

# Using a Technology Acceptance Model To Investigate Academic Acceptance of the Internet

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## Abstract

*Information Technology has long been a well-known research area, but this changed considerably when 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 themselves and their environments. Each theory or model has been proposed with different sets of determinants and moderators. More importantly, most of the research has been conducted in the U.S. Therefore, it is questioned whether the technology acceptance models and theories that have been developed, modified, and extended in the U.S. can be used in other regions such as South East Asia and more specifically in Thailand. It is questioned whether there might be other determinants and moderators that also play important roles in this specific environment. This research study has seven objectives, of which five have already been achieved. From the findings, despite the fact that academics hardly used the Internet (used a few times a month) for teaching in class and providing a personal Web-Base for facilitating teaching, they intended to use it more (a few times a week) in the future. On the contrary, at the time of the survey, they used the Internet rather often (five to six times a week) for enhancing teaching knowledge, searching information for their research, personal tasks, enhancing personal knowledge, and using email for personal contact. Significantly, no matter how often they currently used the Internet, they all intended to use the Internet more often in all type of tasks in the future. With respect to motivation to make full use of the Internet in their work, they not only 'quite agree' that if good facilities were available to support usage (e.g. good computer hardware and software, good communication network etc.) this would motivate them, but they also thought that their strong intentions for providing student contacts, the university's policy to be Research Oriented and become an e-University in the future, also play an important role in motivating them to make full use of the Internet in their work. On the contrary, the availability of technicians and Internet training motivated them less. They also thought that using the Internet helped improve their professional practice (such as teaching in class, preparing teaching materials, research, and administrative tasks), and helped improve personal developments (such as improving their academic and personal knowledge) and helped improve their quality of working life (such as saving their expense e.g. searching Information from e-Journal and Websites and using email in communication with others). Nevertheless, in respect of improving quality of working life and helping them have more time for leisure and creative thinking, they simply 'slightly agreed'. With these findings, it is interesting to investigate deeply about academics' behaviour and intention. Five core constructs (determinants) were examined including perceived usefulness, perceived*

*ease of use, social influence, self-efficacy, and facilitating conditions together with moderators such as gender, age, experience, and some cultural aspects of whether these constructs influenced academic's behaviour. Survey research methodology (questionnaire and semi-structured interviews) were used to collect primary data from Business Schools in Thailand, and the survey yielded 455*

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*usable questionnaires. Structural Equation Modelling with AMOS is also being used to analyse data and is expected to provide evidence to generate the Technology Acceptance Model that is both substantively meaningful and statistically well-fitting (Byrne 2001, 2006). By generating the Technology Acceptance Model in accordance with the main research objectives, it is expected that the generated research model will have the power to explain/predict Internet acceptance and usage behaviour. 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 and usage of the technology (Davis, 1989).*

## Keywords

Internet, Information Technology, Academic, Academic' work and Culture

## Introduction

In the Information Systems field, an important area of research is concentrated on technology acceptance. Many theories and models have been developed, but one of the most well-known theories/models in the U.S is the Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi & Warshaw 1989), introduced more than a decade ago. Despite its popularity and usefulness, many researchers still want to investigate whether TAM should be revised, extended or modified to account for rapid change in both technologies and their environments. Previous research studied what determinants might be significant in affecting behaviour intention and actual behaviour in specific contexts including technology, individual, and organizational. It is questioned whether there are only determinants such as perceive usefulness, perceived ease of use, subjective norm, perceived behaviour control and moderators such as age, gender, experience, voluntariness to determine behaviour intention and actual behaviour. Perhaps there could be some other determinants and moderators that also play important roles. More importantly, much of the research has been conducted in the U.S. and it is wondered whether technology acceptance models that have been developed, modified, and extended in U.S. can be used in other regions like South East Asia and especially in Thailand.

The purpose of this study is to develop the Technology Acceptance Model that will have the power to demonstrate acceptance and actual behaviour (usage) of the Internet<sup>1</sup> by using academics<sup>2</sup> 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 is in developing the following specific research objectives.

1. To review literature in respect of user acceptance/usage theories and models and examine prominent models including Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Decomposed Theory of Planned Behaviour (DTPB), Social Cognitive Theory (SCT), Technology Acceptance Model (TAM), TAM2, Augmented TAM or Combined TAM and TPB (C-TAM-TPB), The Unified Theory of Acceptance and Use of Technology (UTAUT) and a Model of the Innovation-Decision Process .
2. To review previous literature about IT acceptance/adoption and usage within four contexts of study include technology, individual, organisational, and cultural contexts by concentrating on the examining of determinants, moderators, and cultural aspects that may influence user behaviours.

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<sup>1</sup> 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 (Online-Dictionary 2006).

<sup>2</sup> 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'.

3. To investigate the extent to which academics use and intend to use the Internet in their work<sup>3</sup>.
4. To investigate how to motivate academics to make full use of the Internet in their work.
5. To investigate to what extent using the Internet help improving academics' professional practices, professional developments and quality of working life.
6. To formulate a Technology Acceptance Model of Internet usage by Thai academics.
7. To generate and validate a research model that best describes Thai academics' Internet usage behaviour and behaviour intention.

