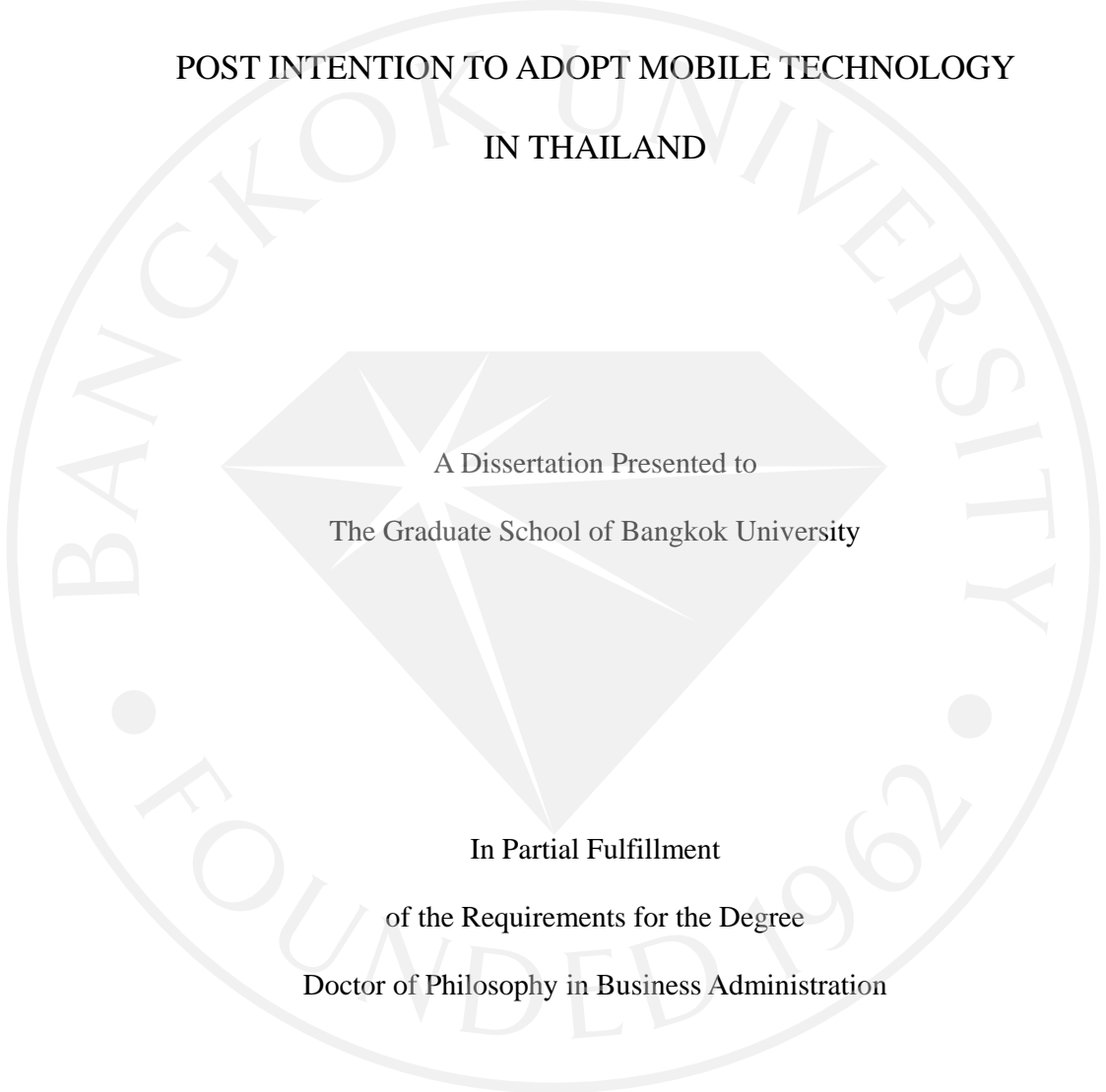# A MODIFIED TECHNOLOGY ACCEPTANCE MODEL FOR

ANALYZING THE DETERMINANTS AFFECTING INITIAL AND

POST INTENTION TO ADOPT MOBILE TECHNOLOGY

IN THAILAND

A Dissertation Presented to

The Graduate School of Bangkok University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy in Business Administration
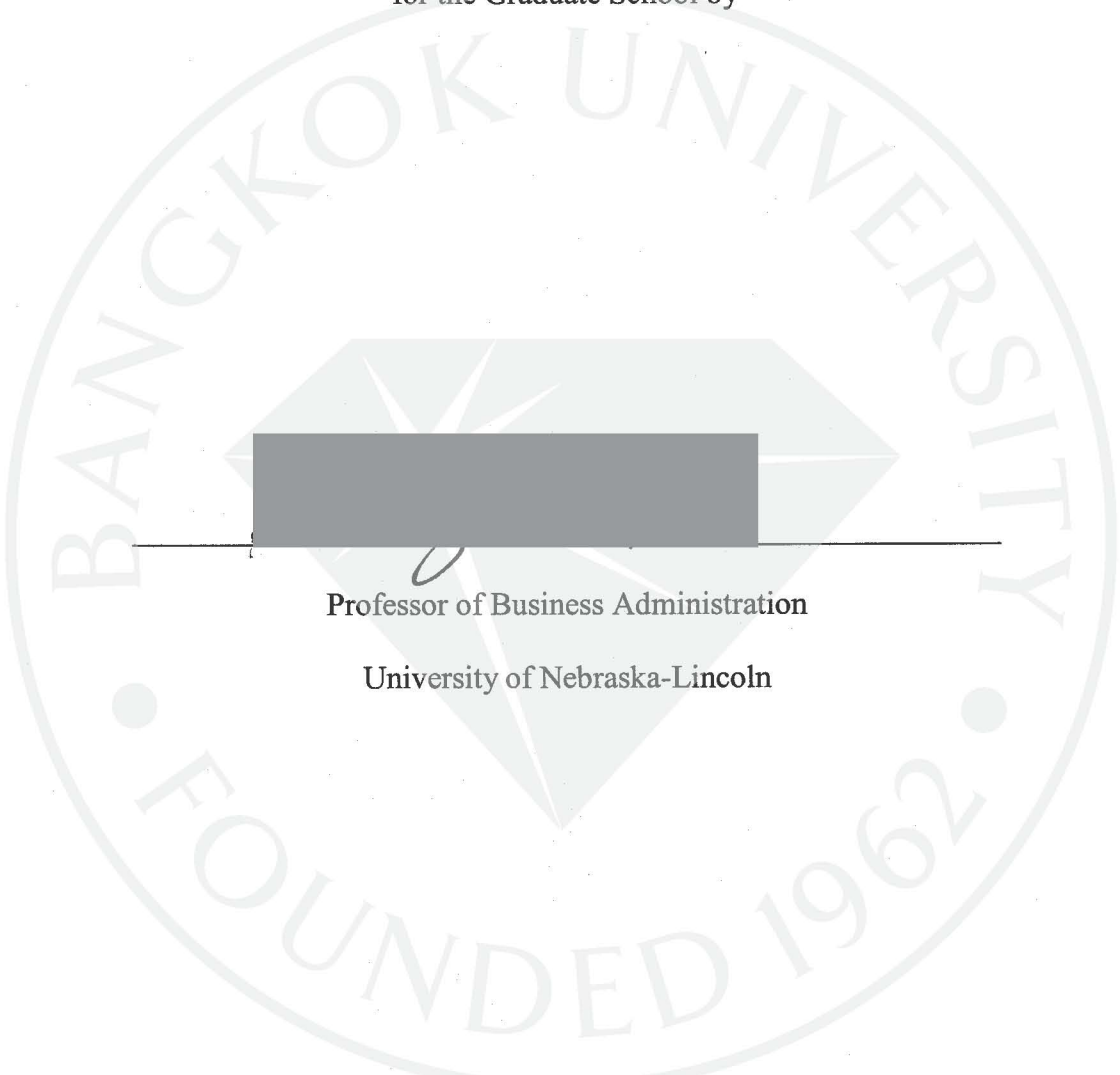
by

Somboon Thanarithiporn

2004

This dissertation has been approved

for the Graduate School by

Professor of Business Administration

University of Nebraska-Lincoln

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Thanarithiporn, Somboon. Ph.D. (Business Administration), November 2004,

Graduate School, Bangkok University

<u>A Modified Technology Acceptance Model for Analyzing the Determinants Affecting
Initial and Post Intention to Adopt Mobile Technology in Thailand</u> (142 pp.)

<u>Advisor of Dissertation</u> : Professor Sang M. Lee, Ph.D.

ABSTRACT

The Internet technology and mobile market have entered a significant growth
stage in recent years. It has been estimated that the global mobile market is set to
expand to over 800 million customers by 2010 and reach the 2 billion mark in 2008.
Additionally, the number of wireless Internet users will reach 800 million by 2007.
With the rapid growth in the mobile technology market, understanding the users'
behaviors will provide invaluable information for manufacturers, operators, and
researchers alike.

Accordingly, this study applies a Modified Technology Acceptance Model to
examine mobile phone users' behaviors in Thailand. The purpose of this study are to
examine: (1) the causal relationships among the determinants such as usefulness, ease
of use, self-efficacy, subjective norm, word of mouth, and mass advertising on the
initial intention to adopt mobile phone in Thailand; (2) the relationship between
satisfaction determinants and the post intention to continue using mobile phones; and
(3) the comparative results of the research between South Korea as a technology
leader and Thailand as a technology follower.

The research methodology used in this study is a survey questionnaire targeted

at graduate students at a leading private university in Bangkok, Thailand. Statistical methods employed are path analysis using LISREL and multiple regression using SPSS for hypothesis testing.

