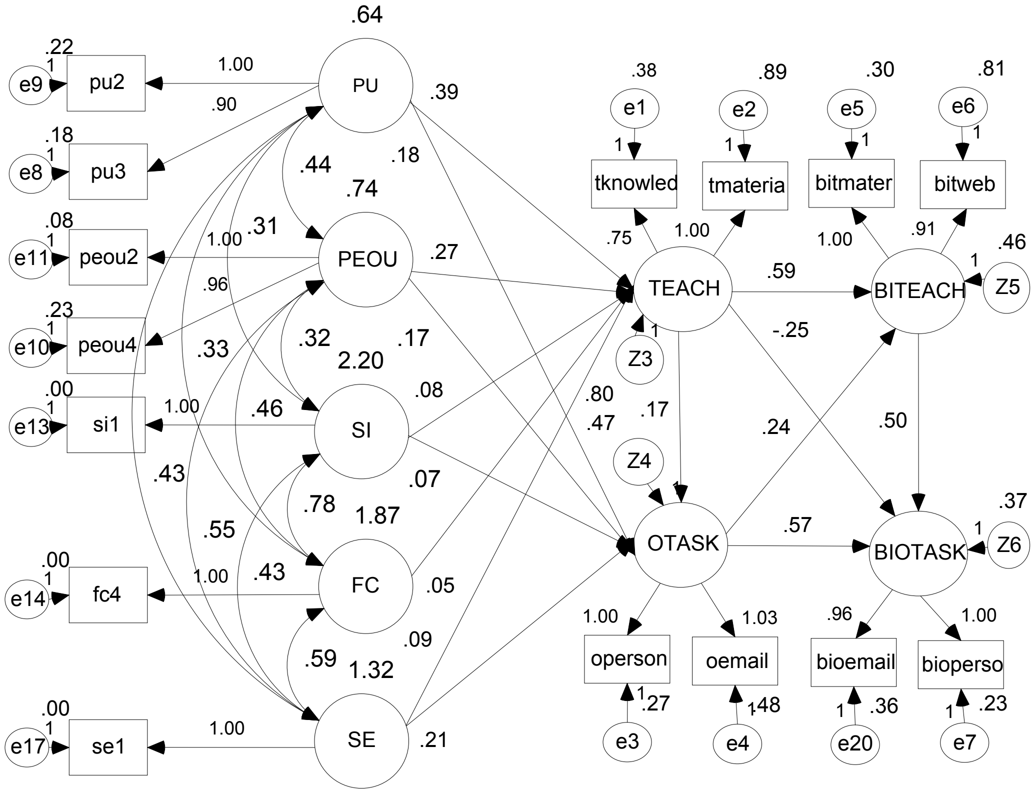
The sample has been separated into two groups; the first group is academics who have acknowledged that their universities already have a plan to become e-university in the near future (296 subjects). The other group is academics who have not yet acknowledged this plan (79 subjects). The moderating hypotheses are:

$MH_1$6a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by acknowledgement of e-university plan.

$MH_1$6b: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by acknowledgement of e-university plan.

In other words, these hypotheses state that the direct paths between determinants and usage behaviour and the direct paths between usage behaviour and behaviour intention differ across acknowledged e-university subjects (group1) and un-acknowledged e-university subjects (group2).

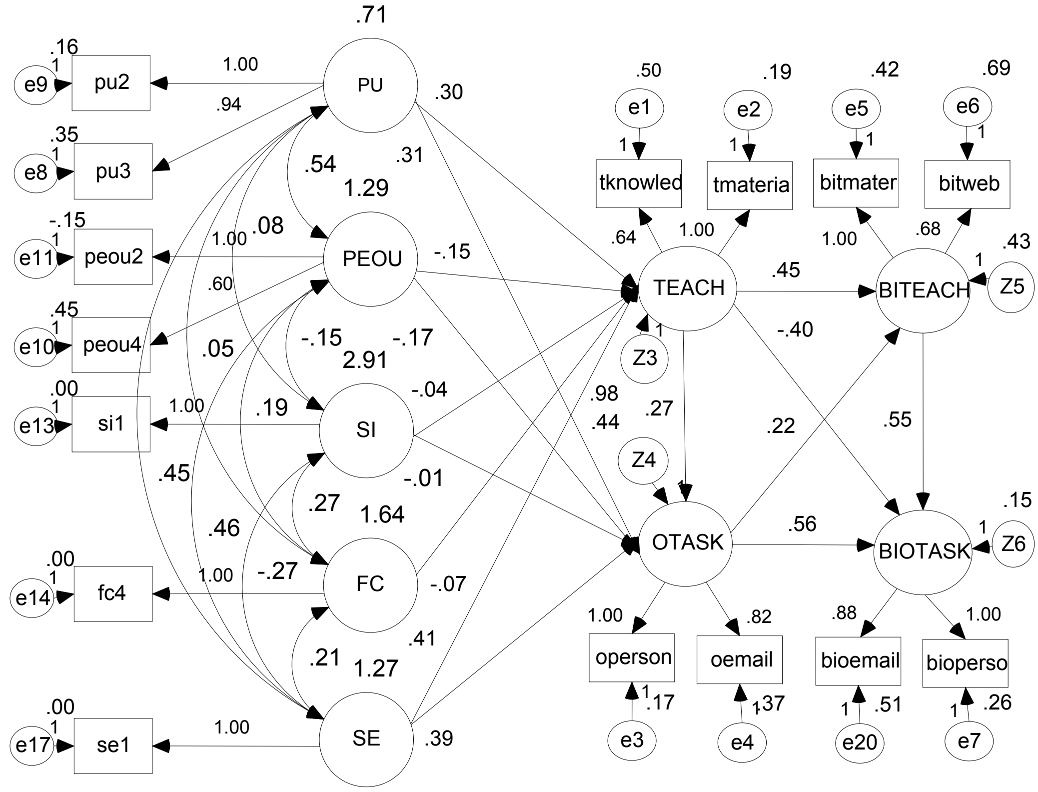
The path diagram of the baseline model (unconstrained model) for acknowledgement of e-university subjects (296 subjects) with unstandardised estimates is presented in Figure 8.30, and the baseline model (unconstrained model) for un-acknowledgement of e-university subjects (79 subjects) with unstandardised estimates is presented in Figure 8.31.



Acknowledged E-university Subjects
Unstandardised Estimates,
Chi-square=212.176,
Degree of Freedom=136,
CMIN/DF=1.560, Probability=.000,
Bollen-Stine Probability= 0.191,
RMSEA=.039, TLI=.956, CFI=.971,
NFI=.926, GFI=.934, AGFI=.884,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.30 The Baseline Model (Multiple-Group Analysis) for Acknowledged E-University Subjects with Unstandardised Estimates

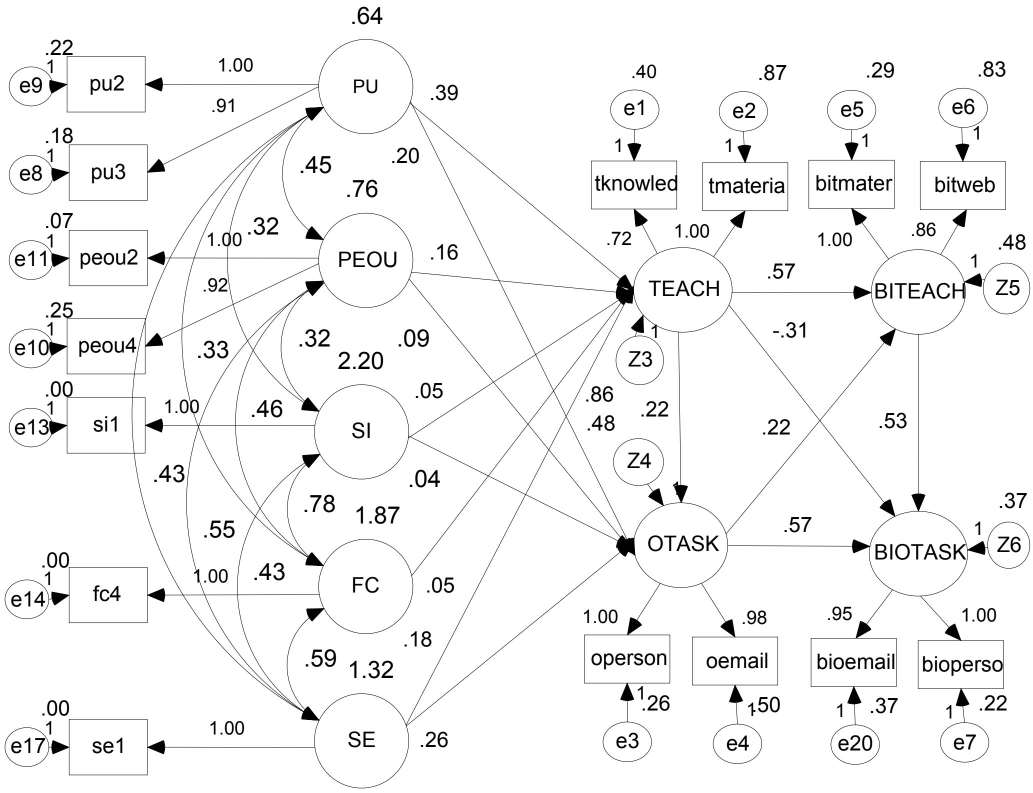


Unacknowleded E-university Subjects
Unstandardised Estimates,
Chi-square=212.176,
Degree of Freedom=136,
CMIN/DF=1.560, Probability=.000,
Bollen-Stine Probability= 0.191,
RMSEA=.039, TLI=.956, CFI=.971,
NFI=.926, GFI=.934, AGFI=.884,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.31 The Baseline Model (Multiple-Group Analysis) for Unacknowledged E-University Subjects with Unstandardised Estimates

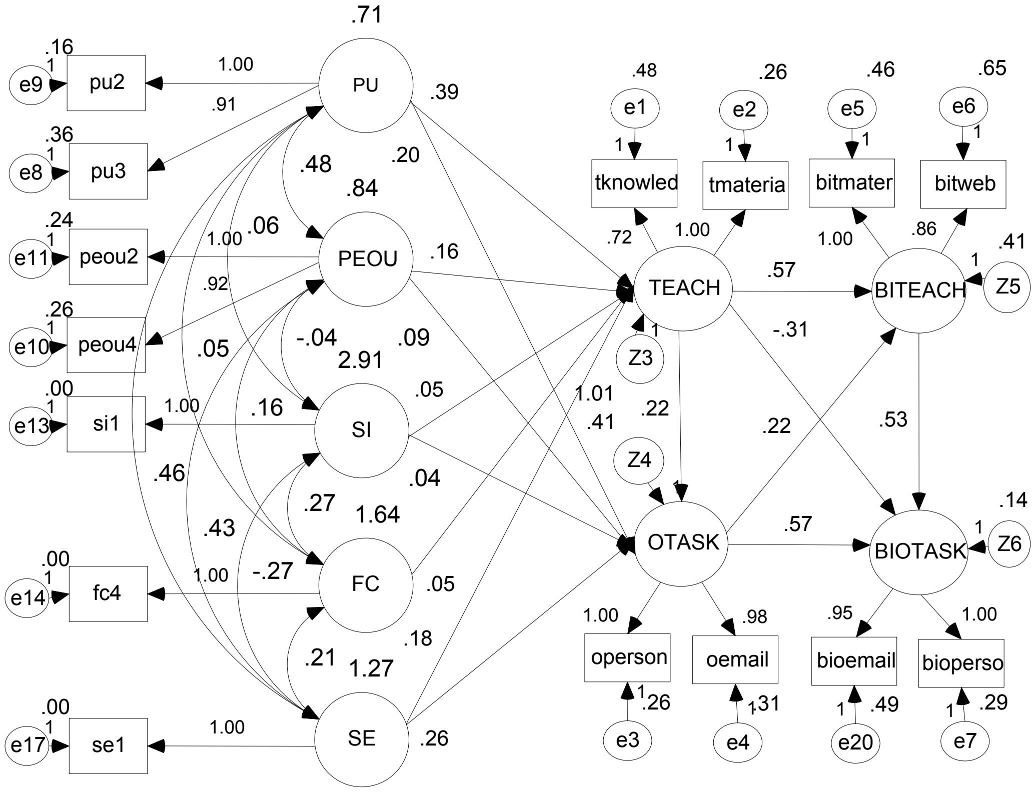
In simultaneous multiple-group analysis, the baseline model (unconstrained model) is generated (in Figure 8.30 and Figure 8.31) and yields a χ^2 (chi-square) of 212.176, degree of freedom = 136 and p value = 0.000 (which is significant at the level of 0.05), Bollen-Stine p value = 0.191 (which is not significant at the level of 0.05). It indicates that the model fits the data for both groups very well. Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.560, RMSEA = 0.039, TLI = 0.956, CFI = 0.971, NFI = 0.926, GFI = 0.934, AGFI = 0.884). Consequently, it indicates that both groups use the same path diagram but possibly difference parameter estimates. It is suitable to proceed to investigate whether their parameter estimates are significantly different. The constrained models (structural weights models) for two groups are presented in Figure 8.32 and Figure 8.33.



Acknowledged E-university Subjects
Unstandardisd Estimates,
Chi-square=249.794,
Degree of Freedom=157,
CMIN/DF=1.591, Probability=.000,
Bollen-Stine Probability= 0.113,
RMSEA=.040, TLI=.953, CFI=.965,
NFI=.913, GFI=.922, AGFI=.881,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.32 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Acknowledged E-University Subjects



Unacknowleded E-university Subjects
Unstandardised Estimates,
Chi-square=249.794,
Degree of Freedom=157,
CMIN/DF=1.591, Probability=.000,
Bollen-Stine Probability= 0.113,
RMSEA=.040, TLI=.953, CFI=.965,
NFI=.913, GFI=.922, AGFI=.881,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.33 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Unacknowledged E-University Subjects

The structural weights model (constrained model) fits the data for both groups very well, it yields a χ^2 (chi-square) of 249.794, degree of freedom = 157 and p value = 0.000 (which is significant at the level of 0.05), Bollen-Stine p value = 0.113 (which is not significant at the level of 0.05). Other evidence supports the goodness of fit of the model to the data as well (CMIN/DF = 1.591, RMSEA = 0.040, TLI = 0.953, CFI = 0.965, NFI =0.913, GFI = 0.922, AGFI = 0.881)(see Figure 8.32 and Figure 8.33). ***No significant difference is found across the baseline model and the measurement weights model because the df increases = 6, the CMIN increases = 11.879, p = 0.065***

(which is not significant at the level of 0.05) (see nested model comparisons in Appendix III – Part C).

Nevertheless, the chi-square difference tests reveal a significant difference ($p = 0.014$) across the baseline model and constrained model (structural weights model). Because the df increases = 21 (157-136), and the CMIN increases = 37.617 (249.794-212.176), $p = 0.014$ (which is significant at the level of 0.05)(see nested model comparisons in Appendix III – Part C).

This result indicates that although both groups can use the same path diagram they have a significant difference in structural weights estimates. This initial test provides evidence that at least one or more of the direct effects differs significantly across the two subgroups. It is recommended to estimate a series of models to identify the specific paths that differ significantly across the two groups (Holmes-Smith, Cunningham & Coote 2006).

After analysing a series of models (15 rounds of analyses) by constraining the direct paths one at a time, it was found that only three direct paths differ significantly across two groups (see Table 8.18). These direct paths are the direct paths between determinants and usage behaviour (FC and PEOU → TEACH and PEOU →OTASK) and no difference related to direct paths between usage behaviour and behaviour intention.

Among the differences of three paths, it is evident that perceived ease of use (PEOU) plays an important role in influencing usage behaviour for acknowledged e-university subjects (see Table 8.18).

In summary, the first moderating hypothesis ($MH_1 6a$) is **accepted** but the second hypothesis ($MH_1 6b$) is **rejected.** The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by acknowledgement of e-university plan but the influence of usage behaviour toward behaviour intention is not moderated by acknowledgement of e-university plan. In other words, the direct paths between determinants (PU, PEOU, SI, FC and SE) and usage behaviour (TEACH and OTASK) differ across groups but the direct paths between usage behaviour and behaviour intention do not differ across groups.

The results of the moderating hypotheses indicate that perceived ease of use (PEOU) seems to play a more important role in influencing usage behaviour in teaching (TEACH) for academics who acknowledged e-university plan than academics who did not acknowledge e-university plan. In addition there is evidence that the influence of facilitating conditions (FC) on using the Internet in teaching (TEACH) and the influence of perceived ease of use (PEOU) on using the Internet in other tasks (OTASK) are significant different across groups.

It can be noticed that one group has a small sample size: un-acknowledged e-university (79 subjects) indicating that caution is required in generalising these findings to the population (as previously mentioned).

			Group1 Estimate	Group2 Estimate	Group1 p value	Group2 p value	Path	Sig. Dif
TEACH	<---	PU	.390	.301	.001***	.161	a	no
TEACH	<---	SI	.084	-.041	.070	.576	e	no
TEACH	<---	SE	.090	.414	.192	.001***	h	no
TEACH	**<---**	**FC**	**.054**	**-.073**	**.310**	**.452**	**g**	**yes**
TEACH	**<---**	**PEOU**	**.266**	**-.154**	**.023***	**.232**	**c**	**yes**
OTASK	<---	TEACH	.172	.265	.008***	.009***	j	no
OTASK	<---	SE	.208	.387	***	***	i	no
OTASK	**<---**	**PEOU**	**.166**	**-.173**	**.055**	**.080**	**d**	**yes**
OTASK	<---	PU	.180	.313	.055	.051	b	no
OTASK	<---	SI	.065	-.008	.051	.878	f	no
BITEACH	<---	OTASK	.242	.215	.003***	.140	m	no
BITEACH	<---	TEACH	.589	.454	***	.001***	k	no
BIOTASK	<---	BITEACH	.496	.550	***	.016***	o	no
BIOTASK	<---	TEACH	-.250	-.402	.009	.015***	l	no
BIOTASK	<---	OTASK	.566	.556	***	***	n	no

Table 8.18 Regression Weights of the Baseline Model for Both Groups (E-University Plan)

*** A p value is statistically significant at the 0.01 level (two-tailed)
* A p value is statistically significant at the 0.05 level (two-tailed)
Sig. dif: yes = This path differs significantly across groups.
Sig. dif: no = This path does not differ significantly across groups.

8.8.7 Research University Plan

Another organisational culture is investigated in association with acknowledgement of research university plan. It is questioned whether there are any differences between academics who have acknowledged the research university plan and the other group who have not yet acknowledged the plan of the university, in the influence of determinants toward their usage behaviour and intention. If academics acknowledged the research university plan they might need to prepare themselves for the future, for example by trying to get familiar with communication technologies in order to use them for finding information for their research. Thus, there might be a difference between the two groups.

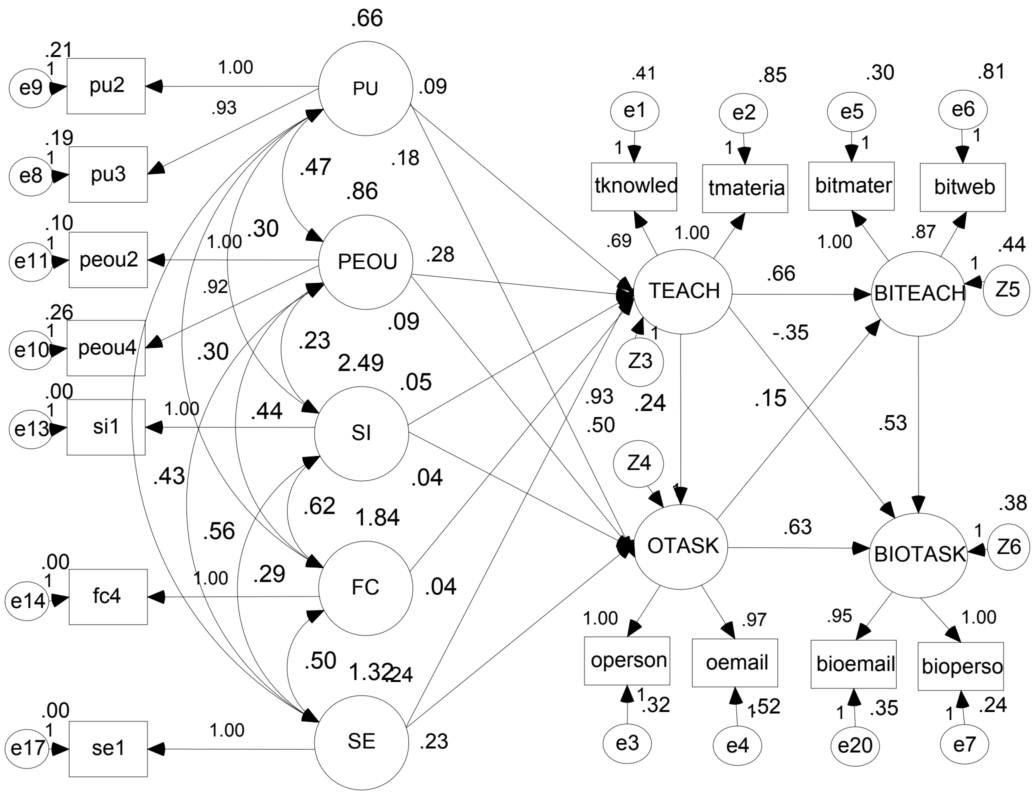
This investigation will help to identify whether there are any differences between the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK) and usage behaviour toward behaviour intention (BITEACH and BIOTASK) to use the Internet between the two groups. The first group is academics who have acknowledged this plan (389 subjects) and the second group is academics who have not yet acknowledged this plan (52 subjects). The moderating hypotheses are:

$MH_1$7a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by acknowledgement of research university plan.

$MH_1$7b: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by acknowledgement of research university plan.

In other words, the hypotheses state that the direct paths between determinants and usage behaviour (TEACH and OTASK), and the direct paths between usage behaviour and behaviour intention differ across groups (acknowledged research university plan subjects-group1 and unacknowledged research university subjects - group2).

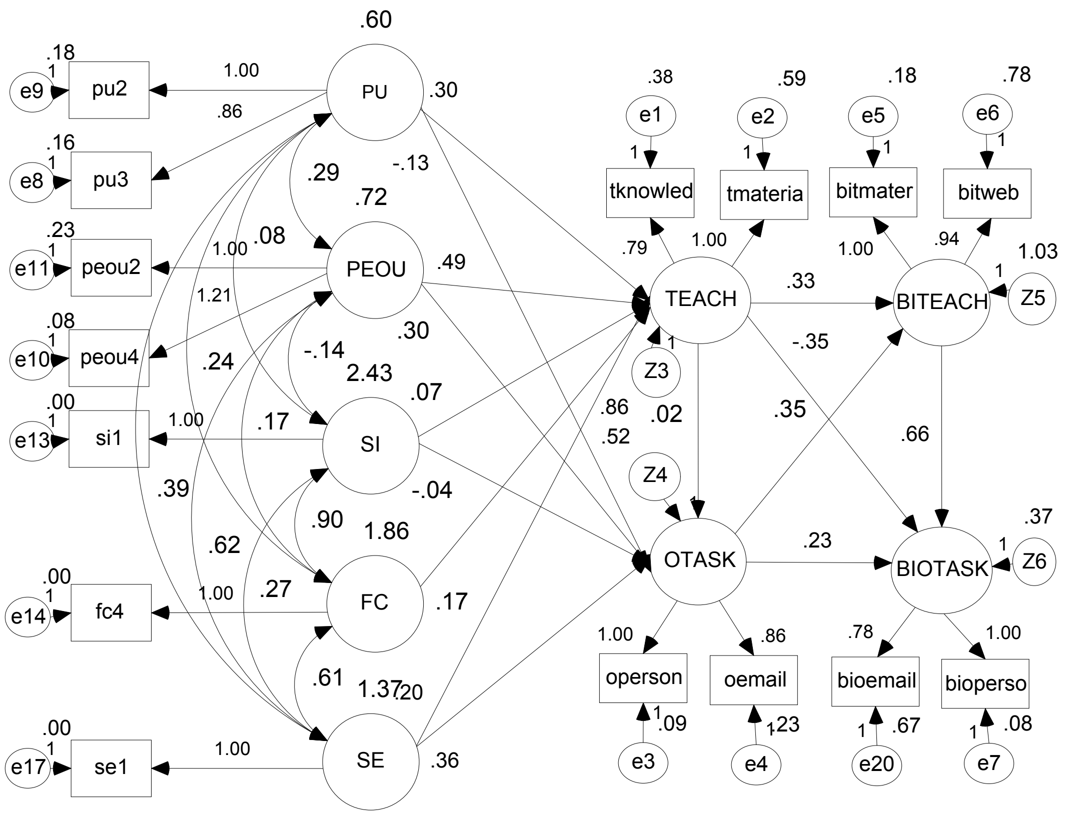
The path diagram of the baseline model (unconstrained model) for acknowledged research university plan subjects - group1 (389 subjects) with unstandardised estimates is presented in Figure 8.34 and the baseline model (unconstrained model) for unacknowledged research university plan subjects - group2 (52 subjects) with unstandardised estimates is presented in Figure 8.35.



Acknowledged Research University Plan Subjects
Unstandardised Estimates,
Chi-square=217.605,
Degree of Freedom=138,
CMIN/DF=1.577, Probability=.000,
Bollen-Stine Probability= 0.342,
RMSEA=.036, TLI=.961, CFI=.974,
NFI=.934, GFI=.943, AGFI=.900,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.34 The Baseline Model (Multiple-Group Analysis) for Acknowledged Research University Plan Subjects with Unstandardised Estimates

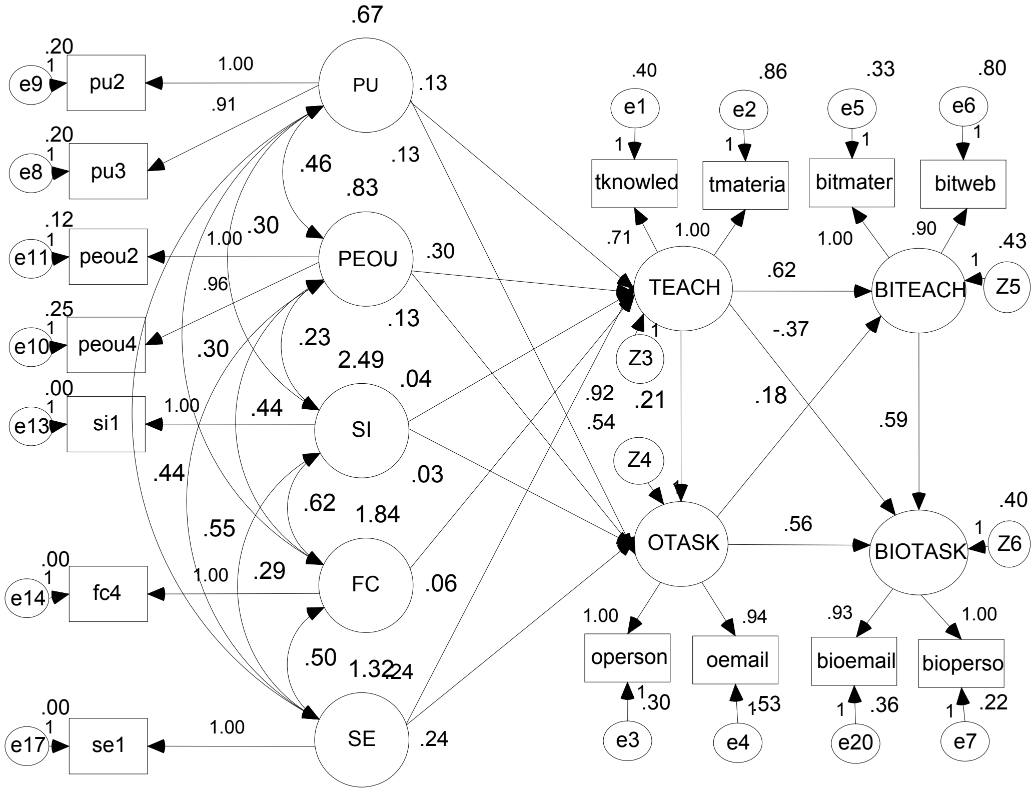


Unacknowledged Research University Plan Subjects
Unstandardised Estimates,
Chi-square=217.605,
Degree of Freedom=138,
CMIN/DF=1.577, Probability=.000,
Bollen-Stine Probability= 0.342,
RMSEA=.036, TLI=.961, CFI=.974,
NFI=.934, GFI=.943, AGFI=.900,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.35 The Baseline Model (Multiple-Group Analysis) for Unacknowledged Research University Plan Subjects with Unstandardised Estimates

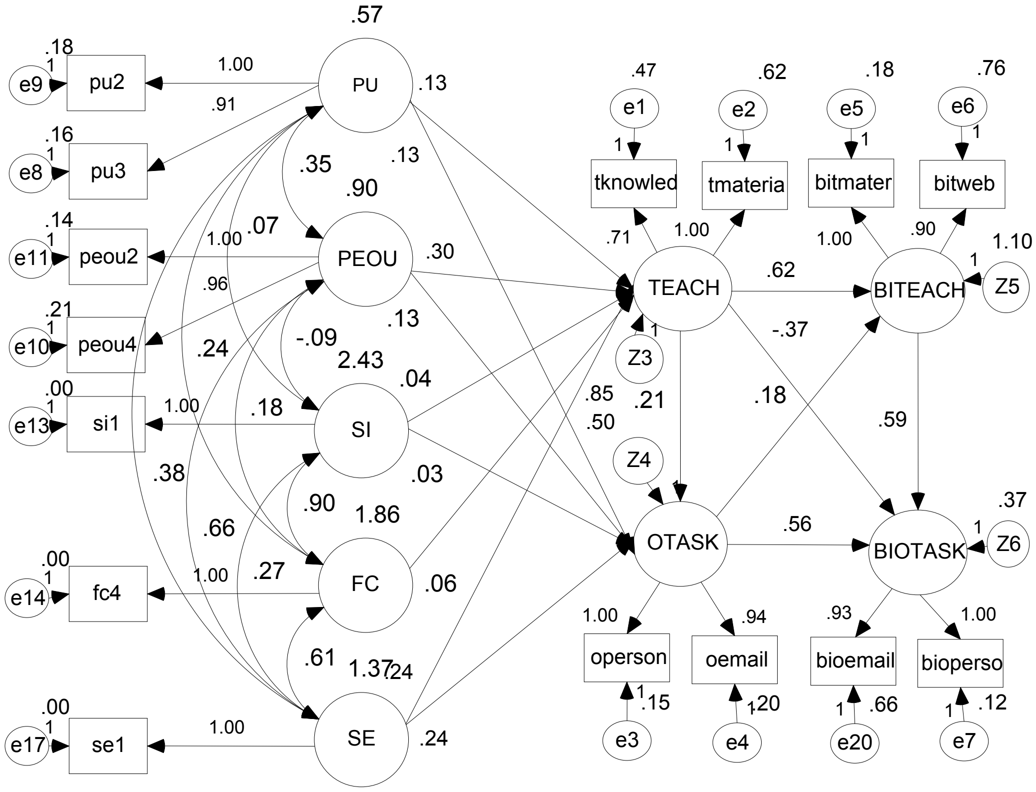
In simultaneous multiple-group analysis, the baseline model (unconstrained model) is generated (in Figure 8.34 and Figure 8.35). It yields a χ^2 (chi-square) of 217.605, degree of freedom = 138 and p value = 0.000 (which is significant at the level of 0.05), Bollen-Stine p value = 0.342 (which is not significant at the level of 0.05). It indicates that the model fits the data for both groups very well. Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.577, RMSEA = 0.036, TLI = 0.961, CFI = 0.974, NFI = 0.934, GFI = 0.943, AGFI = 0.900). It consequently indicates that both groups use the same path diagram but possibly with different parameter estimates. The next step is to investigate whether the parameter estimates (structural weights) are equal across groups by comparing the chi-square difference between the baseline model and the constrained model (structural weights model). The constrained models (structural weights models) for both groups are presented in Figure 8.36 and Figure 8.37.