## Theoretical Base and Context of Study

This research is based on many well-known theories/models including Theory of Reasoned Action (TRA) (Fishbein & Ajzen 1975), Theory of Planned Behaviour (TPB) (Ajzen 1991), Decomposed Theory of Planned Behaviour (DTPB) (Taylor, S & Todd, PA 1995), Social Cognitive Theory (SCT) (Bandura 1986), Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi & Warshaw 1989) (includes its extensions and modifications), TAM2 (Venkatesh, Viswanath & Davis 2000), Augmented TAM or Combined TAM and TPB (C-TAM-TPB) (Taylor, S & Todd, P 1995), The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Viswanath et al. 2003), and a Model of the Innovation-Decision Process (Rogers, 1995; Rogers1983). The aim of this research differs from existing theories/models/practices in that it will concentrate within four specific contexts according to (Han 2003):

1. Technology context (the Internet) circles the target of individual technology acceptance/usage behaviour,
2. The individual context (academics) defines the micro-environment,
3. The organisational context (Business Schools in the Thai Public University Sector) is in the middle,
4. The cultural context (Thai cultural context) serves as the macro-environment.

It is important to comprehensively understand these contexts and their effects on user behaviour towards a given technology in order to develop a model of technology acceptance that best describes user behaviour and behaviour intention. The interpretation of a Technology Acceptance Model of Internet usage from these contexts will provide a solid base to explain user behaviours and behaviour intention, and what *promotes* and *hinders* usage in a specific environment.

## Technology Context

As we live in the information age, the major concern of Information Technology is the use of computers to convert data into useful information in making decisions (Tatnall et al. 2003). The more useful information we get the better the decision making. Because of this, it is worth studying individual reactions to use of information technology and other technologies. These technologies can help people not only in good communication with others but also help providing useful information for decision making in accordance with peoples needs. Previous research studied different technologies in order to develop or extend models or theories of technology acceptance and usage. Examples of technologies under investigation in previous research are: software packages (Davis, F. D., Bagozzi & Warshaw 1989; Venkatesh, Viswanath & Davis 1996), microcomputers (Igbaria, Magid, Guimaraes & Davis 1995), e-mail (Gefen & Straub 1997; Szajna 1996), telemedicine technology (Hu, P. J. et al. 1999) and WWW (Agarwal & Karahanna 2000). The Internet is the Technology under investigation for this

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<sup>3</sup> 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, etc Moreover, academic' work also covers research and administration tasks, for example (Rosenfeld, Reynolds & Bukatko 1992).

research because of its popularity and usefulness. The Internet (sometimes known as the Information Super Highway or Infobahn) is an interconnected network of networks (Tatnall et al. 2003). The Internet is so popular since it can help connect millions of computers and millions of users around the world, by providing so many interesting services with less expense. The most common services of the Internet are the Web and e-mail (Davison, Burgess & Tatnall 2003, 2004). Although the Web offers many facilities but many organisations also make use of Web portals (Tatnall et al. 2003), that aggregate information from multiple sources and make that information available to various users (Tatnall 2005). The other services on the Internet are for example, Usenet, Newsgroups, File sharing, and Gopher (WordIQ 2006).

At present and in the future, the Internet seems to be the most useful technology for communication and for obtaining information for business organisations and educational institutions. Even though the Internet became popular only about a decade ago (Hyperdictionary 2006), it is now very popular in many countries and especially in the U.S. Despite its popularity, the Internet penetration rate of the world (percentage of the population that use the Internet) is still very low. Only 15.7% of all people in the world use the Internet. This accounts for 1,022.9 million people from a total population of 6,499.7 million (*Internet Usage Statistics-The Big Picture* 2006). This statistics shows that many people in many countries still have no opportunity to access the Internet. In Thailand the penetration rate (12.7 %) is lower than the average penetration rate of the world (15.7 %). It cannot be compared with the penetration rate of the U.S. (68.6 %) (*Internet Usage Statistics for the Americas* 2006) and Australia (68.4%) (*Internet Usage and population in Oceania* 2006). The total population of Thailand is 66.6 million, and Internet users make up only 8.4 million people (*Internet Usage for Asia* 2006). Undoubtedly, there are questions in respect of the gap between popularity together with usefulness of the Internet and the penetration rates of this technology. The very low Internet penetration rates in these countries may represent many problems. If Internet technologies are available in these countries via infrastructures, further questions that should be addressed are what determinants influence them to use the Internet and moreover, how to motivate people to make full use of this technology in their work.

## Individual and Organisational Contexts

The Thai Government acknowledges the significance of educating the Thai people, as seen by its policies such as IT 2010(*Education in Thailand* 2004) to support and increase Internet usage within schools and higher education institutions. Unfortunately, the Internet usage rate is still very low compared with other countries within the South East Asia region such as Singapore and Malaysia (their Internet penetration rates are 67.2% and 36.7% respectively) (*Internet Usage for Asia* 2006). Therefore, investigating Internet usage behaviours by academics at higher education institutions seems to be worth doing since they are very important human resources in the country. Their higher qualifications and their knowledge/visions directly affect their work, and consequently affect the quality of students graduated from the universities. In turn, the qualification of students who graduate from these Universities or Business Schools also affect the quality of their work in the workplace within business or other environments in Thailand. If Internet usage can be promoted, it will certainly partly help Thailand to cope with the rapidly changing environments in this Information age.