The results of this study show that subjective norm and mass advertising significantly influence the initial intention to adopt mobile phones in Thailand, while the key determinants for post intention to continue using mobile phones include content, mobility, and usability. Furthermore, the study highlights that South Korea and Thailand are at different stages of mobile technology adoption. In the early stage of diffusion process, Thailand's key determinant for initial adoption of mobile phone is mass advertising, while in South Korea at a later stage of diffusion, word of mouth plays are important role in influencing the initial adoption. For the post adoption, the key determinant for Thailand is mobility, whereas for South Korea is usability.

This research proposes that future research should be conducted in other developed and developing countries to discover other valuable information that may further contribute to ICT literature, as well as to the ICT industry.

Approved:

Signature of Advisor

ACKNOWLEDGMENT

I treat my body like a bodhi tree,

And my mind, I treat it like a panel of mirror.

I will often wipe and clean them diligently,

To make sure that no dust may settle on them.

-Sun Siu

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CHAPTER ONE

INTRODUCTION

1.1   Introduction

Thailand's telecommunications sector continues to form a significant part of

the country's economy. In 2002, Thailand saw its telecommunication services revenue

reaching US$4.14 billion, from US$3.2 billion in 2000, with investments in

telecommunications recording US$1.51 billion (Paul Budde Communication Pty Ltd,

2004).

At the policy maker's level, the Thai government has also placed a strong

emphasis on the telecom reform and its policy towards information and

communication technology (ICT) to achieve its commitment with the World Trade

Organization (WTO) to liberalize telecom markets by 2006.

Strategically speaking, Thailand's Telecommunications Master Plan for 1997-

2006 stipulated three key steps in implementing reform. They included (1) privatizing

the two state-owned enterprises, the Telephone Organization of Thailand and

Communication Authority of Thailand, (2) converting the build-transfer-operate

(BTO) concessions into operating licenses, and (3) forming the National

Telecommunications Commission (NTC) regulatory body (Cairns & Deunden, 1988).

In recent years, Thailand has seen new entrants in its duopoly mobile phone

market, of which the two largest players, namely the Advanced Info Services (AIS)

and Total Access Communication (DTAC), were controlling 90 per cent of the

market. The new players which included TA Orange (originally was CP Orange) and

the Hutchison CAT, a code division multiple access (CDMA) based player, now hold

about 10 per cent of the market share. The last new CDMA based player, which is

known as Thai Mobile, is a joint venture between the Telephone Organization of

Thailand and Communication Authority of Thailand (Mesher & Jittrapanun, 2004).

The entrance of CP Orange in 2001 is expected to jump start the Thai General

Packet Radio Service (GPRS), as it intends to launch a fully 2.5G (GPRS) compliant

network, with the total investment of approximately US$800 million with Siemens

and Motorola as the main contractors. Similarly, the entrance of Hutchison CAT as

the provider of 3G high-speed mobile services may as well provide the Thai mobile

phone market with greater market potential (Komsan & Viviat, 2003).

In terms of promoting information and communication technology, the

government has developed a new information technology policy to be implemented

by 2005. The policy is divided into seven major areas, which are infrastructure, government management, human resources, e-commerce, laws, microelectronics, and software. Specifically, the government has placed a significant emphasis on research and development, and telecommunication liberalization initiatives, such as price reductions for fixed line both domestic and international calls, and for mobile technologies (including internet) for end consumers, unlocking of International Mobile Equipment Identity (IMEI) and set up supportive policies to encourage electronic commerce (CIO Forum, 2004).

With the above government driven initiatives, Thailand's telecom sector has entered a strong growth phase. The mobile market has been growing by more than 100% in both 2001 and 2002. In 2003, the number of mobile subscribers reached 22 million from only 1.9 million in 1998. The number of mobile phone subscribers represented the penetration rate of 35% at the end of 2003, up from 13% in 2001. Also, analysts have suggested that Thailand's mobile market would reach 45% penetration rate or 29.5 million subscribers in 2006, after which the market would be expanding at a slower pace to reach approximately 31 million subscribers by 2008 (Paul Budde Communication Pty Ltd, 2004).

Similarly, dial-up Internet access has grown rapidly, thanks to the reduction in the access charges. The estimated Internet users have grown from approximately 1.3 million in 1999 to 6.5 million in 2003 (Mesher & Jittrapanun, 2004).

In terms of service offerings and devices, Balasubramanian et al. (2002) indicate that devices and systems based mobile technologies are now commonplace in everyday life. These devices include cellular phones, two-way radios, remote car locking systems, Global Positioning System (GPS) – based locators and maps, and electronic monitoring devices for parolees.

With the Thai government's putting telecommunication liberalization on one of its top agenda, the telecom sector will enter a new phase of a more intense competition. Thus, consumers' adoption and continuance behaviors will have a significant implication on business strategies and future opportunities for telecom operators. Along this line, Eason (1998) indicated that without acceptance from the intended user, discretionary users would seek alternatives, and even dedicated users would likely demonstrate dissatisfaction and negate the presumed benefits of new technology. In short, the lack of user acceptance proved a significant impediment to the success of a new information system.