Acknowledged Research University Plan Subjects
Unstandardised Estimates,
Chi-square=249.504,
Degree of Freedom=158,
CMIN/DF=1.579, Probability=.000,
Bollen-Stine Probability= 0.295,
RMSEA=.036, TLI=.961, CFI=.970,
NFI=.925, GFI=.936, AGFI=.902,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.36 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Acknowledged Research University Plan Subjects



Unacknowledged Research University Plan Subjects
Unstandardised Estimates,
Chi-square=249.504,
Degree of Freedom=158,
CMIN/DF=1.579, Probability=.000,
Bollen-Stine Probability= 0.295,
RMSEA=.036, TLI=.961, CFI=.970,
NFI=.925, GFI=.936, AGFI=.902,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.37 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Unacknowledged Research University Plan Subjects

It has been found that the model (the structural weights model) fits the data for both groups very well, it yields a χ^2 (chi-square) of 249.504, degree of freedom = 158 and p value = 0.000 (which is significant at the level of 0.05), Bollen-Stine p value = 0.295 (which is not significant at the level of 0.05). Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.579, RMSEA = 0.036, TLI = 0.961, CFI = 0.970, NFI = 0.925, GFI = 0.936, AGFI = 0.902) (see Figure 8.36 and Figure 8.37.

The chi-square difference tests reveal a significant difference across the baseline model and constrained model (structural weights model) because the degree of freedom increases = 20 (158-138), and CMIN increases = 31.899 (249.504-217.605) and p = 0.044 (which is significant at the level of 0.05). There is no difference found across the baseline mode and the constrained model (measurement weights model) because the degree of freedom increases = 6, and CMIN increases =5.969 and p = 0.427 (which is not significant at the level of 0.05) (see nested model comparisons in Appendix III – Part C)

These results indicate that although both groups can use the same path diagram, they have a significant difference in structural weights estimates. This initial test provides evidence that at least one or more of the direct effects differs significantly across the two subgroups. Therefore, it is recommended to estimate a series of models to identify the specific paths that differ significantly across the two groups (Holmes-Smith, Cunningham & Coote 2006).

After analysing a series of models by constraining the direct paths, one at a time, it has been found that only one direct path differs significantly across two groups (see Table 8.19). This direct path is the direct path between usage behaviour and behaviour intention (OTASK→ BITOTASK). This indicates that this path is significant only for the first group (see Table 8.19).

In summary the first moderating hypothesis (MH_17a) is **rejected** but the second hypothesis (MH_17b) is **accepted.** The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is not moderated by acknowledgement of research university plan but the influence of usage behaviour toward behaviour intention is moderated by acknowledgement of research university plan. In other words, the direct paths between determinants (PU, PEOU, SI, FC and SE) and usage behaviour (TEACH and OTASK) do not differ across groups but the direct paths between usage behaviour and behaviour intention differ across groups.

The significant difference between the two groups indicate that using the Internet in other tasks (OTASK) influences behaviour intention in other tasks (BIOTASK) for academics who acknowledged research university plan more than academics who thought differently.

It can be noticed that one group has a small sample size: un-acknowledged research university (52 subjects) meaning that caution is required before generalising these findings to the population (as previously mentioned).

			Group1 Estimate	Group2 Estimate	Group1 p value	Group2 p value	Path	Sig. Dif
TEACH	<---	PU	.086	.300	.153	.050*	a	No
TEACH	<---	SE	.241	.198	***	.283	h	No
TEACH	<---	PEOU	.279	.492	.001***	.053	c	No
TEACH	<---	SI	.050	.071	.190	.517	e	No
TEACH	<---	FC	.040	.168	.394	.198	g	No
OTASK	<---	SE	.229	.365	***	.004***	i	No
OTASK	<---	PU	.180	-.126	.021*	.488	b	No
OTASK	<---	TEACH	.238	.016	***	.897	j	No
OTASK	<---	SI	.039	-.044	.161	.540	f	No
OTASK	<---	PEOU	.086	.300	.153	.050*	d	No
BITEACH	<---	TEACH	.661	.325	***	.028*	k	No
BITEACH	<---	OTASK	.150	.353	.039*	.065	m	No
BIOTASK	<---	BITEACH	.526	.659	***	***	o	No
BIOTASK	<---	TEACH	-.346	-.350	***	.002***	l	No
BIOTASK	**<---**	**OTASK**	**.634**	**.227**	***	**.094**	**n**	**Yes**

Table 8.19 Regression Weights (the Baseline Model) for Both Groups (Research University Plan)

*** A p value is statistically significant at the 0.01 level (two-tailed)
* A p value is statistically significant at the 0.05 level (two-tailed)
Sig. dif: yes = This path differs significantly across groups.
Sig. dif: no = This path does not differ significantly across groups.

8.8.8 Level of Reading and Writing

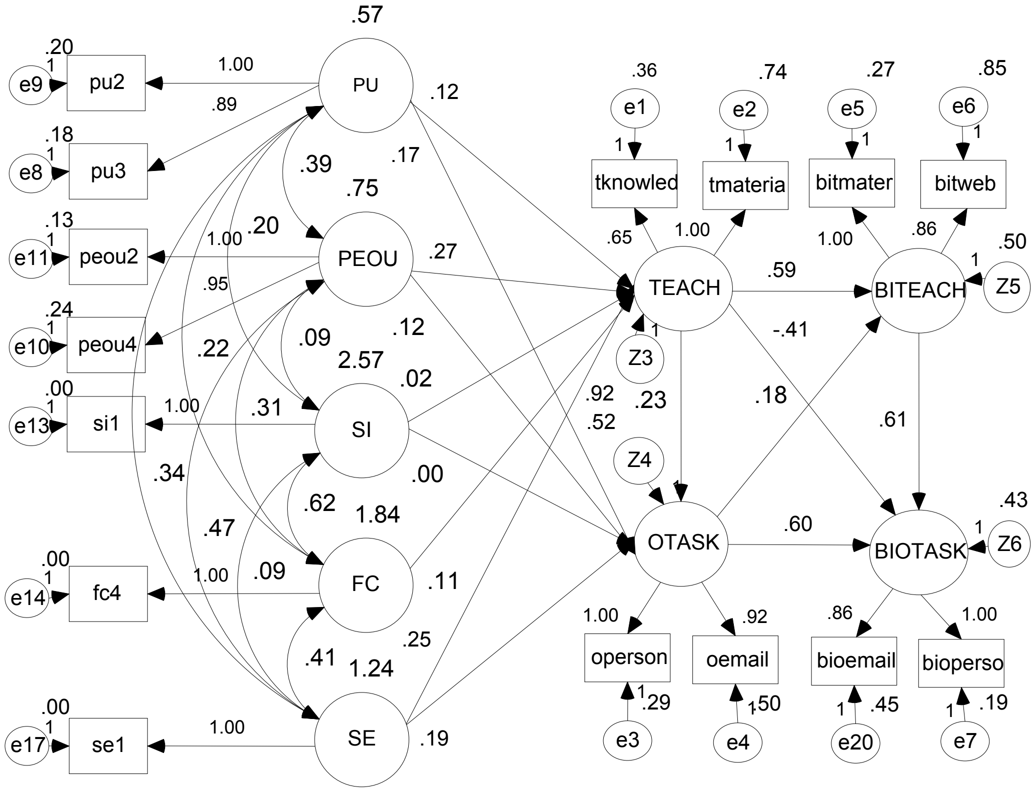
It is questioned whether the level of reading and writing of Thai academics may impact the influence of determinants toward behaviour. In other words, whether there is any difference in relation to the influence of determinants toward usage behaviour and the influence of usage behaviour toward behaviour intention between Thai academic who perceived that their level of reading and writing are not the obstacles in using the Internet (360 subjects - group 1) and others who perceived that their level of reading and writing are obstacles in using the Internet (57 subjects - group2).

The investigation will help to clarify whether the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK), and the influence of usage behaviour toward behaviour intention are moderated by level of reading and writing. The moderating hypotheses are:

$MH_1 8a$: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by level of reading and writing.

$MH_1 8b$: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by level of reading and writing.

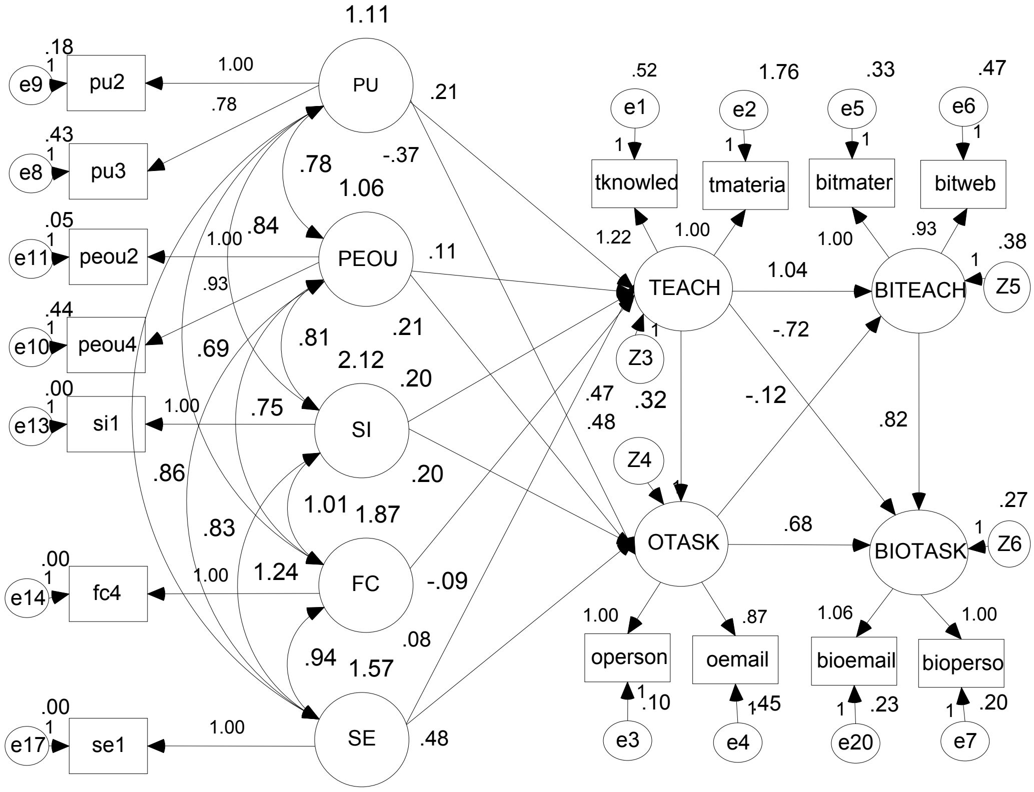
The path diagram of the baseline model (unconstrained model) for group1 (360 subjects) with unstandardised estimates is presented in Figure 8.38, and the baseline model (unconstrained model) for group2 (57 subjects) with unstandardised estimates is presented in Figure 8.39.



Level of reading and writing is not an obstacle
Unstandardised Estimates,
Chi-square=172.714,
Degree of Freedom=138,
CMIN/DF=1.252, Probability=.024,
Bollen-Stine Probability= 0.797,
RMSEA=.025, TLI=.981, CFI=.987,
NFI=.941, GFI=.950, AGFI=.913,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.38 The Baseline Model (Multiple-Group Analysis) with Unstandardised Estimates for Group 1(Level of Reading and Writing is not an Obstacle)

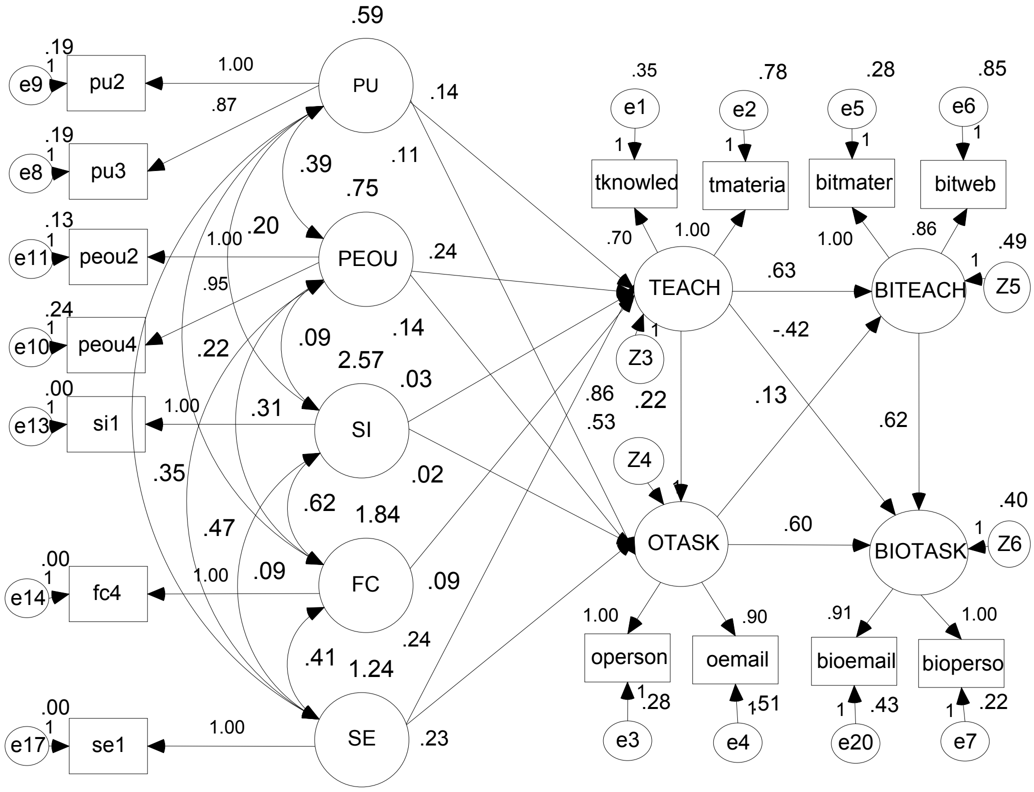


Level of reading and writing is an obstacle
Unstandardised Estimates,
Chi-square=172.714,
Degree of Freedom=138,
CMIN/DF=1.252, Probability=.024,
Bollen-Stine Probability= 0.797,
RMSEA=.025, TLI=.981, CFI=.987,
NFI=.941, GFI=.950, AGFI=.913,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.39 The Baseline Model (Multiple-Group Analysis) with Unstandardised Estimates for Group 2(Level of Reading and Writing is an Obstacle)

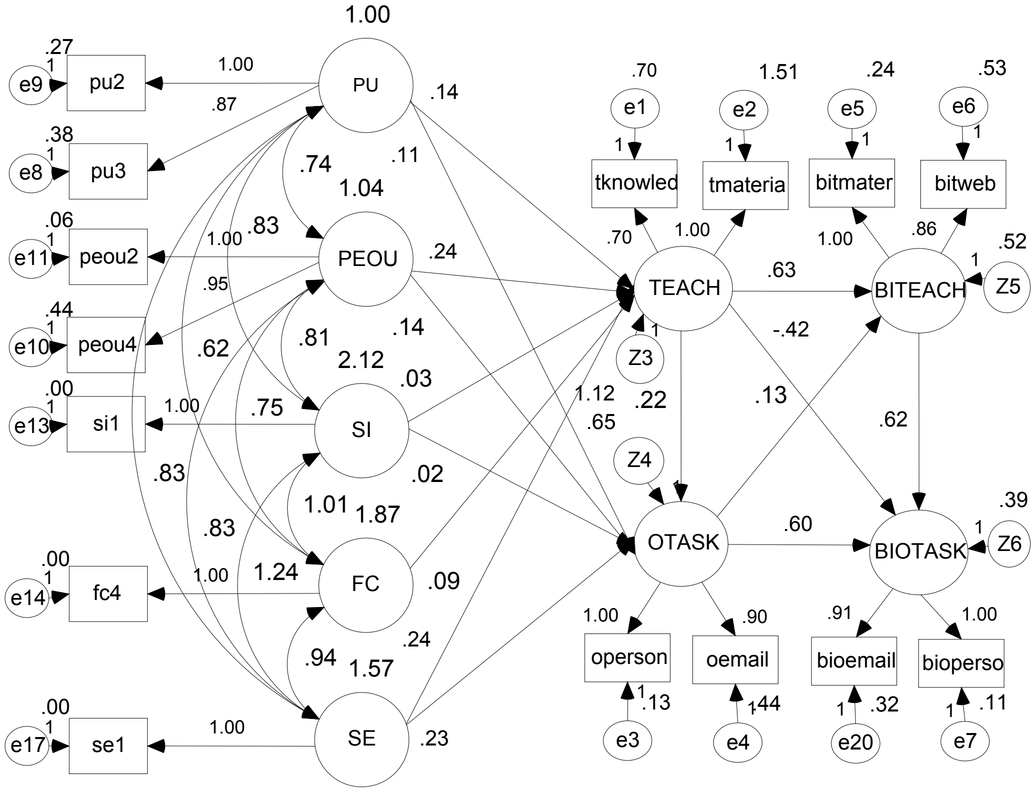
From simultaneous multiple-group analysis, the baseline model (unconstrained model) is generated (in Figure 8.38 and Figure 8.39). It yields a χ^2 (chi-square) of 172.714, degree of freedom = 138 and p value = 0.024 (which is significant at the level of 0.05), Bollen-Stine p value = 0.797 (which is not significant at the level of 0.05). It indicates that the model fits the data for both groups very well. Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.252, RMSEA = 0.025, TLI = 0.981, CFI = 0.987, NFI = 0.941, GFI = 0.950, AGFI = 0.913). It consequently indicates that both groups use the same path diagram but possibly with different parameter estimates. Thus, the next investigation is to find out whether their parameter estimates are significantly different. The constrained models (structural weights models) of two groups are presented in Figure 8.40 and Figure 8.41.



Level of reading and writing is not an obstacle
Unstandardised Estimates,
Chi-square=206.347,
Degree of Freedom=158,
CMIN/DF=1.306, Probability=.006,
Bollen-Stine Probability= 0.696,
RMSEA=.027, TLI=.977, CFI=.982,
NFI=.930, GFI=.939, AGFI=.908,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.40 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Group1 (Level of Reading and Writing is not an Obstacle)



Level of reading and writing is an obstacle
Unstandardised Estimates,
Chi-square=206.347,
Degree of Freedom=158,
CMIN/DF=1.306, Probability=.006,
Bollen-Stine Probability= 0.696,
RMSEA=.027, TLI=.977, CFI=.982,
NFI=.930, GFI=.939, AGFI=.908,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.41 The Structural Weights Model (Multiple-Group Analysis) (Unstandardised Estimates) for Group2 (Level of Reading and Writing is an Obstacle)

The model fits the data for both groups very well. It yields a χ^2 (chi-square) of 206.347, degree of freedom = 158 and p value = 0.006 (which is significant at the level of 0.05), and Bollen-Stine p value = 0.696 (which is not significant at the level of 0.05). Other evidence also supports the goodness of fit of the model to the data (CMIN/DF = 1.306, RMSEA = 0.027, TLI = 0.977, CFI = 0.982, NFI = 0.930, GFI = 0.939, AGFI = 0.908)(see Figure 8.40 and Figure 8.41).

The chi-square difference tests reveal a significant difference across the baseline model and constrained model (structural weights model) because the degree of freedom increases = 20 (158-138), and CMIN increases = 33.633 (206.347-172.714), p = 0.029 (which is significant at the level of 0.05). There is no difference across the baseline mode and the constrained model (measurement weights model) because the degree of freedom increases = 6, and CMIN increases = 9.839, p = 0.132 (which is not significant at the level of 0.05) (see nested model comparisons in Appendix III – Part C)

These results indicate that although both groups can use the same path diagram but they have a significant difference in structural weights estimates. This initial test provides evidence that at least one or more of the direct effects differs significantly across the two subgroups. It is recommended to estimate a series of models to identify the specific paths that differ significantly across the two groups (Holmes-Smith, Cunningham & Coote 2006).

After analysing a series of models by constraining the direct paths, one at a time, it has been found that only two direct paths differ significantly across two groups (see Table 8.20). These direct paths are the direct paths between determinants and usage behaviour (PU → OTASK, and SE → OTASK). This indicates that these two paths are significant different in the regression weights estimates (see Table 8.20).

In summary, the first moderating hypothesis ($MH_1 8a$) is **accepted** but the second hypothesis ($MH_1 8b$) is **rejected.** The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by level of reading and writing but the influence of usage behaviour toward behaviour intention is not moderated by level of reading and writing. In other words, the direct paths between determinants (PU, PEOU, SI, FC and SE) and usage behaviour (TEACH and OTASK) differ across groups but the direct paths between usage behaviour and behaviour intention do not differ across groups.

These results of moderating hypotheses indicates that self-efficacy (SE) and perceived usefulness (PU) play important roles in influencing usage behaviour in other tasks (OTASK) for academics who perceived that their level of reading and writing are obstacles in using the Internet (group 2) than the other group (group1) (academics who thought oppositely).

It can be noticed that one group has a small sample size: academics who thought that their level of reading and writing are obstacles in using the Internet (57 subjects), requiring caution to generalise these findings to the population (as previously discussed).

	Group1 Estimate	Group2 Estimate	Group1 p value	Group2 p value	Path	Sig. Dif
TEACH <--- PU	.118	.206	.076	.122	a	no
TEACH <--- SE	.251	.077	***	.583	h	no
TEACH <--- PEOU	.265	.109	.004	.522	c	no
TEACH <--- SI	.021	.198	.578	.081	e	no
TEACH <--- FC	.106	-.085	.027	.396	g	no
OTASK <--- SE	**.190**	**.478**	*******	*******	**i**	**yes**
OTASK <--- PU	**.167**	**-.369**	**.050**	**.047**	**b**	**yes**
OTASK <--- TEACH	.226	.320	***	.115	j	no
OTASK <--- SI	-.001	.204	.963	.050	f	no
OTASK <--- PEOU	.118	.206	.076	.122	d	no
BITEACH <--- TEACH	.586	1.041	***	.001	k	no
BITEACH <--- OTASK	.181	-.123	.017	.460	m	no
BIOTASK <--- BITEACH	.606	.818	***	.024	o	no
BIOTASK <--- TEACH	-.407	-.715	***	.172	l	no
BIOTASK <--- OTASK	.599	.681	***	***	n	no

Table 8.20 Regression Weights of the Baseline Model for Group1 Compared with Group2 (Level of Reading and Writing)

*** A p value is statistically significant at the 0.01 level (two-tailed)
* A p value is statistically significant at the 0.05 level (two-tailed)
Sig. dif: yes = This path differs significantly across groups.
Sig. dif: no = This path does not differ significantly across groups.

8.8.9 Thai Language

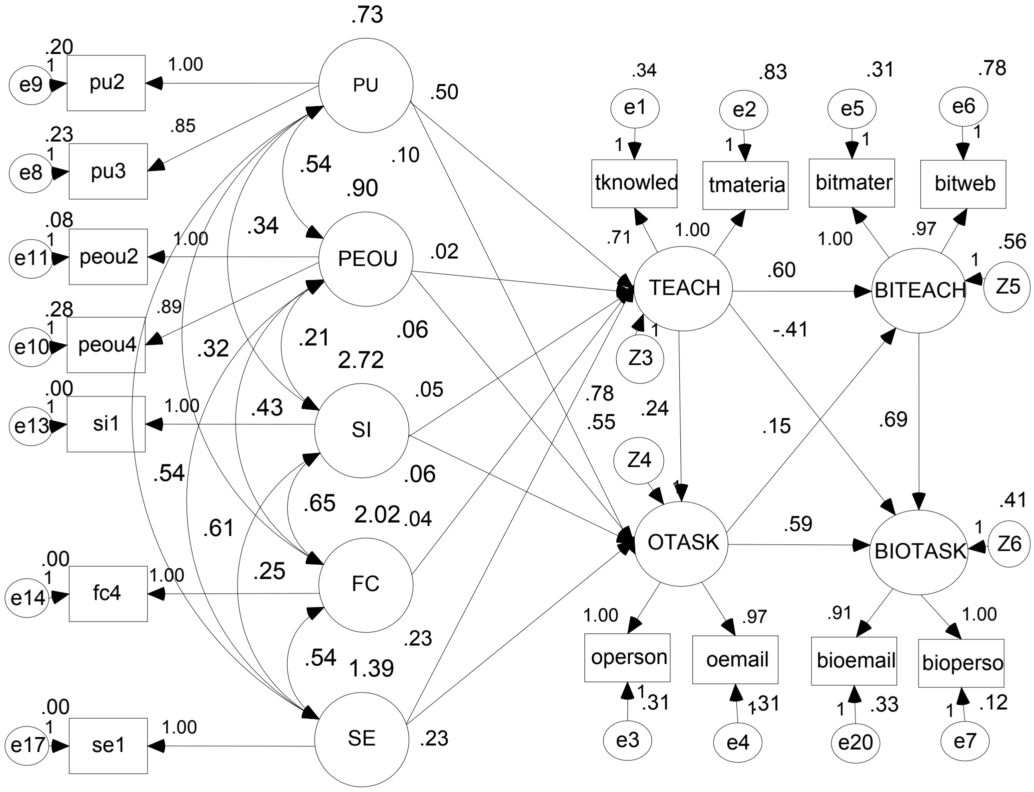
Two groups of academics are investigated: first is a group of academics who thought that Thai language is not an obstacle for them in using the Internet (254 subjects), and second is a group of academics who thought oppositely that Thai language is an obstacle for them in using the Internet (118 subjects).