As individual academics were used as subjects of this study this will help to clarify the importance of individual characteristics in determining usage behaviour (Han 2003). Previous research has studied many other types of subjects, for example, undergraduate and graduate business students (Agarwal & Karahanna 2000; Szajna 1996; Taylor, S & Todd, P 1995; Taylor, S & Todd, PA 1995), MBA students (Agarwal & Prasad 1998; Davis, 1989; Davis, Bagozzi & Warshaw 1989; Igarbaria, Magid, Guimaraes & Davis 1995; Venkatesh, Viswanath & Davis 1996). Chau and Hu (1999) and Hu, Chau, Sheng, and Tarn (1999) used physicians as subjects in their studies.

The organisational context under investigation in this study is Thai Business Schools in the Public University Sector. The organisational context refers to the specific environment where the individual works and the investigated technology acceptance takes place (Han 2003). The interpretation of user

behaviour within this organisational context will also help to make clear how important a role the organisation plays in determining usage behaviour. There are several kinds of organisational contexts from previous research, for example, the MBA program at the University Of Michigan (Davis, F. D., Bagozzi & Warshaw 1989), part-time MBA students at an eastern university (Igarria, Magid, Guimaraes & Davis 1995), business school students (Taylor, S & Todd, P 1995; Taylor, S & Todd, PA 1995), university (Agarwal & Karahanna 2000; Agarwal & Prasad 1998; Szajna 1996), US., Swiss and Japan three airline companies (Gefen & Straub 1997), and public tertiary hospitals in Hong Kong (Hu, P. J. et al. 1999).

## Cultural context

As previously mentioned, most models/theories of technology acceptance were formulated in the U.S and these studies did not consider the impact of cultural factors on usage behaviour. There is interesting evidence from literature about the impact of culture on IT adoption and use. Zakour (2004) claimed that individuals were conditioned by their culture, so the impact of cultural factors on usage behaviour should be considered when studying the Technology Acceptance Model in countries outside the U.S. Hofstede (1997) stated that culture<sup>4</sup>, shaped individual values and affected behaviour and was seen to be different across nations or continents – people may behave differently depending on their culture. Little research has attempted to link culture with Models of Technology Acceptance or usage. However, some previous researchers have linked their research with culture. Gefen and Straub (1997) when they conducted a three-country study to test TAM across cultures found that TAM held for the US and Switzerland but not Japan. Igarria and Iivari (1995) studied cross-cultural settings between two countries and found that culture exerted effects on the computer self-efficacy of Finns. Therefore, there was supporting evidence that culture may impact on IT usage, and so cultural aspects will be integrated into the proposed research model.

According to Hofstede (1997), language groups or linguistic affiliation levels and organisational levels are two different levels of culture. Cooper (1994) found that the organisational cultural role was significant in new IT implementation. Collectively, four cultural aspects considered to have effects on determining Thai Internet usage include:

1. The culture in respect of the habits of Thai people who do not like, or have no habits, of reading and writing. This contradicts the natural culture of using the Internet which needs an effort of reading and/or writing,
2. The Thai language, the first or national language of the Thai people, is different to the main Internet language (English language). Moreover, databases developed in the Thai language are still not sufficient to support the demands of the Thai people, so Thai people or academics have to search the Internet in English to get the information they need, if this is not available in the Thai language,
3. Many leading public universities in Thailand have strategies to change their nature and become research oriented universities. This may help indirectly to influence academics to use the Internet more in their work in order to prepare themselves for the future,
4. One of the strategies of the National IT Policy (2001-2010) (IT 2010) is to stipulate e-Education, so many public universities that are state universities or state-supervised universities have a goal to become e-universities in the future. This will positively affect Internet usage of academics in order to prepare them for the near future.

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<sup>4</sup> Culture is “collective programming of the mind which distinguishes the members of one group or category of people from another” (Hofstede 1997). 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).

Thus cultural aspects will be integrated into the research model to be investigated together with the determinants and moderators to see whether they may have any effects on Internet usage behaviour by academics within Thai Business Schools.

## The Research Model and Hypotheses

Some previous research such as that by Davis, Bagozzi and Warshaw (1989), focused on individual acceptance of technology by using intention and/or usage as the key dependent variable. However, this research was conducted mainly in North America in which models of Technology Acceptance were originally developed, surveyed with individuals' actual usage (Davis, 1989; Davis, Bagozzi & Warshaw 1989). The basic concept underlying user acceptance models is that individual reaction to the use of information technology influences actual use of information technology<sup>5</sup>, and consequently, influences intentions to use it. Intention to use is found to be a predictor of actual use (Venkatesh, Viswanath et al. 2003). Regarding a new technology, in some researches, a longitudinal field study was used and intention to use was captured before actual usage behaviour was measured (Venkatesh, Viswanath et al. 2003).