Accordingly, this study endeavors to provide a new direction for strategizing

business policies to encourage adoption and diffusion of ICT in Thailand. The

research proposes to study the initial adoption and continuance of use among mobile

phone subscribers, as the mobile market segment represents the largest segment in

terms of subscribers and the highest penetration rate among telecommunication

services. Table 1.1 provides ICT service statistics as of 2003.

Table 1.1: ICT Service Statistics – 2003

Fixed telephone lines in service	6.52 million
Fixed –line teledensity	10.5%
Public payphones	272,500
Internet users	6,500,000
Internet penetration	9.7%
Personal Computers	4,000,000
PC Penetration	6.0%
Mobile Subscribers	22,414,100
Annual Growth	28.4%
Mobile Penetration	34.9%

1.2   Statement of the Problem and Research Overview

Whilst the Thai telephone market has become more competitive with heavy advertising, lower airtime prices and IMEI unlocking, which have helped lower the switching costs for the users who wish to change networks without having to buy new phones, factors influencing users' adoption and continuance usage remain unanswered.

According to a study by the International Telecommunication Union in 2002, mobile data usage or even Short Message Services (SMS) showed only limited use in comparison to other South East Asian neighbors notably the Philippines. It was estimated that there were around five million SMS messages sent a day in Thailand, as opposed to around 50 million in the Philippines. Also, the take-up of Wireless Application Protocol (WAP) has also been slow. Despite the launch of WAP services by DTAC in June 2001, traffic was still running at 30,000 minutes per day in March 2002.

With GPRS based technology, some new entrants have indeed resorted to price reduction strategies to penetrate the highly competitive Thai mobile phone market, as opposed to premium pricing associated with more modern features and capabilities.

Accordingly, this research aims to shed light on the diffusion process of

mobile technologies among end users in Thailand. Particularly, this study examines

the key influencing factors on mobile phone users' initial and continuance adoption of

the technology. Addressing these issues will allow both academic researchers and

mobile phone operators to better understand the reasons driving consumers' initial

and continuance adoption of mobile phones.

This research proposes to adopt the following two approaches. First, with the

objective to unveil the relationship between the initial and the continual acceptance

factors of mobile technologies and users' intention to use mobile phones, this research

will qualitatively and quantitatively examine such relationships using the Technology

Acceptance Model (TAM). Secondly, the research will comparatively examine the

diffusion process of mobile technologies between developed and developing

countries, focusing on South Korea as one of the market leaders in mobile phone

technologies, and Thailand as a technology follower to identify trends or similarities

in the diffusion processes.

Specifically, this research will investigate the influence of innovation and

imitation factors on ICT adoption, while using TAM to analyze the initial and

continuance adoption. In terms of the initial adoption, the research will examine

factors affecting the initial intention to adopt ICT based on the interaction dimensions,

namely technology dimensions - usefulness and ease of use (Davis et al., 1989);

motivation dimension - self-efficacy (Bandura, 1982); social dimension - subjective

norm (Ajzen & Fishbein, 1980; Taylor & Todd, 1995), and word-of-mouth (Arndt,

1967; Silverman, 2001; Lee, 2003); and lastly, marketing dimension - mass

advertising (Vaughn, 1980, 1986; Rossiter & Percy, 1987).

With respect to the continuance adoption, this study will analyze key

satisfaction factors affecting the intention to continue ICT adoption, by employing

continuance acceptance models, which include the online repurchase intention model

(Shim et al., 2001), the service quality model (Zeithaml et al., 1996), the behavioral

model (Dabholkar et al., 2000; Homburg & Giering 2001; Oliver 1997; Anderson et

al., 1994; Marr & Crosby, 1992; Ostrom & Iacobucci 1995), and the post acceptance

model (Bhattacherjee, 2001; Karahanna et al., 1999).

1.3   Research Methodology

The research methodology will follow a two-pronged approach. On the one

hand, this paper will use questionnaires to quantitatively analyze the data. On the

other, statistical models will be applied in data interpretation.

With regards to the survey methodology, the questionnaire was translated from English into Thai by the experts in the field to prevent miscommunication arising from language barriers. Prior to the roll-out, the pilot study was conducted to ensure that the interpretation of questionnaire items was not misleading. Based on the pilot results, the questionnaire was revised three times before the final version of the questionnaire was distributed to the target group.

The target population for this study is identified as a group of graduate students at a university in Thailand as they represent both the current and the potential users of mobile phones and mobile services.

Quantitatively speaking, two statistical methodologies are applied in analyzing the survey information. First, to investigate the relationship between determinants of the intention for initial adoption of mobile phones, LISREL 8 path analysis is applied. Secondly, multiple regression (SPSS) is conducted to ascertain the relationship between factors influencing the intention to continue the mobile phone usage.