This investigation will help to clarify whether perceptions of academics would moderate (1) the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (TEACH and OTASK), and (2) the influence of usage behaviour toward behaviour intention. The moderating hypotheses are:

$MH_1$9a: The influence of determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK) is moderated by Thai language.

$MH_1$9b: The influence of usage behaviour (TEACH and OTASK) on behaviour intention (BITEACH and BIOTASK) is moderated by Thai language.

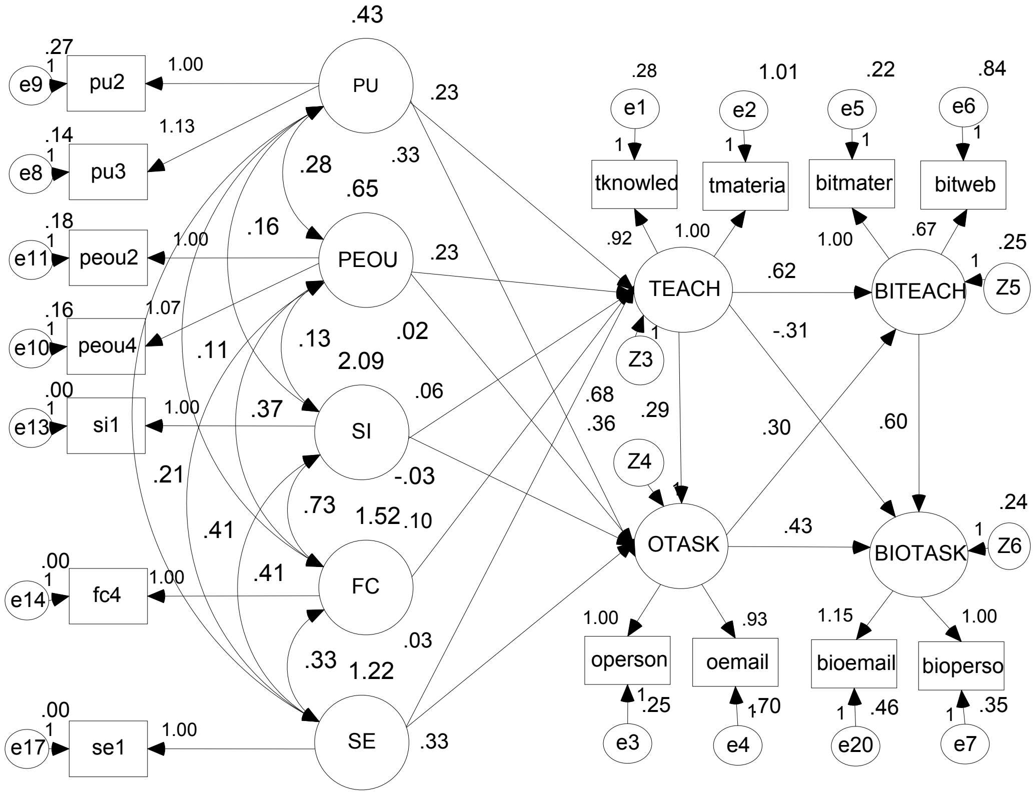
The path diagram of the baseline model (unconstrained model) for the first group (254 subjects) with unstandardised estimates is presented in Figure 8.42, and the baseline model (unconstrained model) for the second group (118 subjects) with unstandardised estimates is presented in Figure 8.43.



Thai Language is not an obstacle subjcets
Unstandardised Estimates,
Chi-square=225.665,
Degree of Freedom=136,
CMIN/DF=1.659, Probability=.000,
Bollen-Stine Probability= 0.124,
RMSEA=.042, TLI=.948, CFI=.966,
NFI=.921, GFI=.930, AGFI=.876,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.42 The Baseline Model (Multiple-Group Analysis) with Unstandardised Estimates for Group1 (Thai Language is not an Obstacle Subjects)

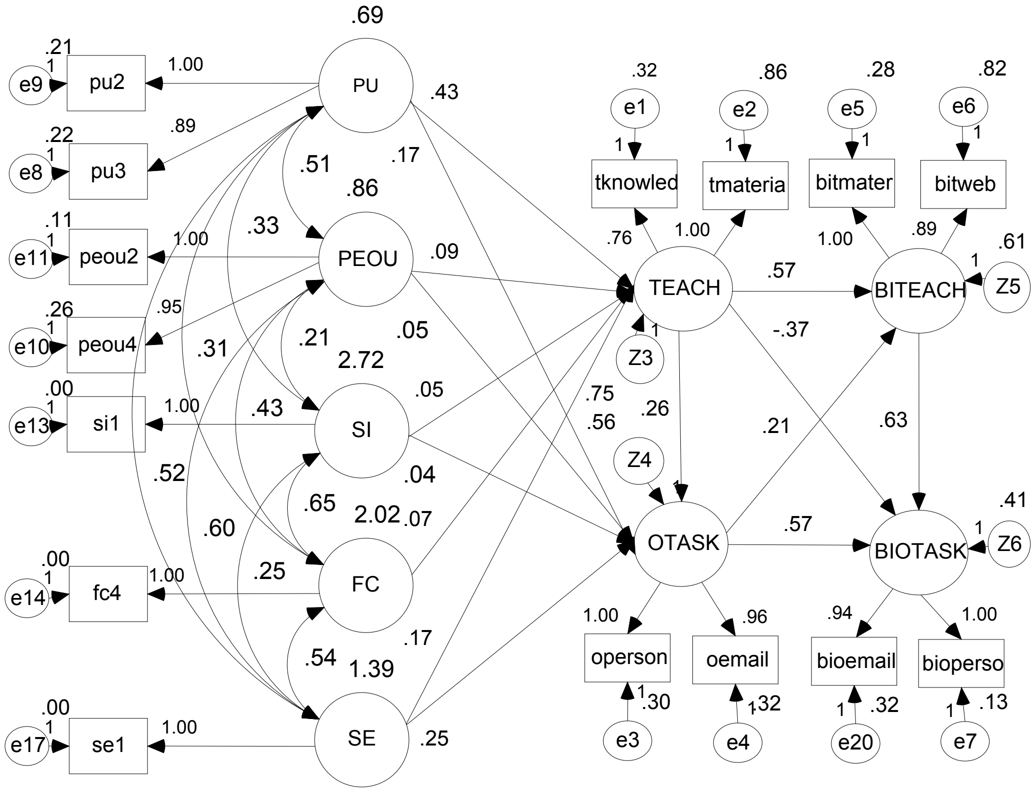


Thai Language is an obstacle subjects
Unstandardised Estimates,
Chi-square=225.665,
Degree of Freedom=136,
CMIN/DF=1.659, Probability=.000,
Bollen-Stine Probability= 0.124,
RMSEA=.042, TLI=.948, CFI=.966,
NFI=.921, GFI=.930, AGFI=.876,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.43 The Baseline Model (Multiple-Group Analysis) with Unstandardised Estimates for Group2 (Thai Language is an Obstacle Subjects)

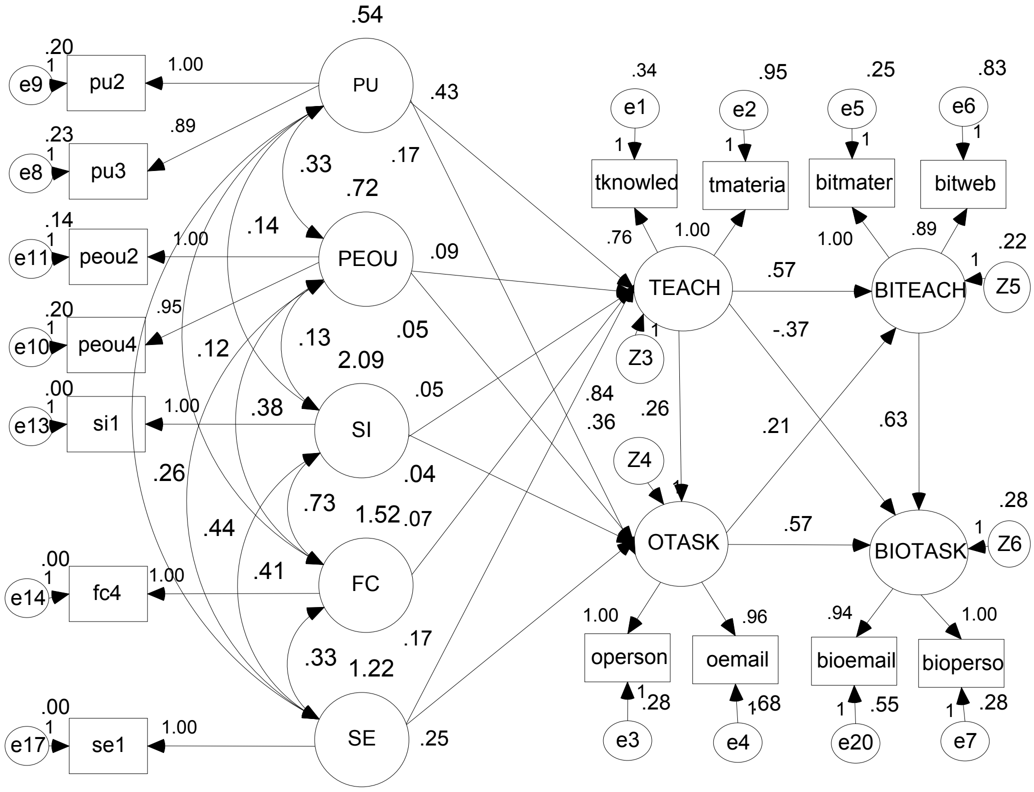
In multiple - group analysis, the baseline model (unconstrained model) is generated (in Figure 8.42 and Figure 8.43). It yields a χ^2 (chi-square) of 225.665, degree of freedom = 136 and p value = 0.000 (which is significant at the level of 0.05), and Bollen-Stine p value = 0.124 (which is not significant at the level of 0.05). It indicates that the model fits the data for both groups very well. Other evidence supports the goodness of fit of the model to the data (CMIN/DF = 1.659, RMSEA = 0.042, TLI = 0.948, CFI = 0.966, NFI = 0.921, GFI = 0.930, AGFI = 0.876). Consequently it indicates that both groups use the same path diagram but possibly difference parameter estimates. A further investigation will be made to find out whether their parameter estimates are significantly different. Figure 8.44 and Figure 8.45 present the constrained models (structural weights models) for both groups.



Thai Language is not an obstacle subjcets
Unstandardised Estimates,
Chi-square=250.112,
Degree of Freedom=157,
CMIN/DF=1.593, Probability=.000,
Bollen-Stine Probability= 0.155,
RMSEA=.040, TLI=.953, CFI=.965,
NFI=.912, GFI=.923, AGFI=.882,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.44 The Structural Weights Model (Multiple-Group Analysis) with Unstandardised Estimates for Group1 (Thai language is not an Obstacle Subjects)



Thai Language is an obstacle subjects
Unstandardised Estimates,
Chi-square=250.112,
Degree of Freedom=157,
CMIN/DF=1.593, Probability=.000,
Bollen-Stine Probability= 0.155,
RMSEA=.040, TLI=.953, CFI=.965,
NFI=.912, GFI=.923, AGFI=.882,

Five Exogenous Latent Constructs: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SI= Social Influence, FC = Facilitating Conditions, SE = Self-Efficacy
Four Endogenous Latent Constructs: TEACH = Internet Usage in Teaching, OTASK = Internet Usage in Other Tasks, BITEACH = Intention to Use the Internet in Teaching, BITEACH = Intention to Use the Internet in Other Tasks.

Figure 8.45 The Structural Weights Model (Multiple-Group Analysis) with Unstandardised Estimates for the Second Group (Thai language is an Obstacle Subjects)

The model fits the data for both groups very well (see Figure 8.44 and Figure 8.45) yields a χ^2 (chi-square) of 250.112, degree of freedom = 157 and p value = 0.000 (which is significant at the level of 0.05), and Bollen-Stine p value = 0.155 (which is not significant at the level of 0.05). Other evidence supports the goodness of fit of the model to the data (CMIN/DF = 1.593, RMSEA = 0.040, TLI = 0.953, CFI = 0.965, NFI = 0.912, GFI = 0.923, AGFI = 0.882).

There is a difference across the baseline mode and the constrained model (measurement weights model) because the degree of freedom increases = 6, CMIN increases = 13.771 and p value = 0.032 (which is significant at the level of 0.05) (see nested model comparisons in Appendix III – Part C). The chi-square difference test reveals a non-significant difference across the baseline model and constrained model (structural weights model) because the degree of freedom increases = 21 (157-136), and CMIN increases = 24.447 (250.112 - 225.665), p = 0.272 (which is not significant at the level of 0.05)(see nested model comparisons in Appendix III – Part C). Because we concentrate on the direct paths of the model, the difference across the baseline model and the measurement weights model are not taken into account here.

In summary, two moderating hypotheses are **rejected.** The influence of determinants toward usage behaviour, and the influence of usage behaviour toward behaviour intention are moderated by the perceptions of whether Thai language is an obstacle or not in using the Internet. Consequently, the direct paths from determinants (PU, PEOU, SI, FC and SE) toward usage behaviour (TEACH and OTASK), and the direct parts between usage behaviour (TEACH and OTASK) and behaviour intention (BITEACH and BIOTASK) do not differ for both groups.

When there is no difference across groups, we can look at the constrained model (structural weights model) for the significant paths for both groups (see Table 8.21). Three direct paths are statistically significant between determinants and usage behaviour (PU, and SE → TEACH and SE →OTASK). All six paths between usage behaviour and behaviour intention are statistically significant. It can be said that for both groups, perceived usefulness (PU) and self-efficacy (SE) play important roles in influencing academics to use the Internet in teaching (TEACH) and only self-efficacy significantly influences academics to use the Internet in other tasks (OTASK).

		Estimate	S.E.	C.R.	p value
TEACH	<--- PU	.429	.109	3.930	***
TEACH	<--- SI	.047	.037	1.274	.203
TEACH	<--- SE	.172	.059	2.917	.004***
TEACH	<--- FC	.068	.044	1.523	.128
TEACH	<--- PEOU	.088	.094	.933	.351
OTASK	<--- TEACH	.256	.060	4.260	***
OTASK	<--- SE	.248	.047	5.317	***
OTASK	<--- PU	.165	.087	1.907	.057
OTASK	<--- SI	.037	.028	1.339	.180
OTASK	<--- PEOU	.048	.071	.668	.504
BITEACH	<--- OTASK	.213	.072	2.954	.003***
BITEACH	<--- TEACH	.573	.070	8.183	***
BIOTASK	<--- BITEACH	.632	.097	6.521	***
BIOTASK	<--- TEACH	-.373	.089	-4.192	***
BIOTASK	<--- OTASK	.573	.072	8.008	***

Table 8.21 Regression Weights (The Structural Weights Model) for Both Groups (Thai Language)

*** A p value is statistically significant at the 0.01 level (two-tailed)

* A p value is statistically significant at the 0.05 level (two-tailed)

8.9 Summary

In this chapter, construct reliability and discriminant validity have been investigated. It has been found that after deleting some indicators, SMCs of indicators indicate good and acceptable reliability of indicator variables. Furthermore, after deleting some other indicators, it reflects the extent to which the constructs in a model are different. Therefore, it can be concluded that the constructs in a model reflect construct reliability and discriminant validity.

In this chapter, two steps of SEM data analyses are presented and discussed along with the results of testing hypotheses.

Step1 is a step of testing the research model by investigating only the determinants and behaviours without considering the impact of the moderators on the influence of the determinants/predictors. Three groups of hypotheses were tested. The result from this testing with modifications is the general model of technology acceptance. In this study, this model is called as an "Internet Acceptance Model"(IAM).

For hypotheses – group1, testing hypotheses between determinants and usage behaviour, only five null hypotheses were accepted from out of ten ($H_1$1a-$H_1$5a, and $H_1$1b-$H_1$5b). It indicated that perceived usefulness (PU) ($H_1$1a), perceived ease of use (PEOU) ($H_1$2a) and self-efficacy (SE) ($H_1$5a) significantly influenced usage behaviour in teaching (TEACH) (see Table 8.22). In addition, for hypotheses - group 2, perceived usefulness (PU) ($H_1$1b), and self-efficacy (SE) ($H_1$5b) significantly influenced usage behaviour in other tasks (OTASK) (see Table 8.22).

For hypotheses – group 3, testing hypotheses between usage behaviour and behaviour intention, all hypotheses were accepted ($H_1$6-$H_1$11), indicating that usage behaviour significantly influenced behaviour intention (see Table 8.23).

In conclusion, the Internet Acceptance Model (without the impact of moderators), has shown that perceived usefulness (PU), perceived ease of use (PEOU), and self-efficacy (SE) significantly influenced usage behaviour in teaching (TEACH). Concurrently, perceived usefulness (PU), and self-efficacy (SE) significantly influenced usage behaviour in other tasks (OTASK). The rest are not statistically significant. All six direct paths between usage behaviour and behaviour intention are statistically significant. More importantly, the model has power to explain 31.6 % of the variance of TEACH, 42.6% of the variance of OTASK, 55.7% of the variance of BITEACH, and 59.8% of the variance of BIOTASK (see figure 8.46).

Step2 is a step of testing the research model by investigating the impact of the moderators on the influence of the determinants/predictors by using multiple-group analysis. After testing the moderating hypotheses, the model that presents the impact of moderators is presented (see Figure 8.47).

Table 8.24 presents a summary of the moderating hypotheses together with a comparison of the baseline models with the structural weights models for testing of moderators, p values (some are not significant, some are significant at the level of 0.05), Bollen-Stine p values (which are not significant at the level of 0.05). The increase in the degree of freedom and increase in chi-square along with the p value for each testing of a moderator are presented. If a p value relating to the increase in chi-square and degree of freedom (df) is significant, it indicates the difference across groups associated with testing the impact of that moderator. The results of moderating hypotheses; whether they are accepted or rejected, are presented in last two columns of Table 8.24: the first group of moderating hypotheses are MH_1a1-MH_1a9; and the second group of moderating hypotheses are MH_1 b1-MH_1b9. Only four moderating hypotheses were accepted. These indicated that age (MH_1a2), acknowledgement of e-university plan (MH_1a6), and level of reading and writing (MH_1a8) significantly impacted the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (see Table 8.25), and age (MH_1b2), and acknowledgement of research university plan (MH_1b7) impacted the influence of usage behaviour toward behaviour intention (see Table 8.26).

After initial tests for all moderating hypotheses, further investigations have been made for the moderators that have significant impacts on the model by analysing a series of models (analysed 15 rounds, each round for each path). Paths that are significantly different across the baseline model and structural weights model are identified.

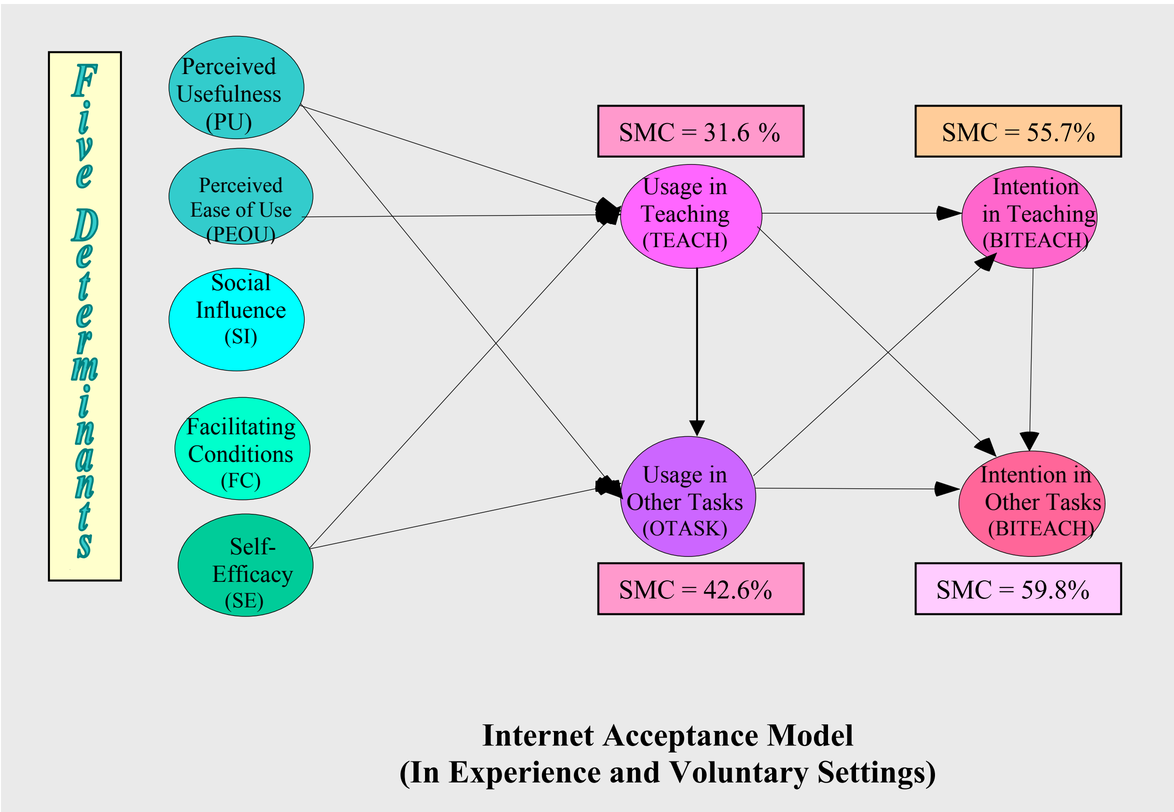


Figure 8.46 Internet Acceptance Model without the Impact of Moderators

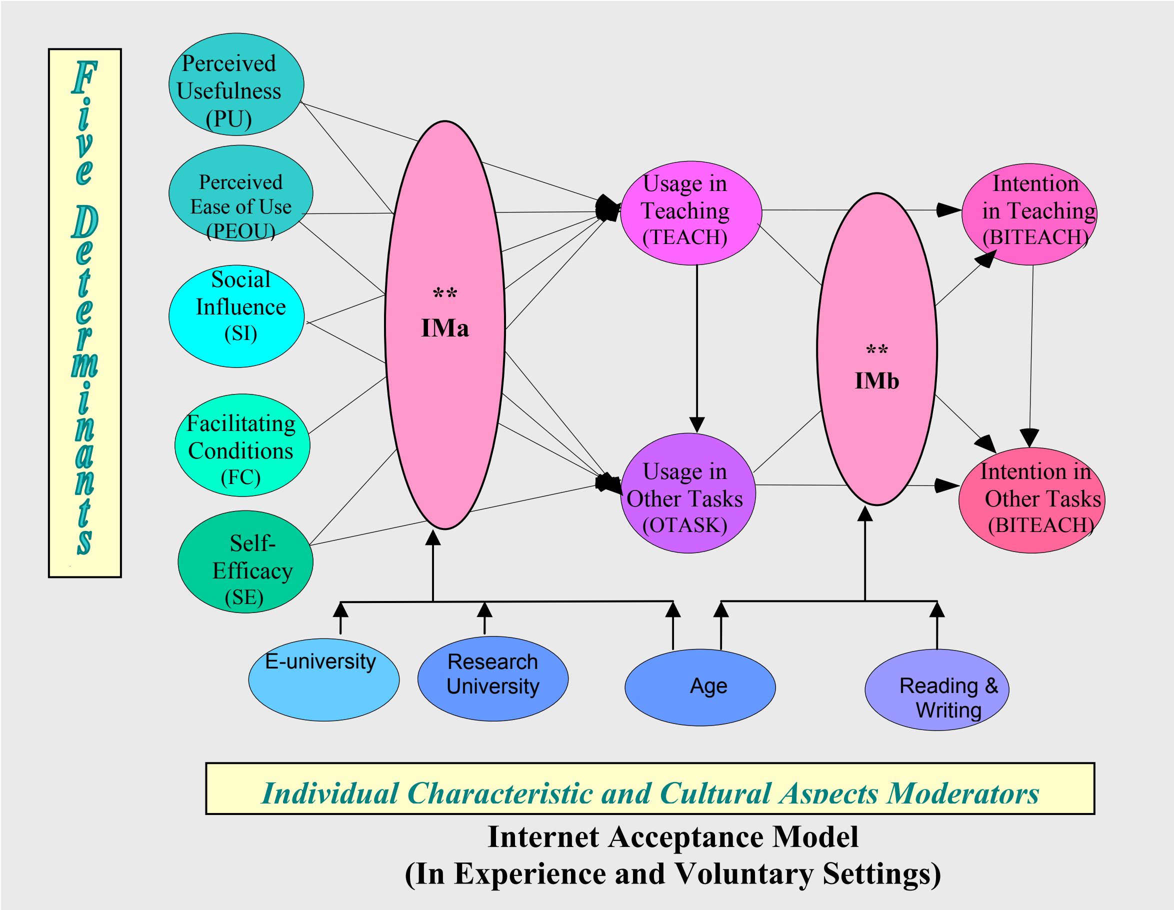


Figure 8.47 Internet Acceptance Model with the Impact of Moderators

** IMa : The impact of moderators on the direct paths between determinants and usage behaviour
** IMb : The impact of moderators on the paths between usage behaviour and intention

These hypotheses testings provided strong evident for the "Internet Acceptance Model" generated (see Figure 8.47). Only four moderators have significant impact on the model including (1) age, (2) e-university plan, (3) Research University plan, and (4) level of reading and writing.

In relation to age, it is evident that not only social influence (SI) and facilitating conditions (FC) play important roles in influencing usage behaviour in teaching (TEACH), but self-efficacy (SE) also plays important role in influencing usage behaviour in other tasks (OTASK) for older subjects than younger subjects. In addition, using the Internet in other tasks (OTASK) influences behaviour intention in other tasks (BIOTASK) more for younger subjects than older subjects.

According to e-university plan, it was found that perceived ease of use (PEOU) seems to play a more important role in influencing usage behaviour in teaching (TEACH) for academics who acknowledged e-university plan than academics who did not acknowledge e-university plan. In addition there is evidence that the influence of facilitating conditions (FC) on using the Internet in teaching (TEACH) and the influence of perceived ease of use (PEOU) on using the Internet in other tasks (OTASK) are significant different across groups.

In association with acknowledgement of research university plan, the significant difference between the two groups indicate that using the Internet in other tasks (OTASK) influences behaviour intention in other tasks (BIOTASK) for academics who acknowledged research university plan (group 1) more than academics who thought differently (group 2).

In addition, regarding level of reading and writing, self-efficacy (SE) and perceived usefulness (PU) play important roles in influencing usage behaviour in other tasks (OTASK) for academics who perceived that their level of reading and writing are obstacles in using the Internet (group 2) than the other group (group1) (academics who thought oppositely).

It can be noticed that in case of a small sample size (around 50 cases and less than 100 cases) caution is required in generalising the findings to the population (as previously mentioned).

Group (Moderator)	Baseline model- A (p, BSp)	Structural Weights Model- B (p & BSp)	Δ in df, and Δ chi-square, p value	Sig Diff A vs B	First group of MH_1 accepted?	Second group of MH_1 accepted?