Nevertheless, some research studied only intention to use (behaviour intention). For example, Chau and Hu (1999) surveyed individual professionals (physicians) by examining physicians' intention to use telemedicine technology in Public tertiary hospitals in Hong Kong. They claimed that according to Szajna (1996) and Moore and Benbasat (1991), technology acceptance can be measured by actual technology use (user behaviour) as well as by intention to use (behaviour intention). Chau and Hu (1999) selected intention to use over actual usage to measure technology acceptance. They claimed that the 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 from using actual technology use to generate results with statistical significance. Taylor and Todd (1995) reported that when comparing experienced users and inexperienced users, TAM has the power of predicting and explaining usage behaviour almost equally.

When Internet usage started in Thailand more than ten years ago (in 1991) there were only 30 Internet users in Thailand (NECTEC 2004). By today, actual Internet usage in Thailand is not widespread when compared to the U.S. Currently, Internet use is 8.4 million people – equal to only 12.7% (penetration rate) (*Internet Usage for Asia* 2006). Since the Internet has been used for this long in Thailand, therefore, actual usage was chosen to measure technology acceptance by academics in order to explain usage behaviour. However, the role of behaviour intention as a predictor of behaviour is critical (Venkatesh, Viswanath et al. 2003), in this case, because of a cross-sectional study, the role of behaviour intention is as a predictor of future behaviour. Therefore, for this study, behaviour intention was also chosen to measure technology acceptance in order to find out about academics' future usage behaviour.

Five core constructs (perceived usefulness, perceived ease of use, social influence, self-efficacy and facilitating conditions), five key moderators (gender, age, experience, educational level and voluntariness of use) and another four culture aspects will be integrated into the research model (see figure 1). Several hypotheses will be tested regarding whether determinants, moderators, and culture aspects may effect on user behaviour, and behaviour intention.

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5 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 (Martin et al. 2002; Thesaurus 2006).

## Perceived Usefulness

Perceived usefulness (PU) in TAM (Davis, 1989), TAM2 (Venkatesh, Viswanath & Davis, 2000), and Augmented TAM or Combined TAM and TPB (Theory of Planned Behaviour) called (C-TAM-TPB) (Taylor, S & Todd, P 1995), is used as a direct determinant of behaviour intention and/or usage behaviour. Perceived usefulness is analogous to the relative advantage of perceived characteristics of an innovation by Rogers (1995). Perceived usefulness is defined and used for this study as the degree to which a person believes that using a particular system would enhance his or her job performance (Davis 1989; Davis, Bagozzi & Warshaw 1989). The influence of perceived usefulness on behavioural intention and/or usage behaviour is expected to be moderated by gender and age. Since gender and age differences have been shown to exist in technology adoption contexts (Morris, Venkatesh & Summer 2000). It has been found that the effect of performance expectancy (which is similar to perceived usefulness) on behaviour intention was moderated by gender and age (Venkatesh, Viswanath et al. 2003). Moreover, Levy (1988) suggested that studies of gender differences can be misleading without reference to age. This research expects that the influence of perceived usefulness on usage behaviour and behavioural intention will be moderated by both gender, age, and cultural aspects. The hypotheses are:

### *Hypotheses on usage behaviour (U)*

- *H1a (U). Reading and writing habits will moderate the influence of perceived usefulness on usage behaviour.*
- *H1b (U). Thai language will moderate the influence of perceived usefulness on usage behaviour.*
- *H1c (U). The university that plans to be a research oriented university will impact on the influence of perceived usefulness on usage behaviour.*
- *H1d (U). The university that plans to be an e-university will impact on the influence of perceived usefulness on usage behaviour.*
- *H1e (U). Gender and age will moderate the influence of perceived usefulness on usage behaviour.*

### *Hypotheses on behaviour intention (BI)*

- *H1a (BI). Reading and writing habits will moderate the influence of perceived usefulness on behaviour intention.*
- *H1b (BI). Thai language will moderate the influence of perceived usefulness on behaviour intention.*
- *H1c (BI). The university that plans to be a research oriented university will impact on the influence of perceived usefulness on behaviour intention.*
- *H1d (BI). The university that plans to be an e-university will impact on the influence of perceived usefulness on behaviour intention.*
- *H1e (BI). Gender and age will moderate the influence of perceived usefulness on behaviour intention.*

## Perceived Ease of Use

Perceived ease of use is analogous to the complexity of perceived characteristics of an innovation by Rogers(1983), although in the opposite direction. Perceived ease of use is similar to effort expectancy which is defined by Venkatesh, Morris, Davis, and Davis (2003, p. 450) as: “The degree of ease associated with the use of the system.” For this study, perceived ease of use (PEOU) is considered to be a direct determinant of usage behaviour and behaviour intention and is defined and used here as the degree to which a person believes that using a system would be free of effort (Davis, 1989; Davis, Bagozzi & Warshaw 1989).