1.4   Contributions of the Study

The emergence of mobile technologies is driven by the convergence of communication and digital technologies. According to the Baskerville's Global Mobile Forecasts to 2010 report, it estimates that "the global mobile market is set to

expand by over 800 million customers by 2010, reaching the 2 billion mark in 2008"

(Global Information Inc, 2004). In the same vein, eMarketer (2002) estimates that the

number of wireless internet users will reach 800 million by 2007. Jupiter Research

(2004) also indicates that the global mobile commerce revenue will achieve US$ 88

billion by 2009. Such development may provide a large and vibrant market for new

mobile applications and services. In Thailand, specifically, the telecommunication

sector will continue to expand with the government's telecom liberalization efforts.

In light of the above, it is important to gain the user acceptance perspective of

mobile technologies. The results of this research will enrich the literature pertaining to

the diffusion process for mobile technologies, providing a better understanding of the

initial and the post adoption processes of ICT, particularly from the behavioral aspect

in information system (IS) research.

In short, this research will contribute to create a new source of information for

practitioners to better understand the influencing factors on users adoption of mobile

technologies. It will also provide new insights to mobile operators, manufacturers, and

content developers concerning right product features and market mixes to suit users'

behaviors, to wisely serve mobile technology users, and to strategically plan for future

business opportunities in mobile technologies.

1.5   Organization of the Dissertation

This dissertation is organized as follows. Following the research framework introduced in Chapter One, Chapter Two provides a thorough review of literature regarding adoption and diffusion of innovation. The literature review section covers prior research on initial acceptance, and continuance adoption determinants in ICT adoption.

Next, the research framework is discussed in depth in Chapter Three. This chapter presents the development of research hypotheses, which include the initial adoption and continuance adoption.

Following the research framework, Chapter Four presents research methodologies with detailed discussion on data collection, operational variables, and statistical methods to test the hypotheses.

Then, Chapter Five focuses on the empirical findings on proposed hypotheses and interpretation of data analysis. Finally, the last chapter, Chapter Six, concludes with the summary, conclusions, research limitations and implications of the findings for future research.

CHAPTER TWO

LITERATURE REVIEW

This chapter aims to provide the empirical evidence on ICT adoption, focusing

on three main areas. First, the chapter will review the IT adoption literature and

innovation diffusion theory. Second, it explores four general streams of ICT adoption

research and explains why the suggested approach, a modified TAM, is appropriate.

Determinants, affecting the initial technology adoption in the dimension of

technology, social, marketing, and motivation will also be discussed. Finally, this

chapter will review the post acceptance model with the intention for continuous

acceptance of the technology.

2.1   Innovation Diffusion Theory

Innovation diffusion theory provides a useful perspective on one of the most

persistent and challenging issues in the ICT area, particularly on how to improve

technology adoption and utilization (Fichman, 1992). Empirical evidence suggests

that diffusion of innovation theory indeed supports research on how and why

innovations are adopted at different rates by individuals or organizations (Lee, 2003).

The most widely regarded approach to the study of innovations diffusion is based on the work of Rogers (1995). According to Rogers (1995), the definition of diffusion is "the process by which an innovation is communicated through certain channels over time among members of a social system." Diffusion of innovation theory (DIT) explains the innovation adopters' adoption behavior, and discusses four main elements of diffusion, namely innovation, times, communication channels, and social systems. Rogers (1995) highlighted the important components of the theory such as: (1) S-Curve of Adoption, (2) Innovativeness and Adopter Categories, and (3) the Innovative-Decision Process.

2.1.1   S-Curve of Adoption

The S-curve of adoption refers to the pattern of the cumulative number of successful adopters of new ideas or products, which forms an S-shaped curve over time. This S-curve shape represents the behavior of adopters. It follows that few individuals initially adopt a new idea. Once, more and more individuals successfully adopt such innovation, an increasing number of individuals will be more willing to try the new idea or product. Finally, it reaches a point at which the majority of individuals will adopt the new idea or product. This process is known as the diffusion model as shown in Figure 2.1.

Figure 2.1: S-shape Curve

No. of New Adopters
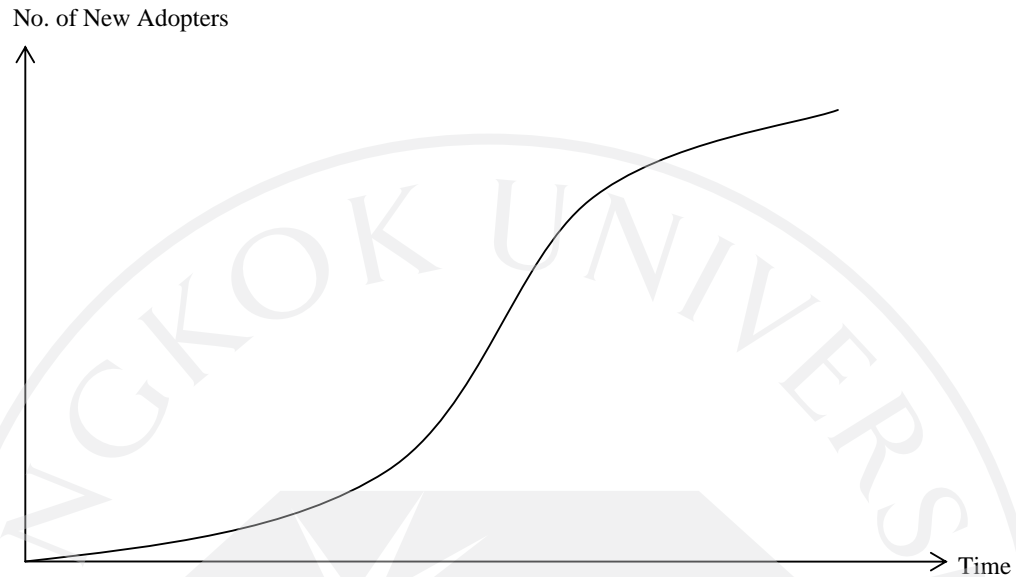
Source: Rogers, E.M. (1995). <u>Diffusion of innovations</u> (4th Ed.). New York, NY:

   Etats-Unis Free Press

2.1.2   Innovativeness and Adopter Categories

   Innovativeness is defined as "the degree to which an individual or other unit of

adoption is relatively earlier in adopting new ideas than other members of a system"

(Roger, 1995). In terms of the stage of adoption, the innovativeness variable could be

classified into five types of adopters: innovators, early adopters, early majority, late

majority, and laggards as shown in Figure 2.2.

Figure 2.2: Adaptor Categorization on the Basis of Innovativeness
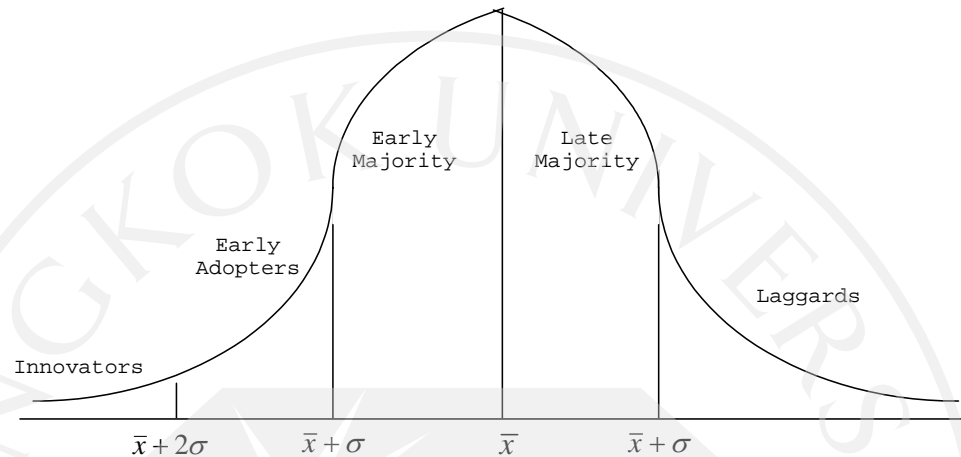
Source: Rogers, E.M. (1995). <u>Diffusion of innovations</u> (4th Ed.). New York, NY:

   Etats-Unis Free Press

2.1.3   Innovative-Decision Process

   According to Rogers (1995), the innovation-decision follows a five-stage

model, which an individual passes through: "(1) from first knowledge of 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 lastly, and (5) to confirmation of the

decision." These five stages describe the types of activities undergone by the

individual during the innovation-decision process, as shown in Figure 2.3.

Figure 2.3: Stages in the Innovation-Decision Process
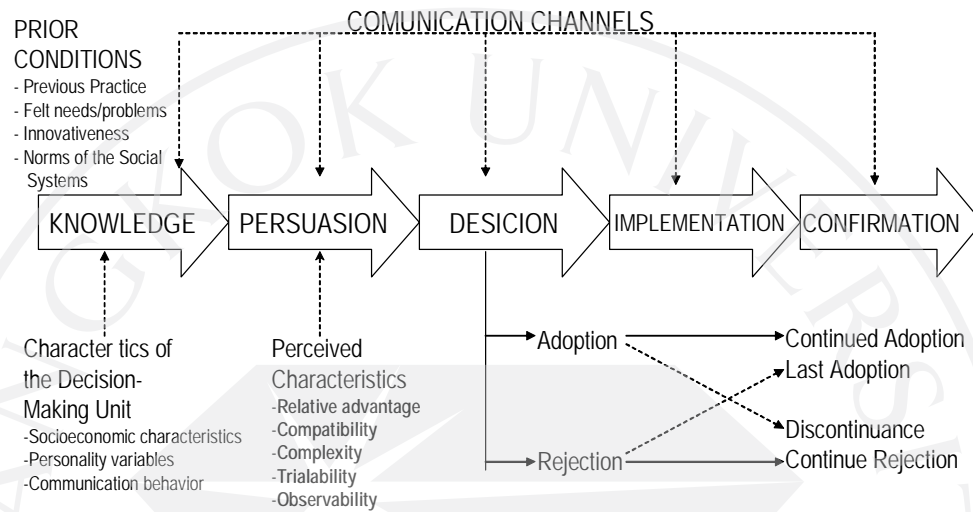
Source: Rogers, E.M. (1995). Diffusion of innovations (4th Ed.). New York, NY:

Etats- Unis Free Press

2.2 Determinants of Initial Acceptance

There are many streams of research focusing on the determinants of initial

adoption. This study will concentrate on the initial acceptance models with respect to

such determinants as technology (Ajzen & Fishbein, 1980; Davis, 1989; Davis et al.,

1989), social (Bearden et al, 1986; Burnkrant & Cousineau, 1975; Handelman &

Arnold, 1999), marketing (Lincoln et al.,1981; Wansink et al.,1998; Rogers & Chen,

2002), and motivation factors (Currall & Judge, 1995; McKnight et al., 1998;

Compeau et al., 1999).