Ho Number	Exogenous Latent Construct	Endogenous Latent Construct	Hypothesis Result	Explanation
$H_1$1a	Perceived usefulness (PU)	Usage in teaching (TEACH)	**Accepted**	PU significantly influenced usage in teaching(TEACH)
$H_1$2a	Perceived ease of use(PEOU)	Usage in teaching	**Accepted**	PEOU significantly Influenced usage in teaching
$H_1$3a	Social influence(SI)	Usage in teaching	Rejected	SI did not significantly influence usage in teaching
$H_1$4a	Facilitating conditions(FC)	Usage in teaching	Rejected	FC did not significantly influence usage in teaching
$H_1$5a	Self-efficacy(SE)	Usage in teaching	**Accepted**	SE significantly influenced usage in teaching
$H_1$1b	Perceived usefulness (PU)	Usage in other tasks (OTASK)	**Accepted**	PU significantly influenced usage in other tasks
$H_1$2b	Perceived ease of use(PEOU)	Usage in other tasks	Rejected	PEOU did not significantly Influence usage in other tasks
$H_1$3b	Social influence(SI)	Usage in other tasks	Rejected	SI did not significantly influence usage in other tasks
$H_1$4b	Facilitating conditions(FC)	Usage in other tasks	Rejected	FC did not significantly influence usage in other tasks
$H_1$5b	Self-efficacy(SE)	Usage in other tasks	**Accepted**	SE significantly influenced usage in other tasks

Table 8.22 Summary of the Influence of Determinants on Usage Behaviour (Before the Impact of Moderators)

Ho Number	Endogenous Latent Constructs	Endogenous Latent Constructs	Result	Explanation
$H_1$6	TEACH	OTASK	**Accepted**	TEACH has a significant influence on OTASK
$H_1$7	TEACH	BITEACH	**Accepted**	TEACH has a significant influence on BITEACH
$H_1$8	TEACH	BIOTASK	**Accepted**	TEACH has a significant influence on BIOTASK
$H_1$9	OTASK	BITEACH	**Accepted**	OTASK has a significant influence on BITEACH
$H_1$10	OTASK	BIOTASK	**Accepted**	OTASK has a significant influence on BIOTASK
$H_1$11	BITEACH	BIOTASK	**Accepted**	BITEACH has a significant influence on BIOTASK

Table 8.23 Summary of the Influence of Usage Behaviour on Behaviour Intention

1.Gender Male (173) Female (265)	p = 0.055 Bsp = 0.838	p = 0.082 Bsp = 0.864	df↑= 21, CMIN↑18.835, p = 0.596 (non-sig dif)	No	No	No
2. Age Younger(282) Older (168)	p = 0.040 Bsp = 0.798	p= 0.008 Bsp= 0.583	df↑= 20, CMIN↑35.221, p = 0.019 (sig dif)	Yes	Yes	Yes
3. Education Master(369) Doctoral(59)	p = 0.000 Bsp = 0.578	p = 0.000 Bsp = 0.623	df↑= 21, CMIN↑ 21.111, p = 0.452 (non-sig dif)	No	No	No
4. Academic position Lecturer(332) Higher(114)	p = 0.005 Bsp = 0.545	p = 0.010 Bsp = 0.618	df↑= 20, CMIN↑17.395,p = 0.627 (non-sig dif)	No	No	No
5. Experience Low (50) Moderate (314) High (89)	p = 0.000 Bsp = 0.187	p = 0.000 Bsp = 0.510	df↑= 21, CMIN↑ 22.858, P = 0.352 (non-sig dif)	No	No	No
6. E-university Acknowledged e-u(296) Unacknowledged e-u (79)	p = 0.000 Bsp = 0.191	p = 0.000 Bsp = 0.113	df↑= 21, CMIN↑ 37.617, p = 0.014 (sig dif)	Yes	Yes	No
7. Research university Acknowledged research u(389) Unacknowledged research u(52)	p = 0.000 Bsp = 0.342	p = 0.000 Bsp = 0.295	df↑= 20, CMIN↑ =31.899, p = 0.044 (sig dif)	Yes	No	Yes
8. Level of reading and writing Group1(360) Group 2(57)	p = 0.024 Bsp = 0.797	p = 0.006 Bsp = 0.696	df↑= 20, CMIN↑ 33.633, p = 0.029 (sig dif)	Yes	Yes	Yes
9. Thai language Group1(254) Group2(118)	p = 0.000 Bsp = 0.124	p = 0.000 Bsp = 0.155	df↑= 21, CMIN↑ 24.447, p = 0.272 (non-sig dif)	No	No	No

Table 8.24 Summary of Moderating Hypotheses

****MH No.**	**Exogenous Latent Constructs**	**Endogenous Latent Constructs**	**Moderator**	**Result**	**Explanation**
$MH_1$1a	PU, PEOU,	TEACH,	Gender	Rejected	Gender did not

	SI, FC, SE	OTASK			significantly moderate the influence of predictors
MH$_1$2a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Age	**Accepted**	Age significantly moderated the influence of predictors
MH$_1$3a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Education	Rejected	Education did not significantly moderate the influence of predictors
MH$_1$4a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Academic position	Rejected	Position did not significantly moderate the influence of predictors
MH$_1$5a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Experience	Rejected	Experience did not significantly moderate the influence of predictors
MH$_1$6a	PU, PEOU, SI, FC, SE	TEACH, OTASK	E-university	**Accepted**	E-university significantly moderated the influence of predictors
MH$_1$7a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Research university	Rejected	Research university did not significantly moderate the influence of predictors
MH$_1$ 8a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Level of reading & writing	**Accepted**	Level of reading & writing significantly moderated the influence of predictors
MH$_1$9a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Thai language	Rejected	Thai language did not significantly moderate the influence of predictors

Table 8.25 Summary of the Impact of Moderators on the Influence of Determinants on Usage Behaviour

** MH No. = Moderating hypotheses number

****MH No.**	**Endogenous Latent Constructs**	**Endogenous Latent Constructs**	**Moderator**	**Result**	**Explanation**
MH$_1$1b	TEACH,	BITEACH,	Gender	Rejected	Gender did not

	OTASK	BIOTASK			significantly moderate the relationships
MH_12b	TEACH, OTASK	BITEACH, BIOTASK	Age	**Accepted**	Age significantly moderate the relationships
MH_13b	TEACH, OTASK	BITEACH, BIOTASK	Education	Rejected	Education did not significantly moderate the relationships
MH_14b	TEACH, OTASK	BITEACH, BIOTASK	Academic position	Rejected	Position did not significantly moderate the relationships
MH_15b	TEACH, OTASK	BITEACH, BIOTASK	Experience	Rejected	Experience did not significantly moderate the relationships
MH_16b	TEACH, OTASK	BITEACH, BIOTASK	E-university	Rejected	E-university did not significantly moderate the relationships
MH_17b	TEACH, OTASK	BITEACH, BIOTASK	Research university	**Accepted**	Research university significantly moderate the relationships
MH_18b	TEACH, OTASK	BITEACH, BIOTASK	Level of reading & writing	Rejected	Level of reading & writing did not significantly moderate the relationships
MH_19b	TEACH, OTASK	BITEACH, BIOTASK	Thai language	Rejected	Thai language did not significantly moderate the relationships

Table 8.26 Summary of the Impact of Moderators on the Influence of Usage Behaviour toward Behaviour Intention Variables

** MH No. = Moderating hypotheses number

CHAPTER 9
CONCLUSIONS AND SUGGESTIONS

9.1 Introduction

The purpose of this final chapter is to summarise the findings of the study, especially the Internet Acceptance Model along with theoretical, methodological and practical implications. The limitations of the study and suggestions for further research are also discussed.

9.2 Key Findings

As mentioned in chapter 5, there were seven research objectives for this study.

15. To review literature in respect of nine prominent theories and models including Innovations Diffusion Theory (IDT), Social Cognitive Theory (SCT), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Decomposed Theory of Planned Behaviour (DTPB), Technology Acceptance Model (TAM), Technology Acceptance Model 2(TAM2), Augmented TAM or Combined TAM and TPB (C-TAM-TPB), and The Unified Theory of Acceptance and Use of Technology (UTAUT).

16. To review previous literature about IT acceptance/adoption and usage within four contexts of study include technology, individual, organisational, and cultural contexts.

17. To investigate the extent to which Thai business academics use and intend to use the Internet in their work.

18. To investigate how to motivate Thai business academics to make full use of the Internet in their work.

19. To investigate to what extent using the Internet helps to improve academics' professional practice, professional developments and quality of working life.

20. To formulate a model of technology acceptance of Internet usage by Thai academics.

21. To generate and validate a research model that best describes Thai academics' Internet usage behaviour and behaviour intention.

The first and second research objectives were conducted and presented in Chapter 4, and Chapter 5. The third, fourth and fifth research objectives of this study were fulfilled by the findings from data analysis in Chapter 7. The sixth research objective was conducted and presented in Chapter 5. The seventh research objective was conducted and presented in Chapter 8.

The findings associated with academics' demographic characteristics, background of Internet usage, Internet usage and Intention to use, difference between two groups, motivation to make full use of the Internet, professional practice, personal development, quality of working life will be briefly summarised and discussed according to the third, fourth and fifth research objectives. Other important key findings according to the seventh research objective will be briefly summarised and discussed in the Internet Acceptance Model topic later in this chapter.

9.2.1 Demographic Characteristics

1) Gender and Age

Demographic characteristics of the academic sample revealed that the number of female academics was almost twice the number of male academics (female = 60.5% and male = 39.5%). A large number of academics in the universities were in the younger age group (age 20-39 years = 62.7%), older academics (age = 40 years up = 37.3%) were about 50% of younger academics. The proportion of younger to older academics is roughly two to one. In particular, younger female subjects were twice as numerous as their younger male counterparts (younger female subjects = 61.4%, younger male subjects = 38.6%, but not in older subjects (older female subjects = 59%, older male subjects= 41%). It is clear that younger female academics have already played important roles in teaching and teaching related tasks in the Thai education system particularly in Business Schools. Nevertheless, it was not implied that younger female subjects or older female subjects also played important roles in the top management teams of these Business Schools. It is possible that the proportion of females to males in the management teams may be different.

2) Education Level and Academic Position

The number of academics who graduated at Master Degree level (82.9%) was far greater than those who graduated at Doctoral level (13.3%), and Bachelor degree level (3.8%). On average, only 10.8% of females and 17.2% of males have Doctoral degree. From this finding, it is questioned why there was a difference in educational opportunities at the highest education level between males and females in Thai Business Schools. The group of Doctoral degree subjects comprised 72.4% older academics and 27.6% younger academics. Moreover, in the younger group, only 5.9% have Doctoral degree and in the older group, 25% have a Doctoral degree.

The lack of doctoral degrees in Thai Business Schools was clear (only 13.3%). The number of doctoral degree academics should be a lot more; maybe it should be at least 50% of academics according to the average proportion of PhD academics in the two top universities in Thailand. These are 46.7% for Chulalongkorn University and 57% for Mahidol University (see Appendix IV – Part A). It is expected that the more academics who graduate at the Doctoral level, the greater the expectation of reasonable prospects for the universities in achieving the goal of research oriented university. The experience and knowledge of Doctoral degree academics will benefits the teaching and learning process. It will benefit the students, the university level, and finally the country.

Although, at present the government has provided many scholarships to academics in the Thai Public University Sector these are still not enough to fulfil academic demand to increase their education level. In Thai tradition of studying at doctoral level, most academics wish to study aboard in USA, Great Britain, and Australia. Study in these countries will be 4 to 5 times more expensive than studying within the country.

Therefore, if the government or the universities do not give any support, it will be impossible for them to support themselves. Moreover, not only are there not enough Universities in Thailand that could provide the study at this level but they also cannot provide the specific areas of study to suite the demand of academics. Unfortunately, because of this, some would be stuck at the Master Degree level until time for them to retire.

Lastly, only 25.6% of academics were in the higher positions (assistant professor, associate professor and professor) while 74.4% of academics were lecturers. In Thailand, teaching orientation still impacted the work of academics who usually spend most of their time in teaching in class or administrative tasks, less in research or writing books or producing journal articles which are the basic requirements of receiving academic positions. Since each university has a goal to be a research oriented university in the future, it could take quite some times in the transition stage especially in relation to the adaptations of academics themselves toward the goal of the university. It is also expected that the average proportion of academics who have higher academic positions will be gradually higher as well. Since academics should spend more times on research and writing journal articles, in turn these will assist academics to be promoted in the higher positions.

9.2.2 Background of Internet Usage

1) General Information

From the descriptive analysis of the background of Internet usage, there was evidence that a great number of academics (58.5%) have used the Internet for a long period of time (about 6-10 years) and 61.5% of them used the Internet "several times a day". Around 69.3 % of academics assessed themselves as "moderate experience", and 48.9% of them thought that they used the Internet enough, but almost half of them (47.8%) indicated that they still have not used the Internet enough. Academics (60.9%) identified that they mostly accessed the Internet at their office in doing their work and when they used the Internet at their office, almost all of them accessed the Internet via the university network (92.1%).

2) Experience

In terms of level of experience, 30.1% of males assessed themselves as having high experience compared with only 13.3% of females. It can be said that on average males have higher experience than females. This may be because in nature, males are more likely to love challenging the new technology than females and they are also more active in trying to improving their experience with new technology than females.

In addition, about a quarter of younger academics (25.2%) assessed themselves as high experience while only 10.2% of older academics assessed themselves as high experience. This indicated that on average more younger academics indicated that they have high Internet experience than older subjects.

3) Frequency of Current Internet Usage

It is clear that nearly three quarters of younger subjects (72%) used the Internet most frequently "use several times a day" but only 44% of older subjects used the Internet "several times a day". So in average, a greater number of younger subjects used the Internet several times a day more than the number of older academics.

4) Adequacy of Using the Internet

Most males (57.2%) thought that they used the Internet enough as did 42.6% of females. In addition, 38.2% of males thought that they still did not use the Internet enough, and while 54.7% of females thought this. Females still need to use the Internet more.

Lastly, 51.1% of younger subjects (age 20-39 years), indicated that they used the Internet enough compared to only 45.8% of older subjects (age 40 years up). But 44.7% of younger academics thought that they still did not use the Internet enough compared to only 52.4% of older academics. Therefore, younger subjects used the Internet more than older subjects.

9.2.3 Internet Usage and Intention to Use on Average

It has been found that some academics hardly used the Internet ('used a few times a month') for teaching in class (task 1) (mean = 3.49) and providing a personal web-base for facilitating teaching (task 2) (mean = 3.49), but they intended to use it more ("a few times a week") in the future (mean = 4.84 for task 1, and mean = 5.09 for task 2). On the other hand, academics have already used the Internet rather often ("five to six times a week" in five tasks (task 4, 6, 8, 9, and 10)(mean ≈ 6.00) including enhancing teaching knowledge, searching information for their research, personal tasks, enhancing personal knowledge, and using email for personal contact and they intended to use it a little bit more in the future ("five to six times a week"), but still in the same category.

9.2.4 Majority of Internet Usage and Intention to Use

Relating to the highest frequency of usage and intention to use the Internet "use several times a day":

1) The highest number of academics used (29%) and intended to use (29.4%) the Internet for enhancing personal knowledge.

2) The next group were different because 26.3% of academics used email for personal contact but 27.9% of academics intended to use the Internet for their research. It seems that academics intended to change their behaviours to using the Internet for their research in the future rather than just using email for personal contact.

3) The slightly smaller group used (25.1%) and intended to used (26.5%) the Internet for enhancing teaching knowledge.

It can be noticed that although 24.8% of academics "did not use the Internet at all" in teaching in class, and 23.9% of them did not use personal web-base for facilitating teaching at all, fortunately, they intended to use the Internet more in these tasks in future.

9.2.5 Difference between Two Groups

1) Gender

The results of the T-test provided interesting information that males significantly used the Internet more often than females:

- in teaching in classes
- using email for student contact and giving advice

In addition males significantly intended to use the Internet more often than females:

- in teaching in classes
- providing a personal web-base for facilitating teaching

2) Age

Regarding age comparison, the findings of T-tests indicated that younger academics significantly used the Internet more than older subjects in four teaching and teaching related tasks:

- accessing a personal web-base for facilitating teaching
- preparing teaching materials
- enhancing teaching knowledge
- using email for student contact and giving advice

Moreover, younger academics significantly used the Internet more than older subjects in three other tasks:

- in personal tasks
- enhancing personal knowledge
- using email for personal contact

In terms of intention to use the Internet, younger academics significantly intended to use the Internet more than older academics in three tasks:

- preparing teaching materials

- searching information for research
- enhancing personal knowledge

3) Education

Doctoral degree subjects significantly used and intended to use the Internet more often than master degree subjects in 3 tasks:

- used and intended use of the Internet in searching information for research.
- intended use of the Internet in personal tasks.
- intended use of email for personal contact.

4) Academic Position

In relation to academic position, it was against my expectations that lecturer subjects significantly used the Internet more often than higher position subjects in 4 tasks:

- teaching in class
- enhanced teaching knowledge
- personal tasks
- using email for personal contacts

5) Experience

It was in accordance with my expectation that high experience subjects significantly used and intended to use the Internet more often than moderate experience subjects in eight tasks (out of 10 tasks). There was no significant difference in two tasks (1) using email for student contact and giving advice, and (2) using the Internet for personal tasks.

9.2.6 Motivations to Make Full Use of the Internet

1) General Information

To some extent, academics still have not made full use of the Internet in their work. They intended to use the Internet more in all types of work in the future (mean = 5.31). Academics acknowledged three important motivating factors:

- If good facilities were available to support usage (e.g. good computer hardware and software, good communication network) (mean = 5.86).

- University policy to be a research oriented university (mean = 5.67).

- University policy to be an e-University (mean = 5.59).

Therefore, in general, if the university wants to motivate academics to make full use of the Internet in their work, the university should pay attention in these three motivations by providing good facilities, and trying to promote information regarding the importance of these two policies toward all academics.

2) Group Comparisons

Significant differences across groups were found relating to education level and experience. No significant difference between groups was found relating to gender and age.

Education Level

More specifically, the results of T-tests provided further information, on these motivations that were perceived as being more important for doctoral degree subjects than master degree subjects in motivating them to make full use of the Internet in their work.

Experience

In terms of experience, the results of t-tests also provided information about the availability of technicians and training, which were perceived as more important for moderate experience subjects than for high experience subjects in motivating them to make full use of the Internet in their work.

9.2.7 Professional Practice

Academics agreed that using the Internet helped in improving their professional practice (6.01), in particular in helping to prepare teaching materials (mean = 5.89) and to improve their research (mean = 6.01). Nevertheless, they were less convinced that using the Internet helped them to improve teaching in class (mean = 5.69), and to improve administrative tasks (mean = 5.59).

The agreements of high experience subjects were significantly different from those moderate experience subjects in that they were more likely agreed that using the Internet helped improving their professional practice than those moderate experience subjects.

9.2.8 Personal Development

Academics agreed that Internet usage affected their personal development (mean = 6.09), in particular, in helping to improve their academic knowledge (mean = 6.21) and their personal knowledge (mean = 6.22).

No significant difference can be seen in gender, age, education, and experience of academics associated with using the Internet to help improve personal development.

9.2.9 Quality of Working Life

1) General Information

Academics agreed that the Internet helped improve quality of working life (mean = 5.96), particularly in:

- saving expense by getting information free of charge from e-journals (mean = 5.81).
- saving expense in communication with others by using email (mean = 5.97).

In contrast, they were significantly less convinced that using the Internet helped them to have more time for leisure (mean = 4.91). Moreover, they were not fully convinced that using the Internet helped them to have more time for creative thinking (mean = 5.57).

2) Group Comparisons

Gender

The views of male subjects were significantly different from those of the females, in that males were more likely to agree that using the Internet helped them to have more time for creative thinking and for leisure.

Age

Younger subjects were more likely to agree that using the Internet helped them improve their quality of working life especially providing more time for creative thinking, and saving expense, than older subjects.

Experience

Overall, the views of high experience subjects were also significantly different from moderate experience subjects in that they were more likely to agree that using the Internet helped improve their quality of working life than those moderate experience subjects. It was found that the more experience academics had about the Internet; the more they agreed that using the Internet helped improve their quality of working life by saving expense.

9.3 The Internet Acceptance Model

This research aimed to integrate some essential elements of nine prominent theories/models on individual acceptance of information technology into the proposed research model.

- Firstly, I identified and discussed the nine specific models of determinants of intention and usage of information technology, knowledge derived from studying these theories/model helped to form the research model (see Figure 9.1).

- Secondly, the literature about the technology acceptance and usage in the field of Information Systems has been reviewed within four contexts of study including technology, individual, organisational, and cultural contexts.

- Thirdly, the proposed research model was formulated with (1) five determinants (perceived usefulness (PU), perceived ease of use (PEOU), social influence (SI), facilitating conditions (FC) , and self-efficacy (SE), and (2) five individual characteristics moderators (gender, age, education level, academic position, and experience) and four cultural aspect moderators (e-university plan, Research University plan, level of reading and writing, and Thai language).

- Fourthly, the proposed research model was tested and modified using the 455 usable data derived from the cross-sectional survey of academics within Business Schools in 20 Public universities in Thailand.

- Fifthly, the "Internet Acceptance Model" was introduced with and without the impact of moderators after the proposed research model had been tested and modified using SEM as a statistical technique with AMOS version 6.0.

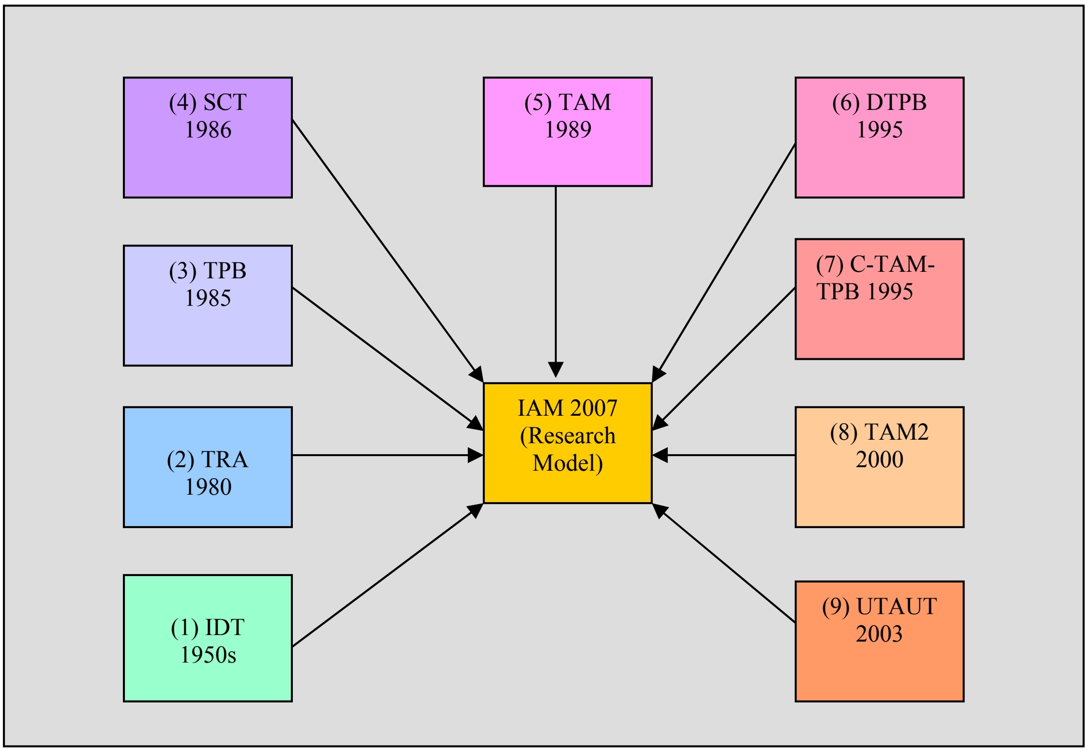


Figure 9.1 Formation of the Research Model (Internet Acceptance Model - IAM) Based on Nine Theories/Models

9.3.1 Results of Hypotheses Testing

In testing and making modifications associated with the proposed research model, two groups of hypotheses were tested:

1) Direct paths hypotheses
2) Moderating hypotheses

For direct paths hypotheses which comprised three groups of hypotheses, it was found that:

1) Only three hypotheses were accepted from five ($H_1$1a-$H_1$5a): perceived usefulness (PU) ($H_1$1a), perceived ease of use (PEOU) ($H_1$2a) and self-efficacy (SE) ($H_1$5a) each significantly influenced usage behaviour in teaching (TEACH)(see Table 9.1).

2) Only two null hypotheses were accepted from five ($H_1$1b-$H_1$5b): perceived usefulness (PU) ($H_1$1b) and self-efficacy (SE) ($H_1$5b), significantly influenced usage behaviour in other tasks (OTASK) (see Table 9.1).

3) All null hypotheses ($H_1$6-$H_1$11) were accepted, indicating that usage behaviour significantly influenced behaviour intention (see Table 9.2).

The moderating hypotheses comprised two groups: the first group ($MH_1$1a-$MH_1$9a), and the second group ($MH_1$1b-$MH_1$9b). Only three moderating hypotheses in the first group were accepted indicating that age ($MH_1$2a), e-university ($MH_1$6a), and level of reading and writing ($MH_1$8a) significantly impacted the influence of determinants (PU, PEOU, SI, FC, and SE) toward usage behaviour (see Table 9.3).

In addition, only two moderating hypotheses in the second group were accepted, indicating that age ($MH_1$2b) and research university plan ($MH_1$7b) impacted the influence of usage behaviour towards behaviour intention (see Table 9.4).

These hypotheses testing provided strong evident for the "Internet Acceptance Model" being generated (see Figure 9.2).

H_o Number	**Exogenous Latent Constructs**	**Endogenous Latent Construct**	**Hypothesis's Result**	**Explanation**
$H_1$1a	Perceived usefulness (PU)	Usage in teaching (TEACH)	**Accepted**	PU significantly influenced usage in teaching(TEACH)
$H_1$2a	Perceived ease of use(PEOU)	Usage in teaching	**Accepted**	PEOU significantly Influenced usage in teaching
$H_1$5a	Self-efficacy(SE)	Usage in teaching	**Accepted**	SE significantly influence usage in teaching
$H_1$1b	Perceived usefulness (PU)	Usage in other tasks (OTASK)	**Accepted**	PU significantly influenced usage in other tasks
$H_1$5b	Self-efficacy(SE)	Usage in other tasks	**Accepted**	SE significantly influence usage in other tasks

Table 9.1 Summary of the Significant Influence of Determinants on Usage Behaviour

H_o Number	Endogenous Latent Construct	Endogenous Latent Construct	Hypothesis's Result	Explanation
$H_1$6	TEACH	OTASK	**Accepted**	TEACH has a significant influence on OTASK
$H_1$7	TEACH	BITEACH	**Accepted**	TEACH has a significant influence on BITEACH
$H_1$8	TEACH	BIOTASK	**Accepted**	TEACH has a significant influence on BIOTASK
$H_1$9	OTASK	BITEACH	**Accepted**	OTASK has a significant influence on BITEACH
$H_1$10	OTASK	BIOTASK	**Accepted**	OTASK has a significant influence on BIOTASK
$H_1$11	BITEACH	BIOTASK	**Accepted**	BITEACH has a significant influence on BIOTASK

Table 9.2 Summary of the Significant Influence of Usage Behaviour on Behaviour Intention

**MH No.	Exogenous Latent Construct	Endogenous Latent Construct	Moderator	Hypothesis's Result	Explanation
$MH_1$2a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Age	**Accepted**	Age significantly moderated the influence of predictors
$MH_1$6a	PU, PEOU, SI, FC, SE	TEACH, OTASK	E-university	**Accepted**	E-university significantly moderated the influence of predictors
$MH_1$8a	PU, PEOU, SI, FC, SE	TEACH, OTASK	Level of reading & writing	**Accepted**	Level of reading & writing significantly moderated the influence of predictors

Table 9.3 Summary of the Significant Impact of Moderators on the Influence of Determinants on Usage Behaviour

** MH No. = Moderating Hypotheses Number

**MH No.	Usage Variables	Behaviour Variables	Moderator	Hypothesis's Result	Explanation
$MH_1$2b	TEACH, OTASK	BITEACH, BIOTASK	Age	**Accepted**	Age significantly moderated the relationships
$MH_1$7b	TEACH, OTASK	BITEACH, BIOTASK	Research university	**Accepted**	Research university significantly moderated the relationships

Table 9.4 Summary of the Significant Impact of Moderators on the Relationships of Usage and Behaviour Intention Variables

** MH No. = Moderating hypotheses number

9.3.2 Internet Acceptance Model (without the Impact of Moderators)

The Internet Acceptance Model without the impact of moderators posits three significant determinants of usage in teaching (TEACH) (perceived usefulness (PU), perceived ease of use (PEOU) and self-efficacy (SE)) and two significant determinants of usage in other tasks (perceived usefulness (PU) and self-efficacy (SE)). From this finding, it can be suggested that academics used the Internet in teaching and in other tasks because of perceived usefulness (PU) and self-efficacy (SE). In addition, in teaching, academics also used the Internet because of perceived ease of use (PEOU). This indicates that sometimes academics may not have used the Internet in teaching and teaching related tasks because they thought that the Internet was not easy to use or there were obstacles related to using it. In other words, academics still use the Internet in teaching less than in other tasks, but those who use the Internet in teaching did so because they perceived that the Internet was easy to use.