There is a similarity between perceived ease of use and effort expectancy in the concept, construct definitions and measurement scales (Davis, F. D., Bagozzi & Warshaw 1989; Moore & Benbasat 1991;

Plouffe, John & Mark 2001; Thompson, Higgins & Howell 1991; Venkatesh, Viswanath et al. 2003). The influence of the effort expectancy on behaviour intention was moderated by gender, age and experience (Venkatesh, Viswanath et al. 2003). Therefore, it is expected that the influence of perceived ease of use toward usage behaviour and behaviour intention will be moderated by cultural aspects, gender, age and experience, and educational level. The hypotheses are:

#### ***Hypotheses on usage behaviour (U)***

- *H2a (U). Reading and writing habits will moderate the influence of perceived ease of use on usage behaviour.*
- *H2b (U). Thai language will moderate the influence of perceived ease of use on usage behaviour.*
- *H2c (U). Gender, age, and experience will moderates the influence of perceived ease of use on usage behaviour.*
- *H2d (U). Educational level will moderates the influence of perceived ease of use on usage behaviour.*

#### ***Hypotheses on behaviour intention (BI)***

- *H2a (BI). Reading and writing habits will moderate the influence of perceived ease of use on behaviour intention.*
- *H2b (BI). Thai language will moderate the influence of perceived ease of use on behaviour intention.*
- *H2c (BI). Gender, age, and experience will moderates the influence of perceived ease of use on behavioural intention.*
- *H2d (BI). Educational level will moderates the influence of perceived ease of use on behavioural intention.*

### **Social Influence**

According to Venkatesh, Morris, Davis and Davis (2003), social influence is a direct determinant of behavioural intention and is represented as a subjective norm in the Theory of Reasoned action (TRA) (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975), TAM2 (Venkatesh, Viswanath & Davis, 2000), Theory of Planned Behaviour (TPB) (Ajzen 1991), Decomposed Theory of Planned Behaviour (DTPB) (Taylor, S & Todd, PA 1995), and Augmented TAM or Combined TAM and TPB (C-TAM-TPB)(Taylor, S & Todd, P 1995), etc. The influence of social influence on behavioural intention was moderated by gender, age, experience, and voluntariness (Venkatesh, Viswanath et al. 2003).

Social influence is defined here as “The degree to which an individual perceives that other important persons believe he or she should use the technology/system” (Venkatesh, Viswanath et al. 2003, p. 451). The influence of social influence on usage behaviour and behavioural intention are expected to be moderated by gender, age, experience, and voluntariness. The hypotheses are:

- *H3 (U). Gender, age, voluntariness and experience will moderate the influence of social influence on usage behaviour.*
- *H3 (BI). Gender, age, voluntariness and experience will moderate the influence of social influence on behavioural intention.*

### **Self-Efficacy**

Self-efficacy is defined as the internal notion of the individual and is related to perceived ability (Bandura 1986). 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 (1995) argued that in DTPB, self-efficacy was a significant determinant of perceived behavioural control, and also a significant determinant of behaviour. However, for this study it is expected that self-efficacy is a significant determinant of usage behaviour and behaviour intention and



the influence of self-efficacy will be moderated by some cultural aspects and educational level. The hypotheses are:

#### ***Hypotheses on usage behaviour (U)***

- *H4a (U). Reading and writing habits will moderate the influence of self-efficacy on usage behaviour.*
- *H4b (U). Thai Language will moderate the influence of self-efficacy on usage behaviour.*
- *H4c (U). Educational level will moderate the influence of self-efficacy on usage behaviour.*

#### ***Hypotheses on behaviour intention (BI)***

- *H4a (BI). Reading and writing habits will moderate the influence of self-efficacy on behaviour intention.*
- *H4b (BI). Thai Language will moderate the influence of self-efficacy on behaviour intention.*
- *H4c (BI). Educational level will moderate the influence of self-efficacy on behaviour intention.*

### **Facilitating Conditions**

Facilitating conditions are defined as “The degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system” (Venkatesh, Viswanath et al. 2003, p. 453). The empirical results also indicated that facilitating conditions did have a direct influence on usage beyond that explained by behavioural intention alone. Consistent with TPB/DTPB, facilitating conditions was also modelled as a direct antecedent of usage. Moreover, the influence of facilitating conditions on usage was moderated by age and experience, the effect stronger for older workers, particularly with increasing experience (Venkatesh, Viswanath et al. 2003). 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, S & Todd, PA 1995). Venkatesh, Morris, Davis and Davis (2003), found that facilitating conditions was non-significant as a determinant of intention. This research expects that facilitating conditions will not have any influence toward behaviour intention but only on usage, and that the influence on usage will be moderated by age and experience. The hypotheses are:

- *H5. Age and experience will moderate the influence of facilitating conditions on usage behaviour.*
- *H6. Facilitating conditions will not have a significant influence on behaviour intention.*

### **User Behaviour (Dependent Variable)**

Normally in Thai Public Universities, Internet usages by academics depend on their volitional control, in the other words, depending on their wills. So it means that this research was conducted in the context of voluntary use which is similar to most previous researches. Since an individual's stated preference to perform the activity (i.e. 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 (Ajzen & Fishbein 1980). Therefore, academic' intention to do/use the Internet will be closely related to their usage behaviour if the use of the technology depending on their wills. Because of this, it supports that actual usage may influence behaviour intention (to use the Internet in the future). Therefore, this research expects that usage behaviour will have a significant positive influence on behaviour Intention to use the Internet in the future. The research hypothesis is:

- *H7. Usage behaviour will have a significant positive influence on behaviour intention.*

### **Behaviour Intention**

From previous research, especially in longitudinal studies, the path from behavioural intention to behaviour is significant in TAM, TPB, and DTPB models according to Taylor and Todd (1995). The importance of behaviour intention as a mediating variable can be seen when behaviour intention (BI) is

omitted from the three models (TAM, TPB, and DTPB) and direct paths are provided to behaviour (user behaviour). When BI is omitted, the prediction of behaviour decreases substantially (Fishbein & Ajzen 1975). User Behaviour is largely influenced by behavioural intention, which on its own explains almost 30% of the variance in behaviour (Taylor, S & Todd, PA 1995). So BI plays an important role in predicting behaviour but it is important to note that BI is more predictive of behaviour when individuals have had prior experience with behaviour (Taylor, S & Todd, P 1995). However, in this cross-sectional study, individual academics already have experienced using the Internet. Therefore, at the time of survey, academic' behaviour intention was logically influenced by actual usage (usage at the time of survey). Significantly, behaviour intention will play an important role in predicting usage behaviour in the future.

## Research Methodology

This research employed the survey research methodology by using semi-structured interviews and questionnaire methods to collect primary data. These two approaches: interviews and questionnaires complement one another in that the weaknesses of one approach are complemented by the strengths of the other. Previous and current research which studied technology acceptance employed a similar research methodology, but most of them used only questionnaire surveys. The following examples of previous researchers that used only questionnaire surveys include Chau and Hu (1999), Gefen, Karahanna and Straub (2003), Hu, Chau, Sheng, and Tam (1999), Igbaria, Magid, Guimaraes and Davis (1995), Taylor and Todd(1995), Taylor and Todd(1995), Venkatesh (1999), Venkatesh. and Davis(2000), Venkatesh and Morris (2000). Other research, for example, Chau and Hu (1999) used interviews together with questionnaires survey.