2.2.1   Technology Dimension

Fishbein & Ajzen (1975) and Ajzen & Fishbein, (1980) are the pioneers in the

fields of TAM. They constructed a general model, known as Theory of Reasoned

Action (TRA) to predict and to understand an individual's behavior.

TRA, which is based on the social psychological literature, prescribes attitude

and subjective norms as two distinct factors of behavioral intention which influences

actual behaviors. More interestingly, TRA introduces the salient beliefs, which are

immediate determinants of a person's attitude. These components can be considered

as external variables, which indirectly influence the attitude towards behavior and the

subjective norm. As depicted in Figure 2.4, TRA includes distinct variables, namely

beliefs, attitudes, intentions and behaviors.

Figure 2.4: Theory of Reasoned Action
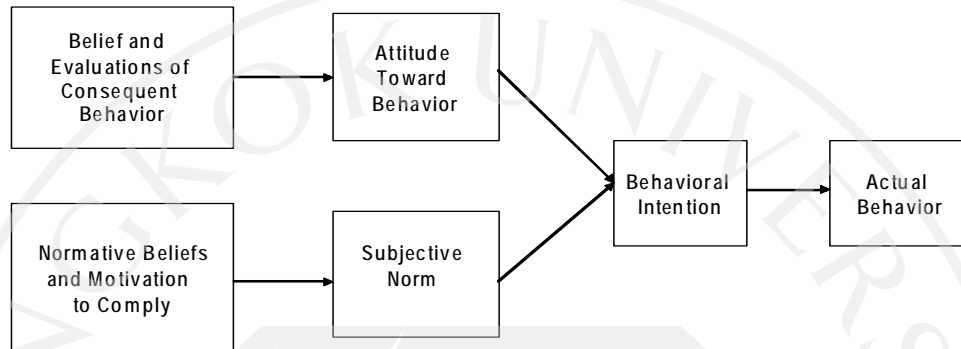
Source: Fishbien, M. and Ajzen, I. (19xx) Belief, Attitude, Intention and behaviour:

An Introduction to Theory and Research. Reading, MA.: Addison-Wesley.

Davis (1986) adapted the TRA model and introduced the technology

acceptance model (TAM), which was specifically designed to explain computer usage

behaviors. According to Davis et al. (1989), TAM is a "model that is helpful not only

for prediction but also for explanations so that researchers and practitioners can

identify why a particular system may be acceptable, and pursue appropriate corrective

steps."

TAM employs only perceived usefulness and perceived ease of use as the two

pre-defined beliefs influencing attitudes, and factors in other external variables, which

are dependent on research areas under investigation. These external variables are

assumed to influence attitudes and intentions only via internal beliefs, as shown in

Figure 2.5.

Figure 2.5: Technology Acceptance Model
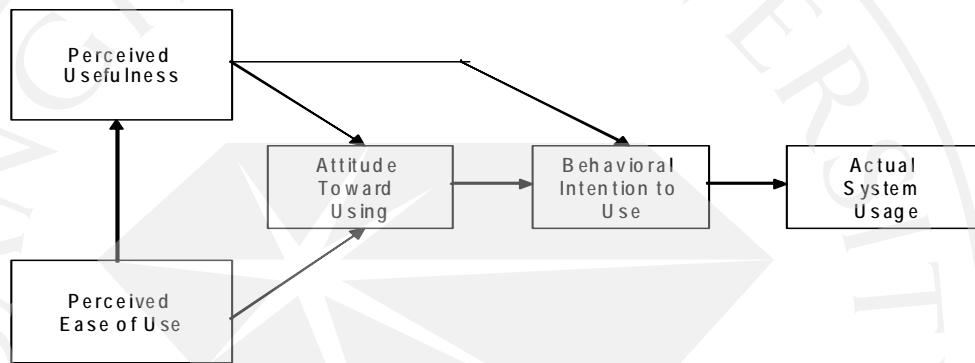
Source: Davis, F.D. (1989, September). Perceived usefulness, perceived ease of use,

and user acceptance of information technology. MIS Quarterly, 13 (3) 319-

340.

In terms of the two pre-defined beliefs, Davis et al. (1989, p.982) defined

perceived usefulness as "the degree of which a person believes that using a particular

system would enhance his or her job performance" and perceived ease of use as "the

degree to which a person believes that using a particular system would be free of

effort."