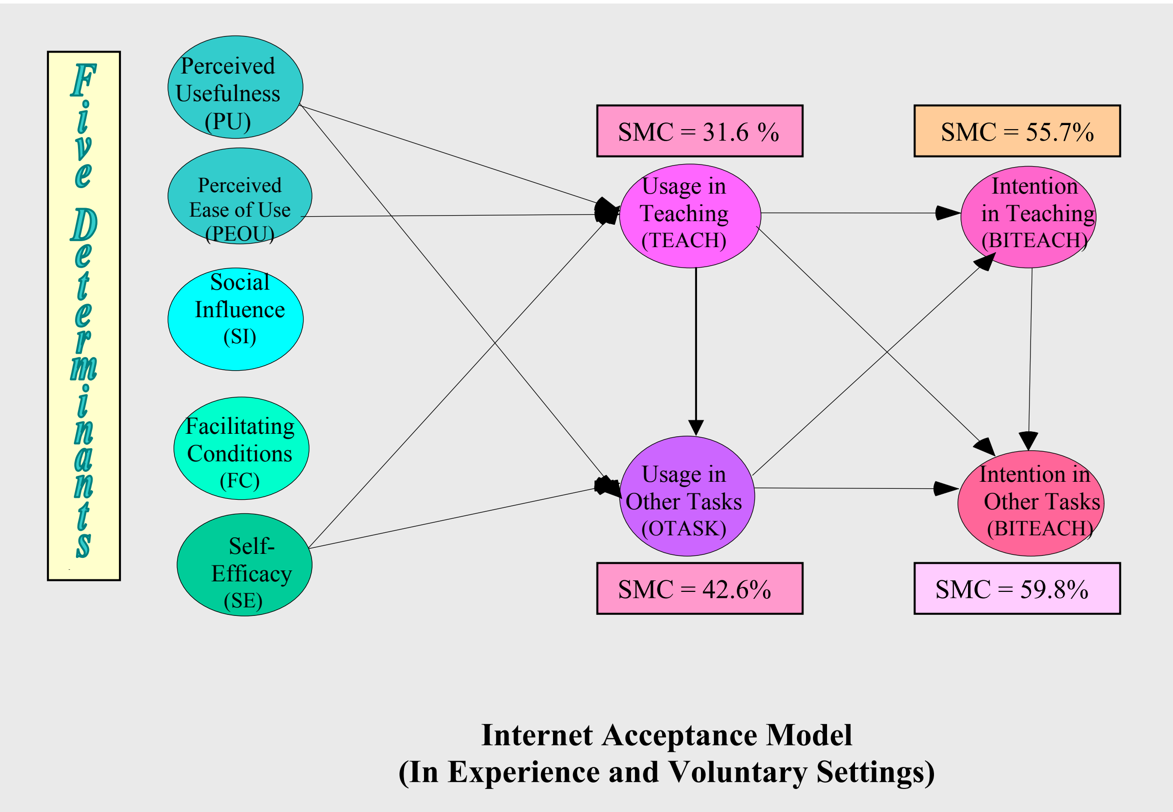


Figure 9.2 Internet Acceptance Model without the Impact of Moderators

*Only significant paths (p values at the 0.01 or 0.05 level (two-tailed) are presented.

Perceived usefulness was an important determinant. The findings suggest that academics used the Internet because they believed that the Internet was useful. This perception motivated them to utilise the technology for their work.

In addition, self-efficacy was another important determinant. The findings suggest that whenever academics used the Internet either in teaching or in other tasks the rationale behind usage was their perceptions that they were able to use the technology. They thus used the technology because of self-confidence associated with their abilities in using the technology.

The generated model is well capable of explaining the variances in four latent constructs by examining the Square Multiple Correlation (SMC). SMC is analogous to the R^2 statistic (Sharma 1996). The SMC values in relation to these constructs are:

- Usage behaviour in teaching (TEACH) (SMC = 31.6%).
- Usage behaviour in other tasks (OTASK) (SMC = 42.6%).
- Behaviour intention in teaching (BITEACH) ((SMC = 55.7%).
- Behaviour intention in other tasks (BIOTASK) (SMC = 59.8%).

It should be noticed that the study was conducted in the experience and voluntary settings (academics used the Internet by their own free will). The capabilities in explaining the variances of usage behaviour and behaviour intention of the model (before incorporating nine moderators), presented an improvement over almost all of the original nine model/theories and their extensions. According to a study of Venkatesh et al (2003) R^2 of IDI was 39 %, SCT (36%), TRA (19%), TPB (21%), TAM (37%), TAM2 (37%), C-TAM-TPB (39%), and UTAUT (36%)(not pooled data together) respectively (see Table 4.1 in Chapter 4).

9.3.3 Internet Acceptance Model (with the Impact of Moderators)

When considering the impact of moderators, it was found that not only age, e-university plan, and level of reading and writing had significant impacts on the influence of determinants toward usage behaviour but also age and Research University plan each had a significant impact on the relationships of usage behaviour and behaviour intention. These four moderators were integrated as features into the Internet Acceptance Model (see Figure 9.3).

1) Age

The affect of social influence (SI) and facilitating conditions (FC) on usage behaviour in teaching (TEACH) were moderated by age such that the effects become significant for older subjects. Despite the fact that the influence of self-efficacy (SE) on usage behaviour in other tasks was still significant as before considering the impact of the moderator, age has moderated the influence such that the effects become stronger for older subjects. In addition, age has impacted the relationships between usage behaviour and behaviour intention such that the relationship between OTASK and BIOTASK becomes more important for younger subjects than older subjects (with statistically significance).

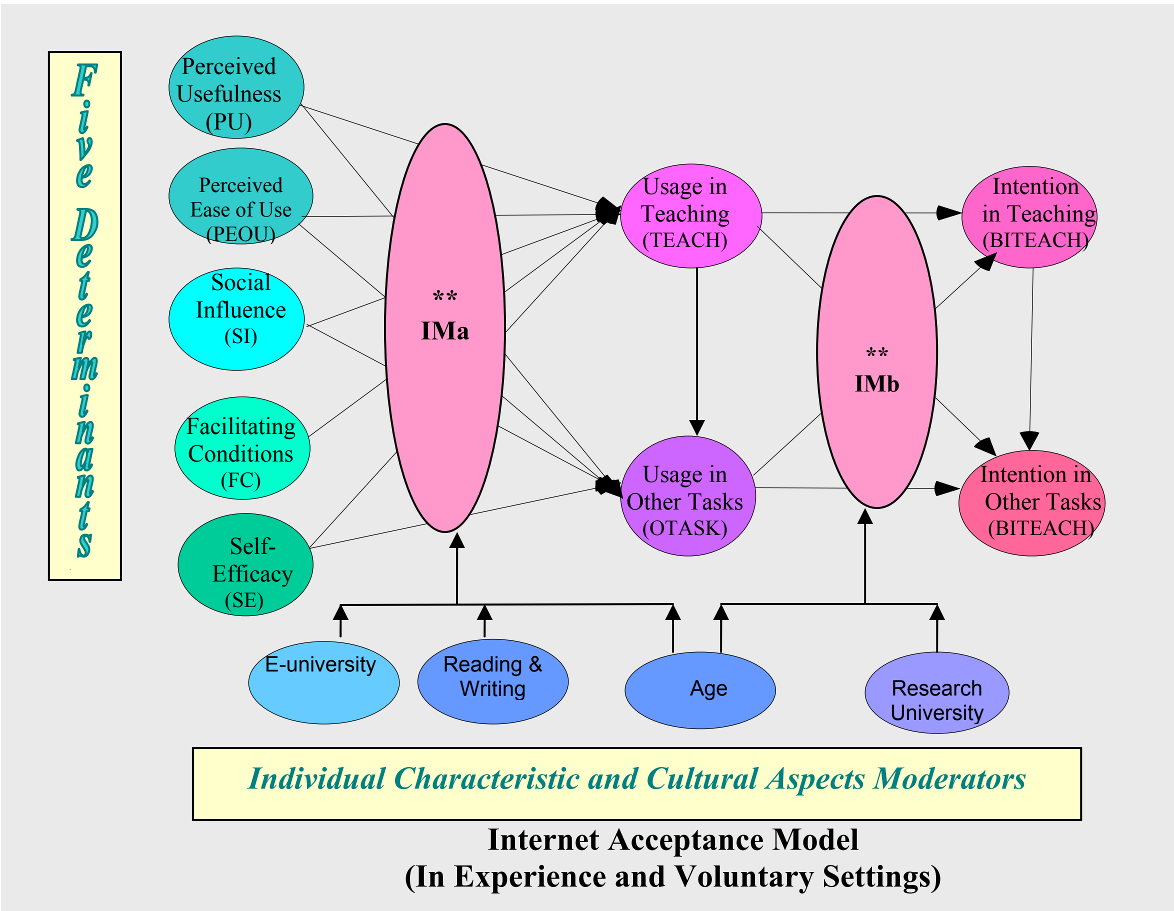


Figure 9.3 The Internet Acceptance Model (with the Impact of Moderators)

** IMa : The impact of moderators on the direct paths between determinants and usage behaviour
** IMb : The impact of moderators on the paths between usage behaviour and intention

2) E-University Plan

The influence of perceived ease of use (PEOU) on usage behaviour in teaching (TEACH) was moderated by e-university plan such that the effect became non-significant for unacknowledged e-university subjects but the effect became significant for acknowledged e-university subjects.

3) Research University Plan

Even a research university moderator has not moderated the influence of determinants toward usage behaviour, but in contrast it has impacted the relationships between usage behaviour and behaviour intention such that the relationship between OTASK and BIOTASK become non-significant for unacknowledged research university subjects.

4) Level of Reading and Writing

Lastly, although without the moderators, the influence of perceived usefulness and self-efficacy on usage behaviour in other tasks were significant, with the impact of the level of reading and writing moderator, the influence of these two determinants were that the effects become stronger for the second group (academics who thought that level of their reading and writing are obstacles in using the Internet).

Introduction of the Internet Acceptance Model has provided explanatory power in combination with a parsimonious structure. The model also provides a foundation to guide further research in this area. Notably, without the impact of moderators, perceived usefulness, perceived ease of use and self-efficacy appear to be significant determinants of usage behaviour. Furthermore, social influence and facilitating conditions appear to be non-significant determinants of usage behaviour. The effects of perceived usefulness, perceived ease of use, social influence and facilitating conditions, and self-efficacy on usage, are contingent on three moderators (age, e-university, and Research University. The influences of determinants on usage behaviour were changed to have more weights or to be in the other direction of significance (from non-significant to be significant or vice versa) when the data were analysed with the inclusion of moderators. In addition, the relationship of usage behaviour and behaviour intention was also impacted by two moderators (age and

Research University). It is also important to note that gender, education, experience level (low, moderate, and high experience), academic position, and Thai language had no effect on the influence of determinants on usage behaviour, and had no effect on the relationships of usage behaviour and behaviour intention.

9.3.4 Summary of Key Findings

The finding of this research project can thus be listed as:

1) **Perceived Usefulness (PU)**

   Overall perceived usefulness was an important motivating determinant. This was the case also for all sub-groups (when considering the impact of moderators). The effect of perceived usefulness on usage behaviour became stronger (when using the Internet in other tasks) for:

   - Academics who thought that their level of reading and writing was an obstacle to using the Internet.

2) **Perceived Ease of Use (PEOU)**

   This was regarded as an especially important determinant only in relation to using the Internet in teaching. It was not the case for all sub-groups. The effect became non-significant for:

   - Academics who did not acknowledge an e-university plan.

3) **Social Influence (SI)**

   Overall social influence was not an important determinant. The effect of social influence on usage behaviour in teaching (TEACH) became significant for:

   - Older academics.

4) **Facilitating Conditions (FC)**

   In general, facilitating conditions was not an important determinant. The effect of facilitating conditions on usage behaviour in teaching (TEACH) became significant for:

   - older academics

5) **Self-Efficacy**

Although self-efficacy was found as an important motivating determinant. This was the case also for all subgroups. The effect of self-efficacy on usage behaviour in other tasks became stronger for:

- Older academics.
- Academics who thought that their level of reading and writing were an obstacle to using the Internet.

6) **Usage Behaviour and Behaviour Intention**

Overall, the relationship between usage behaviour and behaviour intention was significant. This was not the case for all sub-groups (when considered the impact of moderators). In particular, the relationship between using the Internet in other tasks (OTASK) and intention to use the Internet in other tasks (BIOTASK) become:

- More important for younger academics than older academics.
- Non-significant for academics who did not acknowledge a research university plan.

9.4 Research Implications

This study has several valuable implications. These implications will now be discussed as:

1) Theoretical implications
2) Methodological implications
3) Practical implications

9.4.1 Theoretical Implications

From a theoretical perspective, the Internet Acceptance Model provides an understanding about the relationships of determinants and usage behaviour and refines the view of how usage behaviour relates to behaviour intention in the cross-sectional study. Behaviour intention was significantly influenced by the usage experience. The more experience of the technology the more significantly this affects their intention to use the technology in the future. An understanding of how the moderators impacted the relationships between key determinants and usage behaviour were important as well. More specifically, in order to increase the power of explaining behaviour by the model, usage behaviour and behaviour intention were separated into four categories: teaching (TEACH), other tasks (OTASK), intention to use in teaching (BITEACH) and intention to use in other tasks (BIOTASK).

1) Key Determinants

Five determinants in the proposed research model were theorised according to the models/theories of technology acceptance but the findings were not perfectly fitted as theorised, when testings the model without the impact of moderators.

- Firstly, regarding perceived usefulness and perceived ease of use, not only have these received considerable attention in the technology acceptance research literature (rather than self-efficacy) but both also have significant influence on usage behaviour particularly in teaching, and only perceived usefulness has a significant influence on usage behaviour in other tasks.

- Secondly, self-efficacy was found to be another important determinant in this research, which is consistent with previous study such as Lopez and Manson (1997) and Ramayah and Aafaqi (2004). It has a very strong influence on usage behaviour both in teaching and in other tasks, although it has received less attention in the technology acceptance research literature compared to the two determinants previously mentioned.

- Thirdly, it has been found that social influence has no significant influence on usage behaviour although some researchers have argued to integrate social influence in models of adoption and use; for example, Taylor and Todd (1995), and Thompson, Higgins and Howell (1991). Others, however including Davis, Bagozzi and Warshaw (1989) have not integrated them in their models. For this study, social influence has no significant influence on usage behaviour. This might be because academics have already had Internet experience for some 6-10 years. According to the empirical evidence which suggested that experience moderated the relationship between subjective norm (social influence) and behaviour, social influence became less important with increasing levels of experience (Karahanna, Straub & Chervany 1999).

- Fourthly, it has also been found that facilitating conditions have no significant effect on usage behaviour. This finding was not consistent with the finding of Venkatesh et al. (2003), who suggested that facilitating conditions have a significant effect on usage behaviour. Noticeably, the path between facilitating conditions and usage in other tasks was deleted from the Internet Acceptance Model because it was never significant in either category of testing: (1) before integrating moderators, nor (2) after integrating moderators.

2) Moderators

The findings from the investigation of the impacts of moderators were also not perfectly fitted as proposed in the research model.

- Firstly, it is important to emphasise that the key relationships in the model were moderated. Only one demographic variable (age) was found as an important moderator which significantly moderated the key relationships. The affect of social influence and facilitating conditions on usage behaviour in teaching were moderated by age such that the effects become significant for older subjects. Although the influence of self-efficacy on usage behaviour in other tasks was significant before the impact of the moderator for both groups, the influence was moderated by age such that the effect became stronger for older subjects. Venkatesh et al. (2003), suggested that although age has received very little attention in the technology acceptance research literature it has been found that age significantly moderated all of the key relationships in the model. For instance, the affect of social influence on behaviour intention was stronger for older women. The influence of facilitating condition on usage behaviour was also moderated by age such that the effect was stronger for older subjects(Venkatesh et al. 2003). This is consistent with the finding of this research.

- Secondly, although gender has received some recent attention as a key moderating influence in accordance with findings such as of Venketesh et al.(2003) and consistent with the findings in the sociology and social psychology literature such as Levy (1988), surprisingly, gender was not found as a key moderator in this research. This is not consistent with previous research findings.

- Thirdly, education and academic position were not found as key moderators in this study, but education was found to be a key predictor in the literature for factors influencing adoption/usage of information technology, instead of as a key moderator. Although education level has received more attention than academic position in the literature, education still has received less attention in literature than age, gender and experience.

- Fourthly, experience level (low, moderate and high experience) was not found to play an important role in this study since it has no significant effect on key relationships in the experience setting in this study. But in one way or another because the setting of this study involved experienced users, experience has already impacted on the key relationships before any testing. Because it has been found that when testing without any moderator, social influence has no significant impact on usage behaviour in this experience setting of this research, which was consistent with suggestions by Karahanna, Straub and Chervany (1999) in that experience moderated the relationship between subjective norm (social influence) and behaviour intention. In contrast, the finding of Davis et al.(1989), showed that no change in the salience of determinants was found regarding the role of experience using a cross-sectional analysis. In addition, it should be noted that this study did not measure voluntariness as a moderator because the study was already conducted in a voluntary setting. Both voluntariness and experience were however found as key moderators in previous research (Venkatesh et al. 2003). In some cases, such as the original TPB (Ajzen 2006), voluntariness was not included in the previous research as a moderator. This is consistent with this research.

- Fifthly, in this study, e-university plan, Research University plan, and level of reading and writing were found to be important moderators. Although no evidence was found that these moderators have received any attention in the technology acceptance research literature, it can be said that these moderators have effects on key relationships on academic' behaviour especially in the higher educational environment. These findings were consistent with the suggestions from some interviewees (from the preliminary investigation) who indicated the possible impacts of these moderators on the influence of determinants on usage behaviour.

9.4.2 Methodological Implications

The methodology used in this research provides guidelines for further research in this area of study. This is especially the case in the Thai Universities, including ways to approach surveying individual professionals in higher education; questionnaire design; testing of discriminant validity using SEM analysis with AMOS; and analysis of the proposed research model using SEM with AMOS.

- Firstly, because of the difficulty in surveying Thai universities which are scattered around the country, the strategy of distributing questionnaires by mail to the secretarial offices of the faculties within the universities is recommended. Initial contact by telephone, rather than by letters, to the specific staff at the secretarial offices who will be assigned to have a responsibility in distributing and collecting the questionnaire and mailing all collected questionnaires back to the researcher is recommended. It is necessary to follow up the progression of the survey by using many telephone calls to the specific staff in order to help increase the response rate. In addition, the questionnaire was carefully designed to look professional and to provide concise and easy to follow questionnaire design most suited to eliciting information from respondents. This included a clear title, introductory letters with the University' logo and the name of the university to confirm that data will be properly used.

- Secondly, it is strongly recommended that the data collected from the questionnaire survey should not only be tested for reliability and content validity but also tested for construct validity, particularly convergent validity in both the pilot test and in the actual test for the main survey. In particular, discriminant validity, which is one of the testings about construct validity, should be tested by using the SEM analysis via AMOS.

- Thirdly, the very useful statistical method "Structural Equation Modelling" is strongly recommended to be used for model testings and generating especially together with AMOS. There are various benefits of SEM over other multivariate techniques (Byrne 2001, 2006):

    1) SEM presents itself well to the analysis of data for the purposes of inferential statistics. On the other hand, most other multivariate techniques are essentially descriptive by nature (e.g. exploratory factor analysis) so that hypothesis testing is possible but is rather difficult to do.

    2) SEM can provide explicit estimates of error variance parameters, whereas traditional multivariate techniques are not capable of either assessing or correcting for measurement error.

    3) Data analysis using SEM procedures can incorporate both unobserved (latent variables) and observed variables, but the former data analysis methods are based on observed measurements only.

    4) SEM methodology has many important features available including modelling multivariate relations, or for estimating point and/or interval indirect effects whilst there are no widely and easily applied alternative methods for these kinds of features.

- Fourthly, in case of smaller sample size (less than 100 cases), the Boolen-Stine bootstrap method in AMOS is recommended because it is a powerful method in situations of non-normal distributions which are normally found in social science research. The bootstrapping of AMOS incorporates the Bollen-Stine bootstrap Method which is used only for testing model fit under non-normality. The powerful bootstrapping procedure calculates a new critical chi-square value (adjusted chi-square) against which the originally obtained chi-square is compared and an adjusted p-value is then computed (Arbuckle 2005).

The number of bootstrap samples is typically in the range of 250 to 2000 (Bollen & Stine 1992).

9.4.3 Practical Implications

The implications of the key findings provide significant benefits not only for individual academics within Business Schools, but also to the Universities in the Thai Public University Sector as well as the country if they utilise this knowledge. Incorporating the findings presented in Chapter 7, a number of practical implications were found such as promoting academics to make full use of the Internet in their work, and improving professional practice, professional development and quality of work. Significantly, the implications of using the modified model, called the Internet Acceptance Model without the impact of moderators (see in Figure 9.2) and with the impact of moderators (see Figure 9.3), which provides an understanding about the relationships of key determinants and usage behaviour, and usage behaviour with behaviour intention and the impact of moderators, will help promote Internet usage within Thai Business Schools and may be applied to all universities in the country other than just Business Schools in the Public University Sector.

- Firstly, it was found that academics used the Internet less in teaching and teaching related tasks but much more in other tasks (although they indicated their intentions to use the Internet more in all tasks in the future). The increase in Internet usage in all types of work will enable positive changes in teaching and learning process (Leidner & Jarvenpaa 1995). As mentioned before, three important things to motivate academics to make full use of the Internet in all tasks are: (1) good facilities (e.g. good computer hardware and software, good communication network); (2) university policy to be an e-university; and (3) university policy to be a research oriented university. If the Business Schools, the Universities and the Government all utilise this information when issuing policies or strategies by (1) concentrating on the availabilities of good facilities, and (2) if all of them pay more attention to promotion of the importance of e-university and research university plans, these will certainly promote academics to make better use of the Internet in all tasks.

- Secondly, academics generally agreed that using the Internet helped (1) improve their professional practice (particularly it helped to improve preparing their teaching materials, and their research), (2) professional development (particularly, it helped to improve their academic and personal knowledge) and (3) quality of working life, (particularly it helped by saving expense associated with getting information for free of charge and in communication with others by using email). The findings should be very useful for not only individual level and the organisational level but also Thai Government in presenting the importance of information technology effects on professional practice, professional development and quality of working life. Therefore, the information from these findings should encourage and support the formation of future policy not only at university level (organisational level) but also at the National level. If the universities and the government utilise these findings by setting up strategies to promote Internet usage, this may in turn improve professional practice, personal development, and quality of working life. Thus it will result in supporting the universities to achieve educational goals of quality, efficiency, cost-effectiveness. Eventually, the country as a whole should gradually receive these significant benefits.

- Thirdly, the Internet Acceptance Model has already been carefully considered in terms of both parsimony and its contribution to understanding. For predictive, practical applications of the model, parsimony may be more heavily weighted. On the other hand, if trying to obtain the most complete understanding of a phenomenon, a degree of parsimony may be sacrificed (Taylor & Todd 1995). With this rationale, in this study, the Internet Acceptance Model (without the impact of moderators) comprised three important determinants (perceived usefulness, perceived ease of use and self-efficacy) and five determinants (perceived usefulness, perceived ease of use, social influence, facilitating conditions, and self-efficacy) (with the impact of moderators). This has provided useful information about how to promote usage of the Internet by these important issues:

    1) The more academics perceive the usefulness, and ease of use of the Internet the greater these determinants encourage them to use the

Internet. The more academics perceive their ability (self-efficacy) the greater they increase their Internet usage. As previously mentioned, the way to promote self-efficacy is by continuous training. Training was found to be very significant in encouraging individuals to have more self-confidence in their use of the technology, and they will use the technology more because of their self-confidence associated with their abilities in using the technology.

2) If considering the impact of age on the model, the social influence and facilitating conditions should be given more attention in promoting Internet usage for older subjects in teaching, and the important of self-efficacy via training will be very important for promoting usage in teaching for older subjects.

3) When considering the impact of the other three moderators (a) academics who have not acknowledged the e-university plan did not pay any attentions to the ease of use of the Internet when using the Internet in teaching, (b) academics who have not acknowledged research university plans impacted the influence of usage in other tasks toward intention to use the Internet in other tasks until the influence became non-significant, (c) academics who thought that the level of their reading and writing were obstacles in using the Internet, have paid more attention to perceived usefulness of the Internet and to their perceived abilities(self-efficacy) on usage in other tasks rather than the counterpart (academics who thought that level of their reading and writing were not obstacles in using the Internet).

If top management at the universities understand and utilise this information to proactively design interventions (e.g. training.) targeted at populations of users that may be less inclined to use the Internet in their work in order to prepare academics to gain more knowledge and experience of using Internet, not only will this help academics to have better professional practice, personal development and quality of working life, but it will also help the university to achieve its educational goals.

This research has seemed to be not only at the right time and but also in the right place. It is expected that key findings especially the Internet Acceptance Model will help in supporting university policy and National Policies especially the policy to increase ICT usage as part of the teaching-learning process at all levels of education, and also the National policy of e-education.

9.5 Limitations of the Study

The results of this study were valuable because this research has drawn upon a wide range of theoretical viewpoints and comprised a rather large sample size which covered academics within all Business Schools located in many provinces within all regions in the country. However, there are still some limitations for this study.

The limitation concerns the sample size in multiple-group analysis. Five analyses of the impact of moderators consisted of small sample size. The sample size was less than 100 cases in the low experience group (50 cases), doctoral degree subjects (59 cases), unacknowledged e-university (79 cases), unacknowledged research university subjects (52 cases), and academics who thought that their level of reading and writing are an obstacle in using the Internet (57 cases).

The most common SEM estimation procedure is MLE, and this has been found to provide valid results with sample sizes as small as 50 cases. But the recommended minimum samples sizes to ensure stable MLE solution are 100-150 cases(Hair, Black, Babin, Anderson & Tatham 2006). In this regard, caution is required to generalise the findings from these five moderators to the population.

However, it can be noted that many rounds of analyses have been conducted (more than twenty times for each testing for the impact of moderators by using AMOS version 6.0), along with the supported function of the Bollen-Stine bootstrap method in AMOS, and the results were found consistently the same, with no unstable results found. Therefore the results were seen to be valid.

9.6 Suggestions for Further Research

According to the scope of this study (see Chapter 1) and the limitations of this study, there are many opportunities for further research using the "Internet Acceptance Model" and the questionnaire in a wider scope. The wider scope of further research may include (1) all faculties/schools in the university, (2) all universities in the Thai Public University Sector, and (3) all universities in the Thai Private University Sector.

In addition, the suggestions for further research in the area of information technology regarding the Internet in the higher education context, should concentrate more on moderators including gender, age, education, academic position, experience, e-university, Research University, level of reading and writing, and Thai language with a bigger sample size to investigate the impact of these moderators on usage behaviour.

More importantly, education, experience, e-university, Research University and level of reading and writing may be investigated with careful consideration of the sample size, with the recommendation of at least 100-150 cases for each group. This sample size may generate different results compared to this research.

When considering the results of descriptive statistics, further research may be needed to find out why academics still used the Internet in teaching less than in other tasks. The concentration of further research in teaching may provide evidence why this is the case, and may directly indicate the rationale behind the lack of usage in teaching in more detail.

Obviously, self-efficacy was found to be a very important determinant. This determinant strongly related to training, so it would be useful for further research to find out about the scope of training and the type of training that would be suitable for academics in order to promote their Internet usage.

9.7 Summary

This chapter summarised the key findings of the study according to the research objectives along with the research implications. Theoretical implications, methodology implications, and practical implications were provided for researchers who are interesting in investigating the acceptance of technology in the context of higher education.

The Internet Acceptance Model (without the impact of moderators) has the capability to explain the variance of TEACH (31.6%), of OTASK (42.6%), BITEACH (55.7%), and of BIOTASK (59.8%). Perceived usefulness (PU), perceived ease of use (PEOU) and self-efficacy all play important roles in determining usage behaviour in teaching. At the same time, only perceived usefulness (PU) and self-efficacy (SE) play important roles in determining usage behaviour in other tasks.

Age, e-university plan and level of reading and writing moderated the influence of determinants toward usage behaviour. Concurrently, age and research university plan moderated the influence of usage behaviour toward behaviour intention.

The key findings from this research together with the Internet Acceptance Model generated, with and without the impact of moderators, should provide valuable information not only to the university level in Thailand but also to the national level, and may be applied to other countries as well.

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APPENDIX I

PART A

QUESTIONNAIRE SURVEY

QUESTIONNAIRE SURVEY

A Covering Letter

School of Information Systems,
Faculty of Business and Law
300 Flinders Street Campus,
Victoria University, Melbourne,
Victoria 3000, Australia.

Date______________________

Dear Respondent,

I am a PhD student under the supervision of Dr. Arthur Tatnall at School of Information Systems, Faculty of Business and Law, Victoria University, Melbourne, Australia.

We would like to invite you to be a part of a research study. This research entitled: *Examining a Technology Acceptance Model of Internet Usage by Academics within Thai Business Schools*. The aim of the study is to develop a Technology Acceptance Model that will be the most powerful model, which can demonstrate acceptance and actual behaviour of Internet usage by academics within Business Schools in Thai Public University Sector.

The Internet is defined as a publicly available computer network consisting of a world wide network of computer networks that use the TCP/IP network protocols to facilitate data transmission and exchange, its synonyms are cyberspace and the Net. Internet services are e.g. World Wide Web (WWW) or the Web, and email etc.

Academic work relates to teaching in classes and teaching related tasks within the University such as (1) using a personal Web-base for facilitating teaching (e.g. on-line syllabus, lectures, notes, tutorials, tests, quizzes, and providing grade etc.), (2) preparing teaching materials, (3) writing teaching documents or texts, (4) using email for student contacts and giving your advice. Moreover, academic work also cover (1) research and (2) administration tasks, (3) other personal tasks, and (4) using email for personal contact, for example.