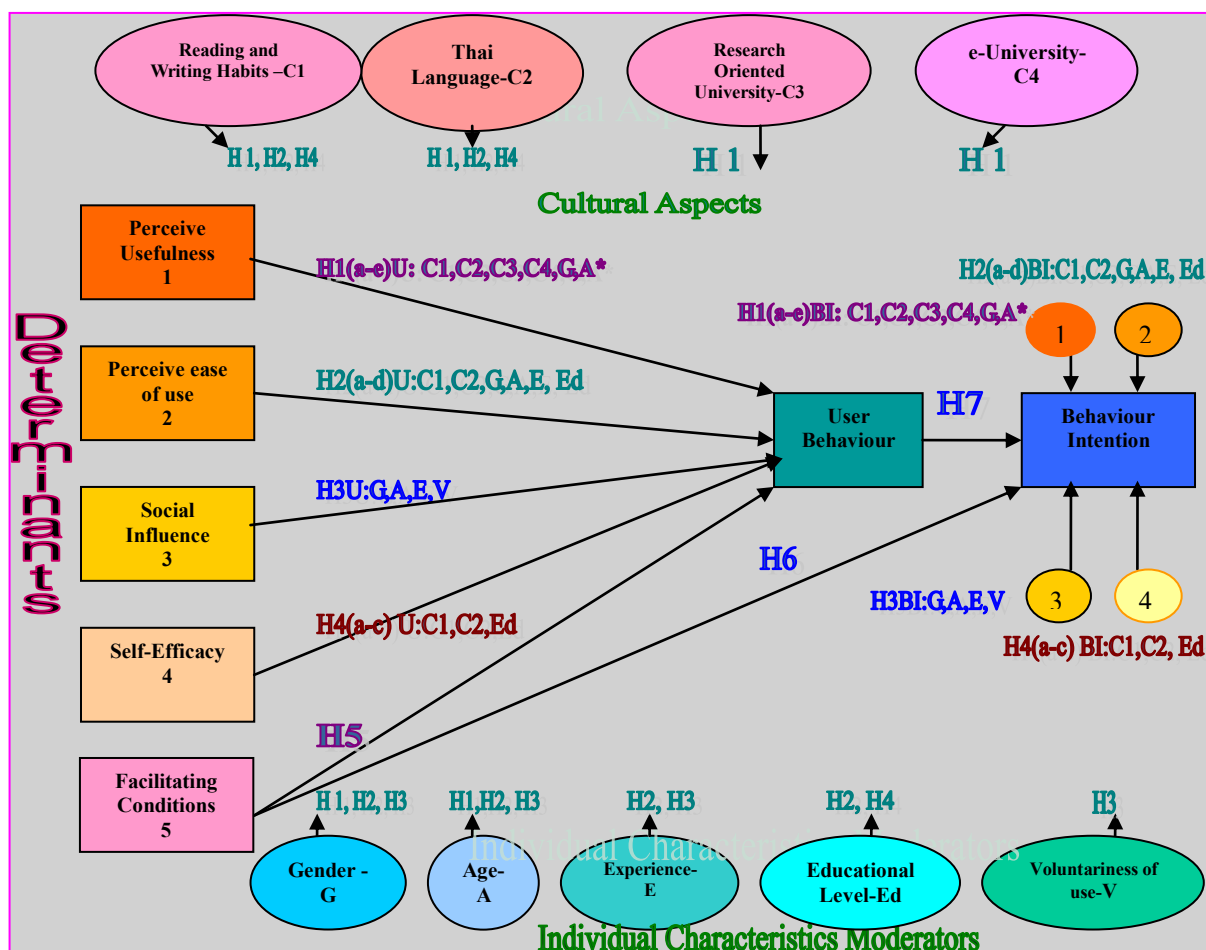


Figure 1: The Research Model

\*H1(a-e)U/BI: Five hypotheses will be tested whether the influence of perceived usefulness on usage behaviour (U)/behaviour intention(BI) will be moderated by reading and writing habits(C1), Thai language(C2), research oriented university(C3), e-university(C4), gender(G), and age(A).

## **Semi-Structured Interviews**

The interview method used in this research is semi-structured interviews. Ten Business School were selected by simple random sampling and then ten academics were selected from each Business School for interviews by using the same technique. Each interview was conducted within 30-60 minutes of face-to-face (personal interviews) using tape-recording or telephone interviews.

## **Questionnaire Survey**

The questionnaire is a convenient data collection mechanism for this research to gather primary data (Sekaran 2000). The items used in measurement of the research model (items used in questionnaire) were based mostly on items used in measurement from many researchers such as Venkatesh, Morris, Davis and Davis (2003), Venkatesh and Davis (2000), Taylor and Todd (1995).

The questionnaire design was pre-tested by distributing 20-30 questionnaires to respondents. Pre-testing helped highlight any potential problems with wordings or measurement and ambiguities (Sekaran 2000), because question wording substantially influence accuracy (Zikmund 2003). After pre-testing, the questionnaire was revised since the respondents had suggested some changes.

After that the pilot study was distributed to two Thai Business Schools within two Private Universities. The response rate was 64.6% (42 responses from the total of 65 academics). From the results of reliability tests and data analysis, a minor change was also made to the questionnaire design.

## **Population and Sample**

Target population for this study was comprised of academics that have Internet experience. There are an estimated 1,045 academics within 22 Business Schools in 24 Universities in the Thai Public University sector. Within 24 universities, one university has three Business Schools or equivalent located and managed separately, and four universities have no Business Schools or equivalent. Approximately 1,100 questionnaires were distributed by mail to the secretarial offices within Business Schools and from there distributed to respondents. It was clearly stated on the top of the questionnaire that: 'This survey is for respondents who have Internet experience only'. After more than three months and several telephone calls, the survey yielded a total of 455 usable questionnaires. Some questionnaires were unusable due to having too much missing data (sometimes only one section responded imperfectly) and one participant replied that although she had no Internet experience she wanted to help.

From an estimated 1,045 academics, 109 academics were on educational leave, and 9 academics had no Internet experience, so the target population was 927 academics. Consequently, the response rate of this survey was 49% (n= 455: usable questionnaire returns from target population N=927 academics). Participation was on a voluntary basis.

## **Model Generating by using SEM with AMOS**

The main objective of this research study is to generate a model of Technology Acceptance that best described usage behaviour of academics who have Internet experience within Thai Business Schools. The generated model is expected to be a model that is both substantively meaningful and statistically well-fitting(Byrne 2001, 2006).

In order to achieve this main research objective, structural equation modelling is considered to be suitable. A structural equation model (SEM), or path model, depicts the structural relationships among constructs (Sharma 1996). In other words, SEM is a model of relationships among variables (Hayduk

1987). It 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, SEM has four significant benefits over those other techniques (Byrne 2001, 2006).

2. 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 contrary, most other multivariate techniques are essentially descriptive by nature (e.g. exploratory factor analysis) so that hypothesis testing is possible but it is rather difficult to do so.
3. SEM can provide explicit estimates of error variance parameters, but traditional multivariate techniques are not capable of either assessing or correcting for measurement error.
4. 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.
5. 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.

Because of these outstanding features SEM was considered for use in model generation for this study. 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 postulated relations among variables; if it is inadequate, the tenability of such relations is rejected (Byrne 2001, 2006). 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 spite of the fact that SEM is being used with the AMOS program (AMOS is an acronym for 'Analysis of Moment Structures' or the analysis of mean and covariance structures (Arbuckle 2005; Byrne 2001, 2006) other statistical analysis methods using SPSS must be used in descriptive data analysis. The interview analysis results will help to complement results obtained from these statistical analyses.

## **Data Analysis and Results**

### **Reliability**

All internal consistency reliabilities by using Cronbach's alphas were greater than 0.70 and were considered to be good and acceptable including: perceived usefulness (0.908), perceived ease of use (0.943), social influence (0.907), facilitating conditions (0.843), perceived ability/self-efficacy (0.716), usage behaviour (0.840), behaviour intention (0.910), frequency of current usage (0.874), frequency of behaviour intention (0.839), motivation to make full use of the Internet (0.839), and professional practice (0.898), professional development (0.915) and quality of working life (0.821) respectively. 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. The reliability indicated how well the items in set (concept) were positively correlated to one another.