The model generated from this research will mainly make a contribution to knowledge regarding determinants that significantly determine Internet usage by academics. Moreover, it is expected to provide significant information to improve the professional practice and quality of working life of academics.

We would appreciate hearing your opinion about Internet usage. This study will require that you complete a questionnaire survey below (5 pages) along with any additional comments you feel would be helpful. You may be asked to participate in an interview discussing which determinants that most influenced you to use the Internet in your work. Your name and any of the information you provide will be kept strictly confidential and will not be attributed to the individual or organisation. All responses will be stored in a secure environment. The results of this research would be used for academic purposes only. Your help would be greatly appreciated, thank you very much for your time and cooperation.

Cordially,

....

(Napaporn Kripanont)

Any queries about your participation in this project may be directed to the researcher
Dr. Arthur Tatnall, phone: 61- 3- 99198-1034, email address: Arthur.tatnall@vu.edu.au and
Napaporn Kripanont, phone: 01-611-3120, email address:
napaporn.kripanont@research.vu.edu.au .If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University, PO Box 14428 MCMC, Melbourne, 8001
(telephone no: 03-9688 4710).

INTERNET USAGE SURVEY

(For respondents who have Internet experience only)

The purpose of this survey is to examine a Technology Acceptance Model of Internet usage by academics within Thai Business Schools.

SECTION A: BACKGROUND OF YOUR INTERNET USAGE

Please answer [√] only one answer for the following questions.

A1. How long have you been using the Internet (years)? (Please √ only one answer)

a	Less than 1 year	b	1-5 years	c	6-10 years	d	More than 10 years

A2. At present, overall how often do you use the Internet? (Please√ only one answer)

a	Don't use at all	b	Use about once each month	c	Use a few times a month
d	Use about once each week	e	Use a few times a week	f	Use five to six times a week
g	Use about once a day	h	Use several times a day	i	Other (please specify)…………….

A3. What is your self-assessment about using the Internet? (Please √ only one answer)

a	Low experience	b	Moderate experience	c	High experience

A4. Currently, do you think that you use the Internet enough or not enough or too much? (Please √ only one answer)

a	Not enough	b	Enough	c	Too much

A5. What is the Web-browser of the Internet that you use most? (Please check √ only one answer)

a	Microsoft Internet Explorer	b	Netscape Navigator	c	Other (please specify)………………..

A6. What is/are the service/s of the Internet that you use most? (Please check √ only one answer)

a	The World Wide Web (WWW) or Websites	b	Emails	c	Websites and Emails	d	Not sure	e	Hardly used both

A7. Mostly, where do you access the Internet in doing your work? (Please check √ only one answer)

a	At my office	b	At my home	c	Both at office and at home	d	Not sure	e	Hardly used both

A8. What Internet access method do you use at your office for your work? (Please check √ only one option)

a	University Network	b	Wireless	c	Other (please specify)………………….………………

A9. What Internet access method do you use at your home in doing your work? (Please check √ only one option)

a	Broadband	b	Dial-up	c	Wireless	d	Other (please specify)…………………….……..

SECTION B: ABOUT YOURSELF (Please check √ only one answer)

B1. Why do you use the Internet?
[a] I use the Internet by my own free will (Voluntary)
[b] I use the Internet because of the departmental directive (Mandatory)

B2. In general, please rate to the extent to which you agree with each statement below regarding your habit of reading and writing/typing. (Please check √ only one option for each statement below)

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5 =Slightly Agree 6= Quite Agree 7= Strongly Agree							
1.I like reading.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2.I like writing/typing.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3.I like both reading and writing/typing.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

B3. Because using the Internet needs an effort of reading (e.g. reading when searching the information from the Websites etc.) and writing/typing (e.g. responding to emails etc.), in relation to your habit that you answer to question B2 above, ,whether your habit is an obstacle for you in using the Internet? (Please check √ only one option)

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5 =Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. I think my habit is not an obstacle for me in using the Internet.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

B4. Since the main language of the Internet is English, please rate to what extent you agree with each statement below regarding whether our Thai National language is an obstacle for you in using the Internet.
(Please check √ only one option for each statement below)

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. I think since Thai language is national language, so it is an obstacle for me in using the Internet when I search and read information from English Language Websites.	***1***	***2***	***3***	***4***	***5***	***6***	*7*
2. I think since Thai Language is national language, so it is an obstacle for me in using the Internet when I read information from English Language Data Bases e.g. e-Journals etc.	***1***	***2***	***3***	***4***	***5***	***6***	*7*
3. I think since Thai Language is national language, so it is an obstacle for me in using the Internet when I read and respond emails in English Language.	***1***	***2***	***3***	***4***	***5***	***6***	*7*
4. Other (Please specify)…………………………………………	***1***	***2***	***3***	***4***	***5***	***6***	*7*

B5. Have your university had a plan to be as a research oriented university in the future?

a	Yes	b	No	c	Other (please specify)………………………………………

B6. Have your university had a plan to change to be as an e-University in the future?

a	Yes	b	No	c	Other (please specify)………………………………………

B7. Academic position

a	Lecturer	b	Assistant Professor	c	Associate Professor	d	Professor

B8. Educational level

a	Bachelor Degree	b	Master Degree	c	Doctoral Level	d	Other (please specify)……….... …………………………………

B9. Gender [a] Male [b] Female
B10. Age (years) [a] 20-29 years [b] 30-39 years [c] 40-49 years [d] 50 years up

SECTION C: PERCEIVED USEFULNESS AND PERCEIVED EASE OF USE TOWARD INTERNET USAGE

Please rate the extent to which you agree with each statement below.
(Please check √ the most appropriate option for each statement below)

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5=Slightly Agree 6= Quite Agree 7= Strongly Agree							
C. PERCEIVED USEFULNESS about the Internet usage.							
1. Using the Internet enables me to accomplish tasks more quickly.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. Using the Internet enhances the quality of my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. Using the Internet makes it easier to do my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. I find the Internet useful in my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
C2.PERCEIVED EASES OF USE about using the Internet.							
1. Learning to use the Internet is easy for me.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. I find it easy to use the Internet to do what I want to do.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. I find it easy for me to become skilful in using the Internet.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. I find the Internet easy to use.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

SECTION D: SOCIAL INFLUENCE, FACILITATING CONDITIONS AND SELF-EFFICACY TOWARD INTERNET USAGE *Please rate the extent to which you agree with each statement below.* (Please check √ only one option for each statement below)

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
D1. SOCIAL INFLUENCE about using the Internet.							
1. Peers think that I should use the Internet.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. Family and friends think that I should use the Internet.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. Students think that I should use the Internet.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. Management of my university thinks that I should use the Internet.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. In general, my university has supported the use of the Internet.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
D2. FACILITATING CONDITIONS within your University about using the Internet.							
1. The resources necessary (e.g. new computer hardware and software, communication network etc.) are available for me to use the Internet effectively.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. I can access the Internet very quickly within my University.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. Guidance is available to me to use the Internet effectively.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. A specific person (or group) is available for assistance with the Internet difficulties.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
D3.PERCEIVED ABILITIES (SELF-EFFICACIES) about using the Internet.							
1. I feel comfortable when I use the Internet on my own.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. I am able to use the Internet even if there is no one around to show me how to use it.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. I can complete my task by using the Internet If I can call someone for help if I get stuck.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. I can complete my task by using the Internet if I have a lot of time.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

SECTION E: CURRENT INTERNET USAGE IN YOUR WORK
Please rate the extent to which you agree with each statement below.
Please check √ only one option for each statement below

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree = Quite Agree 7= Strongly Agree							
E1. CURRENT INTERNET USAGE in teaching and teaching-related tasks.							
1. I use the Internet when teaching in classes.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. I use the Internet in providing a Personal Web-Base for facilitating teaching *(e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc.)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. I use the Internet for preparing teaching materials.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

4. I use the Internet for enhancing my teaching knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. I use Email for student contact and giving my advice	*1*	*2*	*3*	*4*	*5*	*6*	*7*
E2. CURRENT INTERNET USAGE in OTHER WORK.							
1. I use the Internet for searching information for my research.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. I use the Internet to assist administrative tasks (e.g. searching information to assist administrative tasks, email to help accomplishing administrative tasks.)	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. I use the Internet for personal tasks.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. I use the Internet for enhancing personal knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. I use Email for personal contact.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
E3. Overall, I use the Internet in all of my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

SECTION F: SELF-REPORT FOR CURRENT INTERNET USAGE

Please rate the extent to which you currently use the Internet. Please check √ only one option for each statement below

1= Do not use at all 2= Use about once each month 3= Use a few times a month 4= Use about once each week 5= Use a few times a week 6= Use five to six times a week 7= Use about once a day 8= Use several times a day								
F1. Self-Report regarding frequencies of using the Internet in teaching and teaching-related tasks?								
1. I use the Internet when teaching in classes…	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
2. I access my Personal Web-Base for facilitating teaching (e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc)	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
3. I use the Internet for preparing teaching materials.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
4. I use the Internet for enhancing my teaching knowledge……….	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
5. I use Email for student contact and giving my advice…………	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
F2. Self-report regarding frequencies of using the Internet in OTHER WORK?								
1. I use the Internet for searching information for my research………	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
2. I use the Internet to assist administrative tasks………….	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
3. I use the Internet for personal tasks……………	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
4. I use the Internet for enhancing personal knowledge…………	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
5. I use Email for personal contact……………	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
*F3.*Overall, I use the Internet in all of my work…………	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*

SECTION G: BEHAVIOUR INTENTION TO USE THE INTERNET IN THE FUTURE

Please rate the extent to which you agree with each statement below. (Please check √ only one answer)

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= *Strongly Agree*							
G1. BEHAVIOUR INTENTION to use the Internet in the future in: Teaching and teaching related tasks.							
1. I intend to use the Internet more when teaching in classes.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. I intend to use the Internet more in providing a Personal Web-Base for facilitating teaching (e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc.)	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. I intend to use the Internet more for preparing teaching materials.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. I intend to use the Internet more for enhancing my teaching knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. I intend to use Email more for student contact and giving my advice.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
G2. BEHAVIOUR INTENTION to use the Internet in the future in other work.							
1. I intend to use the Internet more for searching information for my research.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. I intend to use the Internet more to assist administrative tasks.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. I intend to use the Internet more for personal tasks.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. I intend to use the Internet more for enhancing personal knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. I intend to use Email more for personal contact.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

G3. Overall, I intend to use the Internet more in the future in all of my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

SECTION H: SELF-PREDICT FOR FUTURE INTERNET USAGE
Please rate the extent to which you intend to use the Internet in the future. (Please check √ only one answer)

1= Do not use at all 2= Use about once each month 3= Use a few times a month 4= Use about once each week 5= Use a few times a week 6= Use five to six times a week 7= Use about once a day 8= Use several times a day								
H1. Self-predict of future internet usage in: Teaching and teaching related tasks.								
1. I intend to use the Internet when teaching in classes.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
2. I intend to use the Internet in providing a Personal Web-Base for facilitating teaching (e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc.)	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
3. I intend to use the Internet for preparing teaching materials.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
4. I intend to use the Internet for enhancing my teaching knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
5. I intend to use Email for student contact and giving my advice.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
H2. Self-predict of future Internet usage in other work.								
1. I intend to use the Internet for searching information for my research.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
2. I intend to use the Internet to assist administrative tasks.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
3. I intend to use the Internet for personal tasks.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
4. I intend to use the Internet for enhancing personal knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
5. I intend to use Email for personal contact.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
H3. Overall, I intend to use the Internet in the future in all of my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*

SECTION I: HOW TO MAKE FULL USE OF THE INTERNET IN WORK
Please rate the extent to which you agree with each statement below. *(*Please check √ only one answer for each statement)

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
I1. Overall, I think I still have not made full use of the Internet in my work so I intend to use the Internet more in all type of my work (e.g. teaching, teaching related-tasks, research, administrative tasks, etc.) in the future.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
I2. Motivations to make full use of the Internet in your work.							
1. If technicians are available in helping me as an academic when I have difficulties; would motivate me to make full use of the Internet in my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. If updated Internet trainings are available when necessary for academics; would motivate me to make full use of the Internet in my work, since Internet Technology was developed very quickly so I could not catch up without trainings.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. If good facilities (e.g. good computer hardware and software, good communication network etc.) are available to support usage, would motivate me to make full use of the Internet in my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. My strong intention for student contacts in order to decrease a gap between my students, and myself motivate me to make full use of the Internet in my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. The university policy to be as a Research Oriented University in the future indirectly motivates me as an academic to make full use of the Internet in my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
6. The university policy to be as an e-University in the future indirectly motivates me as an academic to make full use of the Internet in my work.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
7. Other (Please specify)…………………………………………………	*1*	*2*	*3*	*4*	*5*	*6*	*7*

SECTION J: INTERNET USAGE AFFECTS ACADEMICS' PROFESSIONAL PRACTICE, PERSONAL DEVELOPMENT AND QUALITY OF WORKING LIFE
***Please rate the extent to which you agree with each statement below.* Please check √ only one option for each statement below**

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							

J1. PROFESSIONAL PRACTICE							
1. Using the Internet help improving my teaching in classes.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. Using the Internet help improving my teaching related- tasks e.g. preparing teaching materials etc.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. Using the Internet help improving my research.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. Using the Internet help improving my administrative tasks.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. Overall, using the Internet help improving my professional practices.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
J2. PERSONAL DEVELOPMENT							
1. Using the Internet help improving my academic knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. Using the Internet helps in improving my personal knowledge.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. Overall, using the Internet help improving my personal development.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
J3. QUALITY OF WORKING LIFE							
1. Using the Internet help me to have more time for a creative thinking.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
2. Using the Internet help me to have more time for leisure.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3. Using the Internet helped me to save money such as I can get information from e-Journals with free of charge, get information from various Websites for free etc.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
4. Using emails to communicate with others help me to save my expense.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5. Overall, using the Internet help improving my quality of working life.	*1*	*2*	*3*	*4*	*5*	*6*	*7*

If you have any additional comments you wish to make about Internet usage, please add them here.

……..................................
.
……
……
……
…

Thank you for your time and corporation.
If you have any inquiry regarding this questionnaire survey, please contact at Arthur.Tatnall@vu.edu.au and Napaporn.Kripanont@research.vu.edu.au

APPENDIX I

PART B

A CODING SHEET

A CODING SHEET
(All in numeric)

Code	Quest. No.	Description	Values	Measure
Number		Case number (Numeric)	1-455	Scale
code		Code of universities (String)		Nominal
year1	A1	Years in using the Internet (Numeric)	4 options	Nominal
freq2	A2	Frequencies of using the Internet	9 opts	Nominal
selfass3	A3	Self-assessment about using the Internet	3 opts	Nominal
enough4	A4	Using the Internet enough or not enough or too much	3 opts	Nominal
webbrow5	A5	The Web-browser of the Internet that used most	3 opts	Nominal
service	A6	The service/s of the Internet that used most	5 opts	Nominal
locatio	A7	The location that mostly accessed the Internet in doing work.	5 opts	Nominal
ofaccess	A8	Internet access method that used at your office for your work.	3 opts	Nominal
haccess	A9	Internet access method that used at home in doing work.	4 opts	Nominal
voluntar	B1	Voluntary or mandatory used of the Internet	2 opts	Nominal
reading	B2	1.I like reading.	7-point	Scale
writing	B2	2.I like writing/typing.	7-point	Scale
bothrw	B2	3.I like both reading and writing/typing.	7-point	Scale
ghabit	B3	I think my habit is not an obstacle for me in using the Internet.	3 opts	Nominal
gthailang	B4	I think Thai language is an obstacle for me in using the Internet.	3 opts	Nominal
research	B5	My university had a plan to be as a research oriented university in the future.	3 opts	Nominal
euniver	B6	My university had a plan to change to be as an e-University in the future.	3 opts	Nominal
position	B7	Academic position	4 opts	Nominal
educatio	B8	Educational level	4 opts	Nominal
gender	B9	Gender	2 opts	Nominal
age	B10	Age	4 opts	Nominal
gage	B10	Regroup of age: younger and older subjects	2 opts	Nominal
pu1	C1	1. Using the Internet enables me to accomplish tasks more quickly.	7-point	Scale
pu2	C1	2. Using the Internet enhances the quality of my work.	7-point	Scale
pu3	C1	3. Using the Internet makes it easier to do my work.	7-point	Scale
pu4	C1	4. I find the Internet useful in my work.	7-point	Scale
peou1	C2	1. Learning to use the Internet is easy for me.	7-point	Scale
peou2	C2	2. I find it easy to use the Internet to do what I want to do.	7-point	Scale
peou3	C2	3. I find it easy for me to become skilful in using the Internet.	7-point	Scale
peou4	C2	4. I find the Internet easy to use.	7-point	Scale
si1	D1	1. Peers think that I should use the Internet.	7-point	Scale
si2	D1	2. Family and friends think that I should use the Internet.	7-point	Scale
si3	D1	3. Students think that I should use the Internet.	7-point	Scale
si4	D1	4. Management of my university thinks that I should use the Internet.	7-point	Scale
si5	D1	5. In general, my university has supported the use of the Internet.	7-point	Scale
fc1	D2	1. The resources necessary (e.g. new computer hardware and software, communication network etc.) are available for me to use the Internet effectively.	7-point	Scale
fc2	D2	2. I can access the Internet very quickly within my University.	7-point	Scale
fc3	D2	3. Guidance is available to me to use the Internet effectively.	7-point	Scale
fc4	D2	4. A specific person (or group) is available for	7-point	Scale

		assistance with the Internet difficulties.		
se1	D3	1. I feel comfortable when I use the Internet on my own.	7-point	Scale
se2	D3	2. I am able to use the Internet even if there is no one around to show me how to use it.	7-point	Scale
se3	D3	3. I can complete my task by using the Internet If I can call someone for help if I get stuck.	7-point	Scale
se4	D3	4. I can complete my task by using the Internet if I have a lot of time.	7-point	Scale
tclass	E1	1. I use the Internet when teaching in classes.	7-point	Scale
tweb	E1	2. I use the Internet in providing a Personal Web-Base for facilitating teaching *(e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc.)*	7-point	Scale
tmateria	E1	3. I use the Internet for preparing teaching materials.	7-point	Scale
tknowled	E1	4. I use the Internet for enhancing my teaching knowledge.	7-point	Scale
temail	E1	5. I use Email for student contact and giving my advice	7-point	Scale
oresearc	E2	1. I use the Internet for searching information for my research.	7-point	Scale
oadmin	E2	2. I use the Internet to assist administrative tasks (e.g. searching information to assist administrative tasks, email to help accomplishing administrative tasks.)	7-point	Scale
operson	E2	3. I use the Internet for personal tasks.	7-point	Scale
operknow	E2	4. I use the Internet for enhancing personal knowledge.	7-point	Scale
oemail	E2	5. I use Email for personal contact.	7-point	Scale
totaluse	E3	Overall, I use the Internet in all of my work.	7-point	Scale
ftclas	F1	1. I use the Internet when teaching in classes…	8-point	Scale
ftweb	F1	2. I access my Personal Web-Base for facilitating teaching (e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc)	8-point	Scale
ftmat	F1	3. I use the Internet for preparing teaching materials.	8-point	Scale
ftknow	F1	4. I use the Internet for enhancing my teaching knowledge.	8-point	Scale
ftemail	F1	5. I use Email for student contact and giving my advice.	8-point	Scale
foresear	F2	1. I use the Internet for searching information for my research.	8-point	Scale
foadmin	F2	2. I use the Internet to assist administrative tasks.	8-point	Scale
foperson	F2	3. I use the Internet for personal tasks.	8-point	Scale
foperkno	F2	4. I use the Internet for enhancing personal knowledge.	8-point	Scale
foemail	F2	5. I use Email for personal contact.	8-point	Scale
ftotal	F3	Overall, I use the Internet in all of my work.	8-point	Scale
bitclass	G1	1. I intend to use the Internet more when teaching in classes.	7-point	Scale
bitweb	G1	2. I intend to use the Internet more in providing a Personal Web-Base for facilitating teaching (e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc.)	7-point	Scale
bitmater	G1	3. I intend to use the Internet more for preparing teaching materials.	7-point	Scale
bitknow	G1	4. I intend to use the Internet more for enhancing my teaching knowledge.	7-point	Scale
bitemail	G1	5. I intend to use Email more for student contact and giving my advice.	7-point	Scale
bioresea	G2	1. I intend to use the Internet more for searching information for my research.	7-point	Scale
bioadmin	G2	2. I intend to use the Internet more to assist administrative tasks.	7-point	Scale
bioperso	G2	3. I intend to use the Internet more for personal tasks.	7-point	Scale
bioperkn	G2	4. I intend to use the Internet more for enhancing personal knowledge.	7-point	Scale
bioemail	G2	5. I intend to use Email more for personal contact.	7-point	Scale
bitotalu	G3	Overall, I intend to use the Internet more in the future in all of my work.	7-point	Scale
fbitclas	H1	1. I intend to use the Internet when teaching in classes.	8-point	Scale
fbitweb	H1	2. I intend to use the Internet in providing a Personal	8-point	Scale

		Web-Base for facilitating teaching (e.g. on-line syllabus, lectures, noted, tutorials, tests, quizzes, and providing grade etc.)		
fbitmate	H1	3. I intend to use the Internet for preparing teaching materials.	8-point	Scale
fbitknow	H1	4. I intend to use the Internet for enhancing my teaching knowledge.	8-point	Scale
fbitemai	H1	5. I intend to use Email for student contact and giving my advice.	8-point	Scale
fbiorese	H2	1. I intend to use the Internet for searching information for my research.	8-point	Scale
fbioadmi	H2	2. I intend to use the Internet to assist administrative tasks.	8-point	Scale
fbiopers	H2	3. I intend to use the Internet for personal tasks.	8-point	Scale
fbioperk	H2	4. I intend to use the Internet for enhancing personal knowledge.	8-point	Scale
fbioemai	H2	5. I intend to use Email for personal contact.	8-point	Scale
fbitotal	H3	Overall, I intend to use the Internet in the future in all of my work.	8-point	Scale
fuluse	I1	Overall, I think I still have not made full use of the Internet in my work so I intend to use the Internet more in all type of my work (e.g. teaching, teaching related-tasks, research, administrative tasks, etc.) in the future.	7-point	Scale
technic	I2	1. If technicians are available in helping me as an academic when I have difficulties; would motivate me to make full use of the Internet in my work.	7-point	Scale
training	I2	2. If updated Internet trainings are available when necessary for academics; would motivate me to make full use of the Internet in my work, since Internet Technology was developed very quickly so I could not catch up without trainings.	7-point	Scale
facility	I2	3. If good facilities (e.g. good computer hardware and software, good communication network etc.) are available to support usage, would motivate me to make full use of the Internet in my work.	7-point	Scale
gap	I2	4. My strong intention for student contacts in order to decrease a gap between my students, and myself motivate me to make full use of the Internet in my work.	7-point	Scale
rou	I2	5. The university' policy to be as a Research Oriented University in the future indirectly motivates me as an academic to make full use of the Internet in my work.	7-point	Scale
eu	I2	6. The university' policy to be as an e-University in the future indirectly motivates me as an academic to make full use of the Internet in my work.	7-point	Scale
ppteach	J1	1. Using the Internet help improving my teaching in classes.	7-point	Scale
pptmat	J1	2. Using the Internet help improving my teaching related- tasks e.g. preparing teaching materials etc.	7-point	Scale
ppresea	J1	3. Using the Internet help improving my research.	7-point	Scale
ppmgt	J1	4. Using the Internet help improving my administrative tasks.	7-point	Scale
overallpp	J1	5. Overall, using the Internet help improving my professional practices.	7-point	Scale
pdaknow	J2	1. Using the Internet help improving my academic knowledge.	7-point	Scale
pdpknow	J2	2. Using the Internet helps in improving my personal knowledge.	7-point	Scale
overallpd	J2	3. Overall, using the Internet help improving my personal development.	7-point	Scale
qowcreat	J3	1. Using the Internet help me to have more time for a creative thinking.	7-point	Scale
qowleisu	J3	2. Using the Internet help me to have more time for leisure.	7-point	Scale
saveexp	J3	3. Using the Internet helped me to save money such as I can get information from e-Journals with free of charge, get information from various Websites for free	7-point	Scale

		etc.		
emailsav	J3	4. Using emails to communicate with others help me to save my expense.	7-point	Scale
overallqow	J3	5. Overall, using the Internet help improving my quality of working life.	7-point	Scale