## **Demographic Data**

Respondents were female (60.5%) and male (39.5%), age in the range of 30-39 years (40%), 40-49 years (24.7%), 20-29 years (22.7%), and 50 years up (12.7%) respectively. Most of them graduated at Master Degree Level (82.9%), Doctoral Level (13.3%), and with Bachelor Degree (3.8%). Academic positions were lecturer (74.4%), assistant professor (14.3%), and associate professor (10.8%), and professor (0.4%). Almost all academics (95.5%) responded that they used the Internet of their own free will. Academics (94.4%) acknowledged that their universities have a plan to become research oriented in the future, and academics (66.7%) also acknowledged that their universities plan to become e-Universities in the future.

## **Background of Internet Usage**

At the time of the survey, respondents had used the Internet for about 6-10 years (58.5%), more than 10 years (20.9%), 1-5 years (19.8%), and less than 1 year (0.9%). In general, they used the Internet 'several times a day' (61.5%), 'about once a day' (14.5%), 'five to six times a week' (8.4%). They assessed themselves as having moderate Internet experience (69.5%), high experience (19.6%), and low experience (10.8%). They thought that they had used the Internet enough (48.9%) which was likely to be equal to those who thought that they had used the Internet not enough (47.8%), only 3.3% of them thought that they had used the Internet too much. The web-browser that they used most was the Microsoft Internet Explorer (95.1%). Mostly used Internet services were websites (43.4%), both websites and email (37.9%), email (7.7%). Mostly, they accessed the Internet at their office (60.9%), both at home and office (21%) and 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 they used dial-up (45.5%), broadband (31.8%) and wireless (11.4%) at their home.

## **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, (2) providing a personal Web-Base for facilitating teaching, (3) preparing teaching materials, (4) enhancing their teaching knowledge, and (5) providing student contact and giving advice. The second group was other work including (1) searching information for their research, (2) administrative tasks, (3) personal tasks, (4) enhancing personal knowledge, and (5) using email for personal contact.

In accordance with the respondent's self-reports regarding the extent they currently used the Internet and their intention to use it, it has been found that they had hardly used the Internet ('used a few times a month') for teaching in class and providing personal Web-Base for facilitating teaching, but they intended to use more ('a few times a week') in the future. However, for five tasks including enhancing teaching knowledge, searching information for their research, personal tasks, enhancing personal knowledge, and using email for personal contact, their intention to use the Internet were slightly increased comparing to their actual usages. They had already used the Internet for these five tasks rather often ('five to six times a week'). At the same time they intended to use the Internet more from 'a few times a week' to 'five to six times a week' for three tasks including preparing teaching materials, providing student contact and giving their advice and administrative tasks. Collectively, no matter how academics used the Internet in teaching and other tasks, they intended to use the Internet more in all of their work in the future.

## **How to make full use of the Internet**

Academics agreed if good facilities were available to support usage (e.g. good computer hardware and software, good communication network etc.) this would motivate them to make full use of the Internet. Moreover, they agreed that the other three things also motivated them to make full use of the Internet in their work including (1) their strong intentions for providing student contacts, (2) the university's policy

to be a research oriented in the future and (3) the university' policy to be an e-University in the future. On the other hand, they simply slightly agreed about the availabilities of technicians and Internet training motivating them to make full use of the Internet.

### Professional Practices, Personal Development, Quality of Working Life

Academics agreed that using the Internet helped improve their professional practice (such as teaching in class, preparing teaching materials, researches, and administrative tasks), personal developments (such as improving their academic and personal knowledge) and quality of working life (such as saving their expense e.g. searching Information from e-Journal and Websites and using email in communication with others). Nevertheless, they only slightly agreed that the Internet help improve quality of working life in relation to having more time for leisure and creative thinking.

### Technology Acceptance Modelling

As previously mentioned, by using SEM with AMOS, the model of Technology Acceptance can be generated, and the findings will make a contribution to knowledge regarding the factors that significantly influence academic use of the Internet and their intention to use it under the impact of some moderators in the specific environment. However, at present, the Technology Acceptance modelling is at the state of analysing data.

### Limitations

The study presents some limitations as it targets only full-time academics within Business Schools in the Public University Sector in Thailand. Notably, this study will not cover all Rajabhat Universities since they have just become universities recently. Rajabhat Institutes have 42 institutes scattered around the country (*Address of Rajabhat Institute* 2004). In June 2004, all Rajabhat Institutes became Rajabhat Universities in accordance with the Rajabhat University Act (*Rajabhat University Act, draft, 10 June 2004* 2004). Therefore, the results of this study could be generalised to only Business Schools in all public universities in the country except all Rajabhat Universities. Moreover, the research scopes its study only within Business Schools because there is an attempt to prevent the type of subjects delivered by faculties or schools affecting Internet usage.

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