APPENDIX I

PART C

MISSING DATA ANALYSIS

MISSING DATA ANALYSIS

UNIVARIATE STATISTICS

	N	Mean	Std. Deviation	Missing		No. of Extremes(a)	
				Count	Percent	Low	High
pu1	454	6.02	.984	1	.2	35	0
pu2	450	5.95	1.001	5	1.1	3	0
pu3	451	6.09	.973	4	.9	33	0
pu4	447	6.25	.888	8	1.8	24	0
peou1	454	5.76	1.094	1	.2	7	0
peou2	453	5.75	1.048	2	.4	4	0
peou3	454	5.65	1.162	1	.2	3	0
peou4	453	5.77	1.082	2	.4	4	0
si1	448	4.91	1.716	7	1.5	29	0
si2	448	4.58	1.764	7	1.5	39	0
si3	449	5.14	1.699	6	1.3	29	0
si4	448	5.25	1.636	7	1.5	26	0
si5	449	5.90	1.209	6	1.3	10	0
fc1	451	5.58	1.315	4	.9	13	0
fc2	449	5.25	1.451	6	1.3	10	0
fc3	449	5.10	1.437	6	1.3	9	0
fc4	450	5.06	1.463	5	1.1	12	0
se1	451	5.49	1.232	4	.9	28	0
se2	448	5.98	1.094	7	1.5	4	0
se3	451	4.81	1.596	4	.9	15	0
se4	448	5.58	1.218	7	1.5	9	0
tclass	447	3.94	1.846	8	1.8	0	0
tweb	448	3.93	1.913	7	1.5	0	0
tmateria	448	5.18	1.584	7	1.5	17	0
tknowled	448	5.99	1.156	7	1.5	46	0
temail	444	4.72	1.719	11	2.4	28	0
oresearc	449	5.83	1.275	6	1.3	9	0
oadmin	445	5.19	1.476	10	2.2	14	0
operson	451	5.77	1.172	4	.9	5	0
operknow	451	6.12	.987	4	.9	40	0
oemail	451	5.86	1.283	4	.9	12	0
totaluse	443	5.80	1.091	12	2.6	3	0
bitclass	443	5.12	1.454	12	2.6	9	0
bitweb	440	5.30	1.392	15	3.3	11	0
bitmater	443	5.68	1.280	12	2.6	13	0
bitknow	443	6.08	.993	12	2.6	37	0
bitemail	442	5.63	1.165	13	2.9	6	0
bioresea	443	6.05	1.069	12	2.6	45	0
bioadmin	437	5.57	1.261	18	4.0	9	0
bioperso	443	5.77	1.162	12	2.6	4	0
bioperkn	444	6.12	.950	11	2.4	32	0
bioemail	441	5.76	1.125	14	3.1	5	0
bitotalu	441	6.02	.994	14	3.1	39	0

a Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Missing Data Analysis

	pu1	pu2	pu3	pu4	peou1	peou2	peou3	peou4	si1	si2	si3	si4	si5	fc1	fc2	fc3	fc4	se1	se2	se3	se4	tclass	tweb	tmateria	tknowled	temail	oresearc	oad
pu1	1																											
pu2	.687	1																										
pu3	.678	.729	1																									
pu4	.694	.697	.785	1																								
peou1	.462	.503	.476	.495	1																							
peou2	.494	.534	.510	.498	.818	1																						
peou3	.447	.488	.461	.457	.835	.816	1																					
peou4	.416	.424	.416	.400	.770	.762	.831	1																				
si1	.186	.199	.208	.207	.158	.154	.161	.150	1																			
si2	.225	.186	.202	.194	.163	.168	.189	.169	.816	1																		
si3	.185	.214	.196	.225	.161	.163	.185	.139	.768	.771	1																	
si4	.178	.208	.201	.206	.193	.188	.210	.184	.734	.687	.811	1																
si5	.198	.181	.220	.257	.174	.187	.189	.251	.483	.410	.477	.587	1															
fc1	.222	.271	.240	.255	.306	.341	.326	.320	.200	.163	.134	.109	.238	1														
fc2	.219	.237	.209	.222	.302	.295	.334	.308	.115	.092	.091	.153	.260	.604	1													
fc3	.236	.247	.222	.226	.302	.273	.307	.322	.273	.224	.228	.270	.295	.476	.565	1												
fc4	.213	.233	.253	.206	.304	.296	.322	.350	.317	.265	.239	.233	.264	.509	.500	.782	1											
se1	.369	.445	.408	.421	.487	.502	.458	.454	.177	.191	.128	.126	.105	.299	.225	.298	.351	1										
se2	.313	.305	.331	.366	.466	.441	.427	.450	.112	.100	.112	.135	.201	.307	.183	.215	.281	.532	1									
se3	.215	.312	.193	.159	.236	.264	.258	.263	.112	.130	.115	.092	.026	.203	.183	.343	.408	.327	.160	1								
se4	.325	.372	.355	.342	.398	.385	.368	.303	.156	.195	.152	.168	.100	.255	.202	.234	.324	.495	.440	.475	1							
tclass	.117	.122	.161	.080	.224	.196	.216	.209	.104	.099	.085	.110	.047	.134	.184	.210	.179	.196	.073	.153	.158	1						
tweb	.096	.114	.146	.071	.213	.252	.224	.211	.160	.162	.117	.150	.056	.134	.107	.170	.190	.182	.085	.069	.078	.549	1					
tmateria	.237	.271	.319	.304	.320	.328	.288	.306	.110	.173	.146	.112	-.014	.147	.093	.164	.202	.337	.274	.084	.234	.333	.411	1				

tknowled	.286	.327	.386	.396	.333	.374	.314	.331	.166	.164	.165	.156	.123	.196	.103	.237	.268	.412	.346	.160	.335	.236	.237	.619	1			
temail	.197	.169	.244	.225	.208	.276	.252	.292	.148	.153	.160	.173	.110	.223	.159	.162	.192	.272	.201	.121	.142	.303	.471	.383	.322	1		
oresearc	.398	.445	.450	.475	.465	.457	.425	.408	.189	.170	.184	.201	.240	.248	.153	.245	.281	.472	.411	.184	.386	.146	.156	.381	.469	.321	1	
oadmin	.295	.315	.340	.283	.365	.412	.379	.360	.210	.195	.162	.200	.144	.253	.183	.213	.238	.380	.277	.110	.265	.247	.273	.400	.361	.413	.490	
operson	.342	.323	.345	.386	.375	.340	.311	.338	.128	.154	.129	.123	.153	.261	.181	.214	.244	.462	.458	.169	.307	.100	.112	.323	.328	.276	.492	[illegible]
operknow	.361	.363	.363	.459	.358	.373	.291	.318	.156	.121	.126	.125	.177	.275	.126	.172	.206	.419	.441	.170	.322	.031	.075	.278	.443	.211	.540	[illegible]
oemail	.346	.323	.324	.419	.359	.342	.308	.313	.176	.152	.171	.130	.148	.243	.192	.229	.250	.418	.341	.180	.257	.078	.110	.324	.346	.296	.508	[illegible]
totaluse	.488	.541	.562	.549	.495	.539	.503	.449	.168	.195	.200	.191	.159	.290	.155	.217	.260	.504	.407	.212	.396	.195	.253	.441	.479	.399	.589	[illegible]
bitclass	.306	.278	.305	.281	.312	.300	.310	.300	.154	.179	.183	.199	.114	.185	.170	.188	.174	.347	.228	.225	.323	.436	.294	.357	.316	.318	.328	[illegible]
bitweb	.249	.258	.308	.279	.282	.285	.275	.288	.222	.243	.190	.189	.097	.264	.170	.209	.206	.367	.304	.167	.280	.245	.387	.423	.394	.337	.338	[illegible]
bitmater	.378	.345	.331	.382	.249	.264	.218	.237	.200	.226	.144	.125	.099	.270	.132	.197	.208	.397	.301	.178	.359	.209	.232	.540	.494	.256	.419	[illegible]
bitknow	.336	.363	.362	.416	.277	.282	.251	.259	.191	.171	.178	.181	.162	.225	.110	.214	.209	.357	.402	.208	.352	.098	.144	.378	.483	.195	.440	[illegible]
bitemail	.320	.331	.371	.345	.241	.288	.286	.285	.187	.184	.173	.183	.115	.193	.158	.222	.177	.351	.274	.265	.308	.168	.180	.264	.301	.412	.362	[illegible]
bioresea	.328	.403	.379	.412	.344	.332	.311	.277	.121	.111	.136	.174	.218	.192	.171	.243	.181	.362	.355	.206	.359	.060	.050	.218	.372	.106	.604	[illegible]
bioadmin	.311	.381	.368	.302	.329	.342	.334	.292	.199	.214	.177	.237	.142	.138	.155	.202	.177	.300	.244	.221	.324	.202	.178	.249	.285	.231	.339	[illegible]
bioperso	.282	.324	.274	.276	.255	.247	.258	.227	.175	.160	.137	.183	.191	.200	.195	.238	.159	.345	.201	.222	.266	.080	.023	.159	.187	.116	.344	[illegible]
bioperkn	.296	.379	.331	.355	.236	.231	.219	.206	.149	.127	.088	.152	.164	.224	.115	.196	.160	.334	.329	.197	.319	.050	.021	.192	.311	.111	.429	[illegible]
bioemail	.300	.333	.328	.336	.271	.258	.261	.225	.162	.151	.128	.163	.113	.193	.198	.263	.174	.390	.251	.228	.308	.157	.101	.184	.238	.208	.304	[illegible]
bitotalu	.350	.423	.391	.433	.270	.323	.277	.230	.144	.121	.155	.192	.192	.234	.154	.223	.166	.400	.270	.235	.406	.145	.114	.292	.365	.151	.432	[illegible]

a Little's MCAR test: Chi-Square = 1342.053, DF = 1345, Sig. = .518

APPENDIX II

PART A

DESCRIPTIVE STATISTICS

DESCRIPTIVE STATISTICS

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
pu1	455	2	7	6.03	.958	-.993	.114	.871	.228
pu2	455	2	7	5.95	.983	-.936	.114	.753	.228
pu3	455	3	7	6.11	.917	-1.093	.114	1.023	.228
pu4	455	3	7	6.26	.839	-1.130	.114	.944	.228
peou1	455	3	7	5.78	1.037	-.675	.114	-.100	.228
peou2	455	2	7	5.75	1.035	-.750	.114	.296	.228
peou3	455	1	7	5.66	1.142	-.644	.114	-.097	.228
peou4	455	1	7	5.77	1.075	-.851	.114	.767	.228
si1	455	1	7	4.95	1.649	-.700	.114	-.299	.228
si2	455	1	7	4.63	1.695	-.480	.114	-.632	.228
si3	455	1	7	5.16	1.638	-.882	.114	.096	.228
si4	455	1	7	5.31	1.555	-.971	.114	.329	.228
si5	455	2	7	5.93	1.090	-.997	.114	.526	.228
fc1	455	1	7	5.58	1.317	-.944	.114	.511	.228
fc2	455	1	7	5.24	1.452	-.848	.114	.296	.228
fc3	455	1	7	5.09	1.435	-.652	.114	-.055	.228
fc4	455	1	7	5.05	1.466	-.694	.114	.077	.228
se1	455	2	7	5.50	1.218	-.641	.114	-.208	.228
se2	455	3	7	5.99	1.061	-.968	.114	.187	.228
se3	455	1	7	4.82	1.591	-.490	.114	-.480	.228
se4	455	1	7	5.57	1.218	-.771	.114	.233	.228
tclass	455	1	7	3.96	1.820	-.142	.114	-1.114	.228
tweb	455	1	7	3.94	1.889	-.110	.114	-1.144	.228
tmateria	455	1	7	5.17	1.581	-.852	.114	.149	.228
tknowled	455	2	7	6.00	1.078	-1.111	.114	.762	.228
temail	454	1	7	4.74	1.720	-.525	.115	-.489	.229
oresearc	455	1	7	5.84	1.242	-1.096	.114	.921	.228
oadmin	455	1	7	5.19	1.472	-.758	.114	.366	.228
operson	455	1	7	5.77	1.155	-.876	.114	.543	.228
operknow	455	3	7	6.13	.966	-.974	.114	.181	.228
oemail	455	2	7	5.87	1.249	-1.119	.114	.803	.228
totaluse	455	1	7	5.79	1.082	-.941	.114	.831	.228
bitclass	455	1	7	5.11	1.451	-.765	.114	.233	.228
bitweb	455	1	7	5.29	1.386	-.933	.114	.767	.228
bitmater	455	1	7	5.67	1.271	-1.041	.114	.985	.228
bitknow	455	2	7	6.07	.981	-.976	.114	.643	.228
bitemail	455	2	7	5.63	1.163	-.691	.114	.119	.228
bioresea	455	2	7	6.04	1.060	-1.086	.114	.803	.228
bioadmin	455	2	7	5.57	1.212	-.681	.114	-.051	.228
bioperso	455	1	7	5.76	1.160	-.867	.114	.569	.228
bioperkn	455	3	7	6.12	.947	-.983	.114	.440	.228
bioemail	455	1	7	5.74	1.150	-.924	.114	.941	.228
bitotalu	455	2	7	6.03	.958	-1.024	.114	.875	.228
Valid N (listwise)	454								

APPENDIX II

PART B

CROSS-TABULATION

CROSS-TABULATION

gender * gage Crosstabulation

			gage		Total
			age 20-39	age 40 years up	
gender	Male	Count	108	64	172
		% within gender	62.8%	37.2%	100.0%
		% within gage	38.6%	41.0%	39.4%
		% of Total	24.8%	14.7%	39.4%
	Female	Count	172	92	264
		% within gender	65.2%	34.8%	100.0%
		% within gage	61.4%	59.0%	60.6%
		% of Total	39.4%	21.1%	60.6%
Total		Count	280	156	436
		% within gender	64.2%	35.8%	100.0%
		% within gage	100.0%	100.0%	100.0%
		% of Total	64.2%	35.8%	100.0%

gender * educatio Crosstabulation

			educatio			Total
			Bachelor Degree	Master Degree	Doctoral Level	
gender	Male	Count	6	134	29	169
		% within gender	3.6%	79.3%	17.2%	100.0%
		% within educatio	35.3%	37.7%	50.9%	39.4%
	Female	Count	11	221	28	260
		% within gender	4.2%	85.0%	10.8%	100.0%
		% within educatio	64.7%	62.3%	49.1%	60.6%
Total		Count	17	355	57	429
		% within gender	4.0%	82.8%	13.3%	100.0%
		% within educatio	100.0%	100.0%	100.0%	100.0%

gender * selfass3 Crosstabulation

			selfass3			Total
			Low experience	Moderate experience	High experience	
gender	Male	Count	17	104	52	173
		% within gender	9.8%	60.1%	30.1%	100.0%
		% within selfass3	36.2%	34.3%	59.8%	39.6%
	Female	Count	30	199	35	264
		% within gender	11.4%	75.4%	13.3%	100.0%
		% within selfass3	63.8%	65.7%	40.2%	60.4%
Total		Count	47	303	87	437
		% within gender	10.8%	69.3%	19.9%	100.0%
		% within selfass3	100.0%	100.0%	100.0%	100.0%

gender * enough4 Crosstabulation

			enough4			Total
			Not enough	Enough	Too much	
gender	Male	Count	66	99	8	173
		% within gender	38.2%	57.2%	4.6%	100.0%
		% within enough4	31.3%	46.7%	53.3%	39.5%
	Female	Count	145	113	7	265
		% within gender	54.7%	42.6%	2.6%	100.0%
		% within enough4	68.7%	53.3%	46.7%	60.5%
Total		Count	211	212	15	438
		% within gender	48.2%	48.4%	3.4%	100.0%
		% within enough4	100.0%	100.0%	100.0%	100.0%

gage * educatio Crosstabulation

			educatio			Total
			Bachelor Degree	Master Degree	Doctoral Level	
gage	age 20-39	Count	14	243	16	273
		% within gage	5.1%	89.0%	5.9%	100.0%
		% within educatio	82.4%	66.4%	27.6%	61.9%
		% of Total	3.2%	55.1%	3.6%	61.9%
	age 40 years up	Count	3	123	42	168
		% within gage	1.8%	73.2%	25.0%	100.0%
		% within educatio	17.6%	33.6%	72.4%	38.1%
		% of Total	.7%	27.9%	9.5%	38.1%

Total		Count	17	366	58	441
		% within gage	3.9%	83.0%	13.2%	100.0%
		% within educatio	100.0%	100.0%	100.0%	100.0%
		% of Total	3.9%	83.0%	13.2%	100.0%

gage * selfass3 Crosstabulation

			selfass3			Total
			Low experience	Moderate experience	High experience	
gage	age 20-39	Count	18	193	71	282
		% within gage	6.4%	68.4%	25.2%	100.0%
		% within selfass3	36.7%	61.9%	80.7%	62.8%
		% of Total	4.0%	43.0%	15.8%	62.8%
	age 40 years up	Count	31	119	17	167
		% within gage	18.6%	71.3%	10.2%	100.0%
		% within selfass3	63.3%	38.1%	19.3%	37.2%
		% of Total	6.9%	26.5%	3.8%	37.2%
Total		Count	49	312	88	449
		% within gage	10.9%	69.5%	19.6%	100.0%
		% within selfass3	100.0%	100.0%	100.0%	100.0%
		% of Total	10.9%	69.5%	19.6%	100.0%

gage * enough4 Crosstabulation

			enough4			Total
			Not enough	Enough	Too much	
gage	age 20-39	Count	126	144	12	282
		% within gage	44.7%	51.1%	4.3%	100.0%
		% within enough4	58.9%	65.2%	80.0%	62.7%
		% of Total	28.0%	32.0%	2.7%	62.7%
	age 40 years up	Count	88	77	3	168
		% within gage	52.4%	45.8%	1.8%	100.0%
		% within enough4	41.1%	34.8%	20.0%	37.3%
		% of Total	19.6%	17.1%	.7%	37.3%
Total		Count	214	221	15	450
		% within gage	47.6%	49.1%	3.3%	100.0%
		% within enough4	100.0%	100.0%	100.0%	100.0%
		% of Total	47.6%	49.1%	3.3%	100.0%

APPENDIX II

PART C

RESULTS OF T-TESTS

RESULTS OF T-TESTS

Measures	Male (Mean)	Female (Mean)	t-value	Sig. (2 tailed)
Frequencies of Internet Usage Currently used of the Internet in:				
1) teaching in classes(ftclass)	3.92	3.19	3.720	0.000
2) use Email for student contact and giving my advice(ftemail)	4.94	4.39	2.586	0.010
Frequencies of Intention to Use Intention to use the Internet more in:				
3) teaching in classes(fbitclass)	5.15	4.60	2.799	0.005
4) providing a Personal Web-Based for facilitating teaching(fbitweb)	5.34	4.91	2.308	0.021
Quality of Working life Using the Internet help to:				
5) have more time for a creative thinking(qowcreat)	5.71	5.46	2.195	0.029
6) have more time for leisure(qowleisu)	5.25	4.64	4.028	0.000

Table 1 Mean, T-test Results of Male (n = 173) and Female (n =265)

Measures	Younger (Mean)	Older (Mean)	t-value	Sig. (2 tailed)
Frequencies of Internet Usage Using the Internet for:				
1) accessing my Personal Web-Based for facilitating teaching (ftweb)	3.68	3.21	2.266	0.024
2) preparing teaching materials(ftmat)	5.43	4.86	3.141	0.002
3) enhancing my teaching knowledge (ftknow)	6.24	5.68	3.437	0.001
4) Email for student contact and giving my advice(ftemail)	4.79	4.38	1.987	0.048
5) personal tasks(foperson)	6.27	5.77	3.211	0.001
6) enhancing personal knowledge (foperkno)	6.49	6.07	2.799	0.005
7) Email for personal contact(foemail)	6.47	5.62	5.131	0.000
8) Overall, I use the Internet in all of my work (ftotal)	6.41	5.80	4.223	0.000
Frequencies of Intention to Use Intention to use the Internet more for:				
1) preparing teaching materials (fbitmate)	5.99	5.58	2.382	0.018
2)searching information for my research(fbiorese)	6.50	6.22	1.981	0.048
3) enhancing personal knowledge(fbioperk)	6.60	6.27	2.466	0.014
4) Overall, I intend to use the Internet more in the future in all of my work. (fbitatal)	6.58	6.27	2.396	0.017
Quality of Working life Using the Internet help me to:				
1) have more time for a creative thinking(qowcreat)	5.67	539	2.457	0.014
2) using emails to communicate with others	6.12	5.72	3.485	0.001

help me to save my expense(emailsave)				
3) Overall, using the Internet help improving my quality of working life(overallqow)	6.08	5.77	2.836	0.005

Table 2 Mean, T-test Results of Younger Subjects (n = 282) and Older Subjects (n = 168)

Measures	Master (Mean)	Doctoral (Mean)	t-value	Sig. (2 tailed)
Frequencies of Internet Usage **Using the Internet for:**				
1) searching information for my research (ftoresear)	5.65	6.47	-3.750	0.000
Frequencies of Intention to Use **Intention to use the Internet more for:**				
2)searching information for my research(fbioresear)	6.37	6.86	-2.862	0.005
3) personal tasks(fbiopers)	6.12	6.56	-2.084	0.038
4) using email for personal contact(fbioemail)	6.17	6.58	-2.010	0.045
How to make full use of the Internet				
5) Good facilities(facility)	5.81	6.30	-3.465	0.001
6) Research oriented university plan(rou)	5.62	6.09	-2.817	0.005
7) E-university plan(eu)	5.53	5.96	-2.453	0.015

Table 3 Mean, T-test Results of Master Degree Subjects (n = 369) and Doctoral Degree Subjects (n = 59)

Measures	Lecturer (Mean)	Higher (Mean)	t-value	Sig. (2 tailed)
Frequencies of Internet Usage **Using the Internet for:**				
1) teaching in classes (ftclas)	3.62	3.16	2.080	0.038
2) enhancing my teaching knowledge (ftknow)	6.18	5.63	3.048	0.002
3) personal tasks(foperson)	6.20	5.79	2.156	0.033
4) using email for personal contact (foemail)	6.28	5.82	2.372	0.019
5) Overall, using the Internet in all of my work(ftotal)	6.31	5.88	2.326	0.021

Table 4 T-test Results for the Differences in Lecturer Subjects (n = 332 cases) and Higher Position Subjects (n =114 cases)

Measures	Moderate (Mean)	High (Mean)	t-value	Sig. (2 tailed)
Frequencies of Internet Usage Using the Internet for:				
1) teaching in class (ftclas)	3.42	4.31	-3.307	0.001
2) accessing Websites(ftweb)	3.47	4.18	-2.785	0.006
3) preparing teaching materials(ftmat)	5.23	5.81	-2.635	0.009
4) enhancing my teaching knowledge (ftknow)	6.02	6.49	-2.360	0.019
7) administrative tasks(foadmin)	4.97	5.69	-3.011	0.003
8) personal tasks(foperson)	6.05	6.69	-3.427	0.001
9) enhancing personal knowledge (foperkno)	6.36	6.83	-2.707	0.007
10) Email for personal contact (foemail)	6.16	6.65	-2.621	0.009
11) Overall, I use the Internet in all of my work (ftotal)	6.15	6.97	-5.414	0.000

Table5 T-test Results for the Differences in Current Internet Usage for Moderate Experience Subjects (n = 314 cases) and High Experience Subjects (n = 89 cases)

Measures	Moderate (Mean)	High (Mean)	t-value	Sig. (2 tailed)
Intention to use Using the Internet for:				
1) teaching in class (fbitclas)	4.78	5.53	-2.906	0.004
2) accessing Websites(fbitweb)	5.01	5.81	-3.653	0.000
3) preparing teaching materials(fbitmat)	5.82	6.35	-2.806	0.005
4) enhancing my teaching knowledge (fbitknow)	6.37	6.72	-2.134	0.033
5) Email for student contact and giving my advice(fbitemail)	5.85	6.24	-2.035	0.043
6) personal tasks(fbiopers)	6.15	6.57	-2.427	0.016
7) enhancing personal knowledge (fbioperkno)	6.48	6.83	-2.181	0.030
8) Email for personal contact (fbioemai)	6.16	6.69	-3.144	0.002
9) Overall, I use the Internet in all of my work (fbitotal)	6.43	6.98	-3.696	0.000

Table 6 T-test Results for the Differences in Intention to Use the Internet for Moderate (314 cases) and High Experience Groups (89 cases)

Measures	Moderate (Mean)	high (Mean)	t-value	Sig. (2 tailed)
Motivation to make full use of the Internet				
1) Intend to use the Internet more in all type of my work(fuluse)	5.41	4.93	2.186	0.031
2) technicians are available(technic)	4.86	4.39	2.170	0.032
3) training are available(training)	4.95	4.27	3.149	0.002
Professional Practices				
4) improving teaching in class(ppteach)	5.65	6.00	-2.778	0.006
5)Overall, improving professional practices(overallpp)	6.00	6.27	-2.464	0.014
Quality of Working life **Using the Internet help me to:**				
6) save expense(saveexp)	5.81	6.10	-2.517	0.013
7) using emails to communicate with others help me to save my expense(emailsave)	5.94	6.31	-3.101	0.002
8) Overall, using the Internet help improving my quality of working life(overallqow)	5.98	6.20	-1.989	0.047

Table 7 T-test Results for the Differences in How to Make Full Use of the Internet, Professional Practices and Quality of Working Life for Moderate (314 cases) and High Experience Groups (89 cases)

APPENDIX III

PART A

SAMPLE CORRELATIONS, STANDARDISED RESIDUAL COVARIANCE, AND IMPLIED CORRELATIONS FOR INVESTIGATING DISCRIMINANT VALIDITY

SAMPLE CORRELATIONS, STANDARDISED RESIDUAL COVARIANCE, AND IMPLIED CORRELATONS FOR INVESTIGATING DISCRIMINANT VALIDITY

	se4	fc3	fc4	se1	se2	se3	si3	si4	si5	fc1	fc2
se4	1.										
fc3	.230	1.									
fc4	.327	.784	1.								
se1	.466	.281	.330	1							
se2	.454	.223	.266	.546	1						
se3	.464	.336	.400	.317	.148	1					
si3	.165	.204	.215	.114	.134	.096	1				
si4	.168	.238	.230	.123	.175	.047	.814	1			
si5	.155	.306	.268	.158	.241	.042	.480	.592	1		
fc1	.273	.517	.528	.322	.301	.214	.119	.125	.257	1	
fc2	.209	.574	.521	.211	.202	.157	.059	.116	.254	.642	1.
peou2	.367	.270	.305	.496	.473	.256	.141	.182	.222	.350	.278
peou3	.351	.296	.322	.452	.427	.233	.165	.207	.214	.328	.314
peou4	.310	.293	.324	.480	.480	.220	.104	.155	.237	.356	.317
si1	.155	.271	.308	.151	.124	.093	.750	.733	.488	.203	.121
si2	.175	.213	.258	.166	.107	.100	.748	.669	.401	.168	.094
pu1	.308	.229	.218	.374	.339	.184	.182	.173	.209	.233	.174
pu2	.362	.232	.234	.436	.316	.293	.187	.180	.193	.258	.181
pu3	.326	.217	.250	.373	.337	.183	.199	.201	.252	.269	.200
pu4	.318	.206	.199	.400	.376	.146	.224	.210	.270	.258	.185
peou1	.350	.290	.297	.468	.466	.206	.151	.194	.204	.306	.282

Table 1 Sample Correlations of Indicators for Five Exogenous Latent Constructs before Deleting Any Indicators

	peou2	peou3	peou4	si1	si2	pu1	pu2	pu3	pu4	peou1
se4										
fc3										
fc4										
se1										
se2										
se3										
si3										
si4										
si5										
fc1										
fc2										
peou2	1.000									
peou3	.809	1.000								
peou4	.809	**.869**	1.000							
si1	.128	.143	.124	1.000						
si2	.139	.159	.134	.788	1.000					
pu1	.498	.444	.435	.169	.213	1.000				
pu2	.531	.475	.439	.171	.154	.678	1.000			
pu3	.515	.470	.440	.200	.190	.678	.754	1.000		

	peou2	peou3	peou4	si1	si2	pu1	pu2	pu3	pu4	peou1
pu4	.484	.447	.421	.191	.170	.659	.672	.780	1.000	
peou1	.826	.832	.814	.133	.125	.468	.480	.490	.495	1.000

Table 1 Sample Correlations of Variables for Five Exogenous Latent Constructs before Deleting Any Indicators (continued)

	fc3	fc4	se1	se2	si4	peou2	peou4	si1	si2	pu1	pu2	pu3	pu4
fc3	.00												
fc4	.00	.00											
se1	.15	.38	.00										
se2	-.6	-.4	.00	.00									
si4	.36	-.4	-.1	1.2	.00								
peou2	-.2	-.3	-.3	.02	1.2	.000							
peou4	.65	.54	.05	.79	.82	.000	.000						
si1	.20	.21	-.1	-.4	-.02	-.42	-.28	.00					
si2	-.5	-.3	.56	-.5	.04	.098	.184	.00	.00				
pu1	.87	.08	.43	.30	.43	.854	.245	-.2	1.1	.00			
pu2	.66	.12	1.2	-.6	.37	.876	-.24	-.5	-.42	.47	.00		
pu3	.02	.09	-.7	-.7	.5	-.13	-.89	-.1	.05	-.4	.07	.00	
pu4	.05	-.7	.37	.51	.96	-.130	-.698	-.1	-.1	-.02	-.6	.4	.00

Table 2 Standardised Residual Covariances of Variables for Five Exogenous Latent Constructs after Deleting Eights Indicators

	bioperso	bioresea	bioperkn	bioemail	bitweb	bitmater	bitknow	operson	operknow	oemail	tmateria	tknowled
bioperso	1.0											
bioresea	.50	1.										
bioperkn	.66	.70	1.00									
bioemail	.74	.40	.624	1.00								
bitweb	.41	.42	.407	.369	1.0							
bitmater	.46	.50	.502	.416	.65	1.00						
bitknow	.46	.61	.636	.456	.48	.710	1.00					
operson	.51	.50	.494	.459	.30	.395	.397	1.00				
operknow	.39	.52	.505	.364	.27	.407	.518	.705	1.000			
oemail	.45	.43	.382	.447	.25	.330	.293	.693	.617	1.0		
tmateria	.19	.22	.198	.190	.40	.536	.362	.315	.284	.29	1.00	
tknowled	.21	.41	.344	.253	.39	.493	.472	.380	.486	.37	.601	1.00

Table 3 Sample Correlations of Variables for Four Endogenous Latent Constructs after Deleting Eight Indicators

	bioemail	bioresea	bioperso	bioperkn	bitweb	bitmater	bitknow	oemail	operson	operknow	tmateria	tknowled
bioemail	.000											
bioresea	-1.86	.000										
bioperso	2.01	-1.241	.000									
bioperkn	-.419	1.212	-.420	.00								
bitweb	-.352	1.072	-.041	-.32	.00							
bitmater	-1.50	1.078	-1.28	-.74	.68	.00						
bitknow	.173	3.783	-.371	2.81	-1.3	.005	.00					
oemail	.771	.072	.212	-1.26	-.75	-.82	-.869	.00				
operson	-.033	.573	.321	-.196	-.58	-.47	.356	.142	.000			
operknow	-1.13	1.681	-1.17	.856	-.60	.45	3.45	-.174	-.036	.000		
tmateria	-.910	-.356	-1.23	-1.19	.30	.97	-1.51	-.795	-1.08	-1.08	.0	
tknowled	.189	3.378	-.934	1.58	-.21	-.28	.255	.629	-.111	2.67	.0	.00

Table 4 Standardized Residual Covariances of Variables for Four Endogenous Latent Constructs after Deleting Eight Indicators

	SI	PEOU	FC	SE	PU	se2	fc3	fc4	se1
SI	1.000								
PEOU	.170	1.000							
FC	.338	.363	1.000						
SE	.214	.714	.427	1.000					
PU	.247	.624	.290	.586	1.000				
se2	.152	.506	.303	.708	.415	1.000			
fc3	.280	.301	.830	.355	.240	.251	1.000		
fc4	.320	.343	.945	.404	.274	.286	.784	1.000	
se1	.165	.550	.329	.771	.452	.546	.273	.311	1.000
si4	.788	.134	.266	.169	.195	.119	.221	.252	.130
peou2	.159	.932	.338	.665	.581	.471	.280	.320	.513
peou4	.148	.868	.315	.619	.541	.439	.261	.297	.477
si1	.931	.158	.315	.199	.230	.141	.261	.298	.154
si2	.846	.144	.286	.181	.209	.128	.237	.270	.140
pu1	.193	.487	.226	.457	.781	.324	.188	.214	.353
pu2	.206	.521	.242	.489	.835	.346	.201	.229	.377
pu3	.222	.560	.260	.526	.898	.373	.216	.246	.406
pu4	.209	.527	.245	.495	.845	.351	.203	.231	.382

Table 5 Implied (for all Variables after Deleting Eight Variables) Correlations for Five Exogenous Latent Constructs for Investigating Discriminant Validity

	si4	peou2	peou4	si1	si2	pu1	pu2	pu3	pu4
SI									
PEOU									
FC									
SE									
PU									
se2									
fc3									
fc4									
se1									
si4	1.000								
peou2	.125	1.000							
peou4	.116	.809	1.000						
si1	.733	.148	.137	1.000					
si2	.667	.134	.125	.788	1.000				
pu1	.152	.454	.423	.180	.163	1.000			
pu2	.162	.485	.452	.192	.175	.652	1.000		
pu3	.175	.522	.486	.207	.188	.701	.749	1.000	
pu4	.164	.491	.457	.194	.177	.660	.705	.759	1.000

Table 5 Implied (for all Variables) Correlations for Five Exogenous Latent Constructs (continued) for Investigating Discriminant Validity

	BIOTASK	BITEACH	OTASK	TEACH	bioemail	bioperso
BIOTASK	1.000					
BITEACH	.577	1.000				
OTASK	.643	.485	1.000			
TEACH	.306	.731	.521	1.000		
bioemail	.821	.474	.528	.251	1.000	
bioperso	.903	.521	.580	.276	.741	1.000
bitweb	.419	.726	.352	.531	.344	.378
bitmater	.518	.897	.435	.656	.425	.467
oemail	.514	.387	.799	.417	.422	.464
operson	.557	.420	.867	.452	.458	.503
tmateria	.239	.571	.407	.781	.196	.216
tknowled	.235	.562	.401	.769	.193	.212

Table 6 Implied (for all variables) Correlations for four endogenous latent constructs (for checking discriminant validity)

	bitweb	bitmater	oemail	operson	tmateria	tknowled
BIOTASK						
BITEACH						
OTASK						
TEACH						
bioemail						
bioperso						
bitweb	1.000					
bitmater	.651	1.000				
oemail	.281	.347	1.000			
operson	.305	.377	.693	1.000		
tmateria	.415	.512	.326	.353	1.000	
tknowled	.408	.504	.320	.348	.601	1.000

Table 6 Implied (for all variables) Correlations for four endogenous latent constructs (continued)

APPENDIX III

PART B

SAMPLE CORRELATIONS, STANDARDISED RESIDUAL COVARIANCE FOR TNTERNET ACCEPTANCE MODEL WITHOUT THE IMPACT OF MODERATORS

SAMPLE CORRELATIONS, STANDARDISED RESIDUAL COVARIANCE FOR TNTERNET ACCEPTANCE MODEL WITHOUT THE IMPACT OF MODERATORS

	si4	se2	pu2	pu1	bioemail	se1	fc3
si4	1.000						
se2	.175	1.000					
pu2	.180	.316	1.000				
pu1	.173	.339	.678	1.000			
bioemail	.127	.265	.329	.276	1.000		
se1	.123	.546	.436	.374	.350	1.000	
fc3	.238	.223	.232	.229	.226	.281	1.000
fc4	.230	.266	.234	.218	.140	.330	.784
si1	.733	.124	.171	.169	.133	.151	.271
si2	.669	.107	.154	.213	.122	.166	.213
peou2	.182	.473	.531	.498	.230	.496	.270
peou4	.155	.480	.439	.435	.224	.480	.293
pu3	.201	.337	.754	.678	.318	.373	.217
pu4	.210	.376	.672	.659	.317	.400	.206
bitweb	.164	.325	.244	.216	.369	.346	.189
bioperso	.173	.234	.331	.274	.741	.363	.203
bitmater	.135	.299	.348	.373	.416	.356	.174
oemail	.106	.352	.307	.332	.447	.395	.168
operson	.131	.467	.349	.369	.459	.479	.178
tmateria	.099	.268	.284	.242	.190	.296	.145
tknowled	.141	.395	.356	.301	.253	.379	.212

Table 1 Sample Correlations for the Initial Internet Acceptance Model

	fc4	si1	si2	peou2	peou4	pu3	pu4
si4							
se2							
pu2							
pu1							
bioemail							
se1							
fc3							
fc4	1.000						
si1	.308	1.000					
si2	.258	.788	1.000				
peou2	.305	.128	.139	1.000			
peou4	.324	.124	.134	.789	1.000		
pu3	.250	.200	.190	.515	.440	1.000	
pu4	.199	.191	.170	.484	.421	.780	1.000
bitweb	.183	.182	.196	.290	.315	.272	.261
bioperso	.144	.181	.172	.243	.236	.286	.285
bitmater	.186	.174	.200	.259	.261	.323	.370
oemail	.182	.168	.122	.323	.312	.330	.415
operson	.208	.130	.142	.343	.348	.374	.427
tmateria	.179	.095	.141	.314	.322	.291	.294

	fc4	si1	si2	peou2	peou4	pu3	pu4
tknowled	.261	.146	.129	.352	.348	.358	.410

Table 1 Sample Correlations for the Initial Internet Acceptance Model (continued)

	bitweb	bioperso	bitmater	oemail	operson	tmateria	tknowled
si4							
se2							
pu2							
pu1							
bioemail							
se1							
fc3							
fc4							
si1							
si2							
peou2							
peou4							
pu3							
pu4							
bitweb	1.000						
bioperso	.409	1.000					
bitmater	.651	.457	1.000				
oemail	.254	.445	.330	1.000			
operson	.299	.506	.395	.693	1.000		
tmateria	.395	.189	.536	.288	.315	1.000	
tknowled	.387	.214	.493	.373	.380	.601	1.000

Table 1 Sample Correlations for the Initial Internet Acceptance Model (continued)

	si4	se2	pu2	pu1	bioemail	se1	fc3
si4	.000						
se2	1.166	.000					
pu2	.382	-.660	.000				
pu1	.434	.240	.499	.000			
bioemail	.967	-.004	1.989	1.275	.000		
se1	-.124	.000	1.252	.477	1.350	.000	
fc3	.399	-.585	.713	.905	2.472	.235	.000
fc4	-.460	-.459	.137	.080	.296	.420	.000
si1	-.012	-.380	-.436	-.218	.793	-.026	.245
si2	.039	-.474	-.414	1.045	.733	.581	-.461
peou2	1.204	-.055	.924	.875	.326	-.266	-.163
peou4	.816	.684	-.233	.227	.496	.074	.668
pu3	.550	-.767	.138	-.369	1.491	-.585	.069
pu4	.941	.406	-.611	-.082	1.721	.373	.069
bitweb	1.520	1.315	-.085	-.328	.395	1.366	1.014
bioperso	1.790	-1.160	1.647	.787	.000	1.051	1.760

	si4	se2	pu2	pu1	bioemail	se1	fc3
bitmater	.475	-.365	.964	1.855	-.165	.322	.060
oemail	-.310	-.812	-.669	.255	.593	-.514	.087
operson	-.111	.477	-.686	.173	-.222	.087	-.139
tmateria	-.422	-1.115	-.606	-1.067	-.210	-1.001	-.831
tknowled	.355	1.170	.572	-.138	.924	.336	.395

Table 2 Standardized Residual Covariances of the Internet Acceptance Model

	fc4	si1	si2	peou2	peou4	pu3	pu4
si4							
se2							
pu2							
pu1							
bioemail							
se1							
fc3							
fc4	.000						
si1	.200	.000					
si2	-.257	-.003	.000				
peou2	-.309	-.414	.101	.000			
peou4	.509	-.290	.175	.000	.000		
pu3	.105	-.129	.059	-.082	-.887	.000	
pu4	-.704	-.087	-.164	-.159	-.764	.318	.000
bitweb	.438	1.541	2.032	.756	1.637	.120	.177
bioperso	.132	1.607	1.610	.161	.338	.331	.585
bitmater	-.221	.848	1.672	-.980	-.548	-.029	1.274
oemail	-.140	.519	-.170	.060	.264	-.733	1.372
operson	-.103	-.657	-.087	-.351	.222	-.772	.697
tmateria	-.689	-.962	.286	-.250	.336	-.941	-.537
tknowled	.815	-.020	-.101	.207	.585	.105	1.525

Table 2 Standardized Residual Covariances for the Internet Acceptance Model (continued)

	bitweb	bioperso	bitmater	oemail	operson	tmateria	tknowled
si4							
se2							
pu2							
pu1							
bioemail							
se1							
fc3							
fc4							
si1							
si2							
peou2							
peou4							
pu3							
pu4							
bitweb	.000						
bioperso	.505	.000					
bitmater	.000	-.169	.000				
oemail	-.593	-.256	-.263	.000			
operson	-.398	-.191	.156	.079	.000		
tmateria	-.258	-.639	.778	-.413	-.652	.000	
tknowled	-.782	-.316	-.487	1.029	.335	.031	.000

Table 2 Standardized Residual Covariances for the Internet Acceptance Model (continued)

APPENDIX III

PART C

NESTED MODEL COMPARISON
(MULTIPLE-GROUP ANALYSIS)

NESTED MODEL COMPARISON (MULTIPLE-GROUP ANALYSIS)

1. Gender

Nested Model Comparisons
Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	9.295	.158	.003	.003	.001	.001
Structural weights	21	18.835	.596	.006	.006	-.003	-.003
Structural covariances	36	37.140	.416	.011	.012	-.002	-.002
Structural residuals	40	42.855	.350	.013	.013	-.002	-.002
Measurement residuals	52	69.585	.052	.021	.022	.002	.003

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	15	9.540	.848	.003	.003	-.003	-.004
Structural covariances	30	27.845	.579	.008	.009	-.003	-.003
Structural residuals	34	33.560	.489	.010	.011	-.003	-.003
Measurement residuals	46	60.290	.077	.018	.019	.001	.002

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	18.305	.247	.005	.006	.000	.000
Structural residuals	19	24.020	.195	.007	.008	.001	.001
Measurement residuals	31	50.750	.014	.015	.016	.005	.005

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	5.714	.222	.002	.002	.000	.000
Measurement residuals	16	32.445	.009	.010	.010	.005	.005

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	26.730	.008	.008	.008	.004	.005

2. AGE

Nested Model Comparisons
Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	3.544	.738	.001	.001	-.002	-.002
Structural weights	20	35.221	.019	.011	.011	.004	.005
Structural covariances	35	54.661	.018	.016	.017	.004	.005
Structural residuals	39	56.468	.035	.017	.018	.003	.003
Measurement residuals	51	132.856	.000	.040	.042	.024	.025

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	14	31.677	.004	.010	.010	.006	.006
Structural covariances	29	51.118	.007	.015	.016	.006	.006
Structural residuals	33	52.925	.015	.016	.017	.005	.005
Measurement residuals	45	129.312	.000	.039	.041	.025	.027

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	19.441	.194	.006	.006	.000	.000
Structural residuals	19	21.248	.323	.006	.007	-.001	-.001
Measurement residuals	31	97.635	.000	.029	.031	.019	.021

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	1.807	.771	.001	.001	-.001	-.001
Measurement residuals	16	78.194	.000	.024	.025	.019	.021

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	76.387	.000	.023	.024	.020	.022

3. Education

Nested Model Comparisons

Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	5.079	.534	.002	.002	-.002	-.002
Structural weights	21	21.111	.452	.006	.007	-.004	-.004
Structural covariances	36	47.922	.088	.014	.015	-.002	-.002
Structural residuals	40	56.162	.046	.017	.018	-.001	-.001
Measurement residuals	52	102.461	.000	.031	.032	.008	.009

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	15	16.032	.380	.005	.005	-.002	-.003
Structural covariances	30	42.843	.060	.013	.014	.000	.000
Structural residuals	34	51.083	.030	.015	.016	.001	.001
Measurement residuals	46	97.382	.000	.029	.031	.010	.011

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	26.811	.030	.008	.009	.002	.002
Structural residuals	19	35.051	.014	.011	.011	.003	.003
Measurement residuals	31	81.350	.000	.025	.026	.013	.013

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	8.240	.083	.002	.003	.001	.001
Measurement residuals	16	54.539	.000	.016	.017	.011	.011

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	46.299	.000	.014	.015	.010	.010

4. Academic Position

Nested Model Comparisons
Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	2.890	.823	.001	.001	-.002	-.002
Structural weights	20	17.395	.627	.005	.005	-.004	-.004
Structural covariances	35	49.004	.058	.015	.015	.001	.001
Structural residuals	39	49.677	.118	.015	.015	-.001	-.001
Measurement residuals	51	101.538	.000	.030	.032	.011	.012

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	14	14.505	.413	.004	.005	-.001	-.002
Structural covariances	29	46.114	.023	.014	.014	.003	.003
Structural residuals	33	46.788	.056	.014	.015	.001	.001
Measurement residuals	45	98.649	.000	.030	.031	.013	.014

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	31.609	.007	.009	.010	.005	.005
Structural residuals	19	32.283	.029	.010	.010	.003	.003
Measurement residuals	31	84.144	.000	.025	.026	.015	.016

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	.674	.955	.000	.000	-.002	-.002
Measurement residuals	16	52.535	.000	.016	.017	.010	.011

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	51.861	.000	.016	.016	.012	.013

5. Experience

Nested Model Comparisons

Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	9.587	.143	.003	.003	.000	.000
Structural weights	21	22.858	.352	.007	.007	-.004	-.004
Structural covariances	36	63.575	.003	.019	.020	.002	.002
Structural residuals	40	79.341	.000	.024	.025	.005	.005
Measurement residuals	52	115.227	.000	.034	.037	.010	.011

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	15	13.271	.581	.004	.004	-.004	-.004
Structural covariances	30	53.989	.005	.016	.017	.002	.002
Structural residuals	34	69.754	.000	.021	.022	.005	.005
Measurement residuals	46	105.640	.000	.031	.034	.010	.011

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	40.717	.000	.012	.013	.005	.006
Structural residuals	19	56.483	.000	.017	.018	.008	.009
Measurement residuals	31	92.369	.000	.027	.030	.013	.015

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	15.766	.003	.005	.005	.003	.003
Measurement residuals	16	51.652	.000	.015	.017	.008	.009

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	35.886	.000	.011	.012	.005	.005

6. E-university

Nested Model Comparisons
Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	11.879	.065	.004	.004	.001	.001
Structural weights	21	37.617	.014	.013	.014	.002	.002
Structural covariances	36	61.840	.005	.022	.023	.002	.003
Structural residuals	40	67.506	.004	.024	.025	.002	.002
Measurement residuals	52	106.995	.000	.037	.039	.010	.011

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	15	25.738	.041	.009	.009	.001	.001
Structural covariances	30	49.960	.013	.017	.018	.001	.001
Structural residuals	34	55.627	.011	.019	.020	.001	.001
Measurement residuals	46	95.115	.000	.033	.035	.009	.009

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	24.222	.061	.008	.009	.000	.000
Structural residuals	19	29.889	.053	.010	.011	.000	.000
Measurement residuals	31	69.378	.000	.024	.026	.008	.008

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	5.666	.225	.002	.002	.000	.000
Measurement residuals	16	45.155	.000	.016	.017	.008	.008

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	39.489	.000	.014	.015	.008	.009

7. Research University

Nested Model Comparisons

Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	5.969	.427	.002	.002	-.002	-.002
Structural weights	20	31.899	.044	.010	.010	.000	.000
Structural covariances	35	42.239	.187	.013	.013	-.005	-.005
Structural residuals	39	53.893	.057	.016	.017	-.003	-.003
Measurement residuals	51	73.890	.020	.022	.023	-.002	-.002

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	14	25.930	.026	.008	.008	.002	.002
Structural covariances	29	36.270	.166	.011	.011	-.003	-.003
Structural residuals	33	47.924	.045	.014	.015	-.001	-.001
Measurement residuals	45	67.921	.015	.021	.021	-.001	-.001

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	10.340	.798	.003	.003	-.005	-.005
Structural residuals	19	21.994	.285	.007	.007	-.003	-.003
Measurement residuals	31	41.991	.090	.013	.013	-.002	-.002

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	11.654	.020	.004	.004	.002	.002
Measurement residuals	16	31.651	.011	.010	.010	.003	.003

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	19.997	.067	.006	.006	.001	.001

8. Level of reading and writing

Nested Model Comparisons
Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	9.839	.132	.003	.004	.001	.001
Structural weights	20	33.633	.029	.011	.012	.004	.004
Structural covariances	35	72.486	.000	.025	.026	.012	.013
Structural residuals	39	73.881	.001	.025	.026	.010	.011
Measurement residuals	51	118.274	.000	.040	.042	.021	.022

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	14	23.793	.049	.008	.008	.003	.003
Structural covariances	29	62.646	.000	.021	.022	.011	.011
Structural residuals	33	64.042	.001	.022	.023	.009	.010
Measurement residuals	45	108.435	.000	.037	.039	.019	.021

ssuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	38.853	.001	.013	.014	.008	.009
Structural residuals	19	40.248	.003	.014	.014	.006	.007
Measurement residuals	31	84.641	.000	.029	.030	.017	.018

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	1.395	.845	.000	.001	-.002	-.002
Measurement residuals	16	45.788	.000	.016	.016	.009	.009

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	44.393	.000	.015	.016	.010	.011

9. Thai Language

Nested Model Comparisons

Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	6	13.771	.032	.005	.005	.002	.002
Structural weights	21	24.447	.272	.009	.009	-.005	-.005
Structural covariances	36	46.487	.113	.016	.017	-.006	-.006
Structural residuals	40	63.713	.010	.022	.023	-.001	-.001
Measurement residuals	52	92.275	.000	.032	.034	.002	.003

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	15	10.676	.775	.004	.004	-.007	-.007
Structural covariances	30	32.716	.335	.011	.012	-.008	-.008
Structural residuals	34	49.942	.038	.017	.018	-.003	-.003
Measurement residuals	46	78.504	.002	.027	.029	.000	.000

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	15	22.040	.107	.008	.008	-.001	-.001
Structural residuals	19	39.267	.004	.014	.015	.004	.004
Measurement residuals	31	67.829	.000	.024	.025	.007	.008

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	4	17.227	.002	.006	.006	.005	.005
Measurement residuals	16	45.789	.000	.016	.017	.008	.009

Assuming model Structural residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	12	28.562	.005	.010	.011	.003	.004

APPENDIX IV

PART A

ACADEMIC STAFF AND ENROLMENT IN THE THAI PUBLIC UNIVERSITY SECTOR

ACADEMIC STAFF AND ENROLMENT IN THE THAI PUBLIC UNIVERSITY SECTOR

Institution	Total	Degrees				
		Lower than Bachelor	Bachelor	Graduate Diploma	Master	PhD
1. Academic Staff in Public University (Grand Total)	**23,153**	**10**	**2,258**	**0**	**12,676**	**8,209**
1.1 Limited Admission Universities	**20,926**	**0**	**2,138**	**0**	**11,223**	**7,565**
1) Chulalongkorn University	2,811		151		1,346	1,314
2) Kasetsart University	2,083		294		1,095	694
3) Khon Kaen University	1,907		265		1,036	606
4) Chiang Mai University	2,049		213		1,003	833
5) Thammasat University	1,168		43		723	402
6) Naresuan University	855		135		527	193
7) Burapha University	680		67		474	139
8) Mahidol University	2,889		156		1,086	1,647
9) Srinakharinwirot University	1,082		136		671	275
10) Silpakorn University	746		105		478	163
11) Prince of Songkla University	1,580		200		790	590
12) Ubon Ratchathani University	338		78		193	67
13) King Mongkut's Institute of Technology Ladkrabang	860		112		508	240
14) King Mongkut's Institute of	661		92		456	113
Technology North Bangkok						
15) Maejo University	329		9		229	91
16) The National Institute of Development Administration	150				35	115
17) Mahasarakham University	497		44		392	61
18) Thaksin University	241		38		181	22
1.2 Open Universities	**1,226**	**10**	**50**	**0**	**1071**	**195**
19) Sukhothai Thammathirat Open U.	380				347	33
20) Ramkhamhaeng University	846	10	50		624	162
1.3 Autonomous Universities	**1,001**	**0**	**70**	**0**	**482**	**449**
21) King Mongkut's University of Technology Thonburi	485	0	64	0	225	196
22) Suranaree University of Technology	245	0	0	0	79	166
23) Walailak University	179	0	2	0	112	65
24) Mae Fah Luang University	92	0	4	0	66	22

Table 1 Number of Academic Staff in Public Universities Classified by Education Qualifications in Fiscal Year 2003 (Commission of Higher Education 2004a)

Type of Institution	Levels of Education					
	Total	**Lower than Bachelor**	**Bachelor's**	**Graduate Diploma**	**Master's**	**PhD.**
Total enrolments (Grand Total) Public, Private, and Others	**1,667,736**	**21,108**	**1,532,993**	**3,245**	**111,767**	**8,623**
1. Public University/Institute	**1,013,565**	**12,152**	**884,698**	**3,120**	**105,987**	**7,608**
1.1 Limited Admission Universities	**336,570**	**2,586**	**236,403**	**2,916**	**88,362**	**6,303**
1) Chulalongkorn University	28,202	0	18,005	252	8,803	1,142
2) Kasetsart University	37,525	0	28,714	24	8,096	691
3) Khon Kaen University	18,860	0	15,272	103	3,176	309
4) Chiang Mai University	25,169	0	18,202	168	6,405	394
5) Thammasat University	30,871	0	22,259	565	7,799	248
6 Naresuan University	20,574	20	13,274	18	7,133	129
7) Burapha University	16,184	0	11,177	9	4,838	160
8) Mahasarakham University	19,879	0	13,418	1,163	5,268	30
9) Mahidol University	20,397	854	11,398	463	5,584	2,098
10) Srinakharinwirot University	16,001	97	9,787	82	5,734	301
11) Silpakorn University	11,437	0	9,208	4	2,150	75
12) Prince of Songkla University	24,048	0	19,820	8	3,982	238
13) Ubon Ratchathani University	4,754	0	4,499	0	240	15
14) King Mongkut's Institute of Technology Ladkrabang	17,356	0	14,056	0	3,182	118
15) King Mongkut's Institute of	17,728	1,005	14,091	0	2,576	56
Technology North Bangkok						
16) Maejo University	8,809	0	8,148	0	652	9
17)The National Institute of	12,184	0	0	49	11,845	290
Development Administration						
18) Thaksin University	6,592	610	5,075	8	899	0
1.2 Open Universities	**652,564**	**9,566**	**629,078**	**63**	**13,037**	**820**
19) Sukhothai Thammathirat Open U.	181,387	9,566	168,347	19	3,455	0

20) Ramkhamhaeng University	471,177	0	460,731	44	9,582	820
1.3 Autonomous Universities	**24,431**	**0**	**19,217**	**141**	**4,588**	**485**
21) King Mongkut's University of Technology Thonburi	11,877	0	8,128	58	3,449	242
22) Suranaree University of technology	5,833	0	5,309	0	302	222
23) Walailuk University	4,388	0	3,556	83	728	21
24) Mae Fah Luang University	2,333	0	2,224	0	109	0

Table 2 Total Enrolments Classified by Types of Institution and Levels of Education in Academic Year 2003(Commission of Higher Education 2004c).

APPENDIX IV

PART B

WEBSITES OF THAI BUSINESS SCHOOLS AND THAI PUBLIC UNIVERSITIES

WEBSITES OF THAI BUSINESS SCHOOLS AND THAI PUBLIC UNIVERSITIES

Type of University/Institution	Business Schools within Public Universities/Institutes	
	Name of Business School	Websites of Business Schools (URL)
1.1 Limited Admission Universities		
1) Chulalongkorn U.	Faculty of Commerce and Accountancy	http://www.acc.chula.ac.th
2) Kasetsart U. - Bangkhen Campus (Main)	Faculty of Business Administration	http://www.bus.ku.ac.th
- Sriracha Campus	Faculty of Management Science	http://ms.src.ku.ac.th/index2.html
-Chalermprakiat Sakon Nakorn Campus	Faculty of Liberal Arts and Management	http://www.csc.ku.ac.th/~fartmang
3) Khon Kaen U.	Faculty of Management Science	http://ms.kku.ac.th
4) Chiang Mai U.	Faculty of Business Administration	http://www.ba.cmu.ac.th
5) Thammasat U.	Faculty of Commerce and Accountancy	http://www.bus.tu.ac.th
6) Naresuan U.	Faculty of Management and Information Sciences	http://www.mis.nu.ac.th
7) Burapha U.	Faculty of Humanities and Social Science , Department of Business Administration	http://www.huso.buu.ac.th
8) Mahasarakham U.	Faculty of Accountancy & Management	http://www.acc.msu.ac.th
9) Mahidol U.	International College, Business Administration Major	http://www.muic.mahidol.ac.th
10) Srinakharinwirot U.	Faculty of Social Science, Department of Business Administration	http://ccapp.swu.ac.th
11) Silpakorn U.	Faculty of Management	http://www.su.ac.th/html_academics/management.asp
12) Prince of Songkla U.	Faculty of Management Science	http://www.mgt.psu.ac.th/webmgt/index.php
13) Ubon Ratchathani U.	Faculty of Management Science	http://www.bus.ubu.ac.th
14) King Mongkut's Institute of Technology Ladkrabang	No Business School	http://www.kmitl.ac.th
15) King Mongkut's Institute of Technology North Bangkok	No Business School	http://www.kmitnb.ac.th
16) Maejo U.	Faculty of Agricultural Business, Department of Business Administration and Agricultural Marketing	http://www.agribus.mju.ac.th

17)The National Institute of Development Administration	School of Business Administration	http://www.nida.ac.th/en/mba/page2
18) Thaksin U.	Faculty of Economics and Business Administration	http://www.tsu.ac.th/ecba/
1.2 Open Universities		
19) Sukhothai Thammathirat Open U.	School of Management Science	http://www.stou.ac.th/Eng/Schools/Sms
20) Ramkhamhaeng U.	Faculty of Business Administration	http://www.ru.ac.th/english/Faculties/business/
1.3 Autonomous Universities		
21) King Mongkut's U. of Technology Thonburi	No Business School	http://www.kmutt.ac.th
22) Suranaree U. of Technology	No Business School	http://www.sut.ac.th
23) Walailuk U.	School of Management	http://management.wu.ac.th
24) Mae Fah Luang U.	School of Management	http://lecture.mfu.ac.th

Table 3 Websites (URL) of Business Schools in Public Universities

Type of University/ Institution	Business School	
	Name of Business School	Website of University/Institution (URL
1. Public University/ Institute		
1.1 Limited Admission Universities		
1) Chulalongkorn U.	Faculty of Commerce and Accountancy	http://www.chula.ac.th
2) Kasetsart U. - Bangkhen Campus (Main)	Faculty of Business Administration	http://www.ku.ac.th
-Sriracha Campus	Faculty of Management Science	http://www.src.ku.ac.th
-Chalermprakiat Sakon Nakorn Campus	Faculty of Liberal Arts and Management	http://csc.ku.ac.th
3) Khon Kaen U.	Faculty of Management Science	http://www.kku.ac.th
4) Chiang Mai U.	Faculty of Business Administration	http://www.cmu.ac.th
5) Thammasat U.	Faculty of Commerce and Accountancy	http://www.tu.ac.th
6) Naresuan U.	Faculty of Management and Information Sciences	http://www.nu.ac.th
7) Burapha U.	Faculty of Humanities and Social Science , Department of Business Administration	http://www.buu.ac.th

8) Mahasarakham U.	Faculty of Accountancy & Management	http://www.msu.ac.th
9) Mahidol U.	International College, Business Administration Major	http://www.mahidol.ac.th
10) Srinakharinwirot U.	Faculty of Social Science, Department of Business Administration	http://www.swu.ac.th
11) Silpakorn U.	Faculty of Management	http://www.su.ac.th
12) Prince of Songkla U.	Faculty of Management Science	http://www.psu.ac.th
13) Ubon Ratchathani U.	Faculty of Management Science	http://www.ubu.ac.th
14) King Mongkut's Institute of Technology Ladkrabang	No Business School	http://www.kmitl.ac.th
15) King Mongkut's Institute of Technology North Bangkok	No Business School	http://www.kmitnb.ac.th
16) Maejo U.	Faculty of Agricultural Business, Department of Business Administration and Agricultural Marketing	http://www.mju.ac.th
17)The National Institute of Development Administration	School of Business Administration	http://www.nida.ac.th
18) Thaksin U.	Faculty of Economics and Business Administration	http://www.tsu.ac.th
1.2 Open Universities		
19) Sukhothai Thammathirat Open U.	School of Management Science	http://www.stou.ac.th
20) Ramkhamhaeng U.	Faculty of Business Administration	http://www.ru.ac.th
1.3 Autonomous Universities		
21) King Mongkut's U. of Technology Thonburi	No Business School	http://www.kmutt.ac.th
22) Suranaree U. of Technology	No Business School	http://www.sut.ac.th
23) Walailuk U.	School of Management	http://www.wu.ac.th
24) Mae Fah Luang U.	School of Management	http://www.mfu.ac.th

Table 4 Websites of Universities/Institutions.