The empirical evidence in IS literature studies strongly supports the

application of TAM. Particularly, IS researchers have investigated and replicated

these two constructs and agreed that these two factors are valid in predicting an

individual's acceptance of various corporate information technologies (Pavri, 1988;

Sheppard et al., 1988; Mathieson, 1991; Adams, et al., 1992; Davis, 1993; Segars &

Grover, 1993; Lu & Gustafson, 1994; Chin & Todd, 1995; Igbaria & Iivari, 1995;

Keil et al., 1995; Moore & Benbasat, 1996; Szajna, 1996, Agarwal & Prasad, 1997;

Venkatesh & Davis, 2000).

However, Mathieson (1991) and Taylor and Todd (1995) argued that TAM

excluded imitation influences, which were explicit in social constructs. Accordingly,

Venkatesh and Davis (2000) introduced the extension of the technology acceptance

model (TAM2) to better understand user acceptance and usage of new systems.

The extended model incorporated three interrelated social forces, namely

subjective norm, voluntariness, and image. It also included job relevance, output

quality, and result demonstrability, which directly influenced the perceived

usefulness, as shown in Figure 2.6.

Figure 2.6: Extension of Technology Acceptance Model (TAM2)
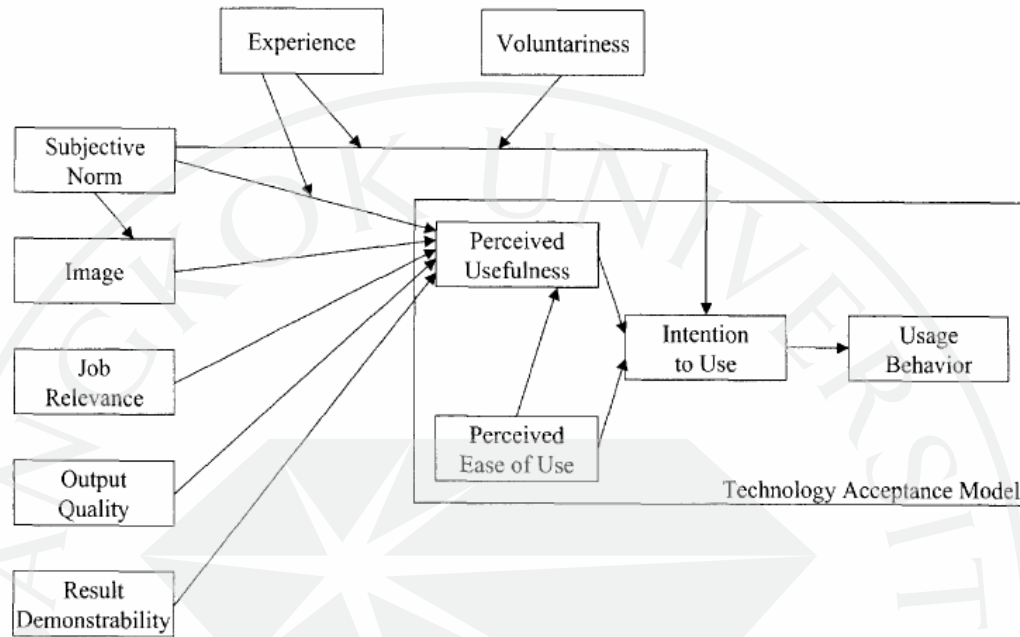
Source: Venkatesh, V. and Davis, F.D. (2000, February). A theoretical extension of

the technology acceptance model: Four longitudinal field studies.

Management Science, 46 (2), 186-204.

2.2.2   Motivation Dimension

The motivation constructs have been incorporated in the technology adoption

research by Bandura (1986), who introduced the concept of self-efficacy to the

technology adoption study. According to Bandura (1986), self-efficacy is the belief

that one has about his/her capability to perform particular behaviors. Bandura

contended that the perceived self-efficacy has an important effect on motivation and

behavior (Igbaria & Iivari, 1995). Igbaria and Iivari (1995) argued that the perceived

self-efficacy would lead an individual to be more inclined to behave in such a way

that they believe would result in favorable outcomes than to project behaviors that

they saw as having unfavorable consequences.

In the context of TAM, several information system researches have pinpointed

a strong link between self-efficacy and individual reactions to computer adoption and

usage (Compeau & Higgins, 1995b; Igbaria & Iivari, 1995; and Venkatesh, 2000).

In the study of Venkatesh (2000), he extended TAM to include self-efficacy

based constructs to the perceived ease of use as a determinant for technology

adoption. The extended model included such variables as computer self-efficacy,

computer playfulness, and computer anxiety as the initial influencing factors on the

perceived ease of use on the new technology. The degree of influences of the above

three constructs on the perceived ease of use would induce an individual to

experiment with the new system. Complementing with the anchor factors, the

perceived ease of use would be further determined by the perceived enjoyment, and

the objective usability (see Figure 2.7).

Figure 2.7: Theoretical Framework of Perceived Ease of Use
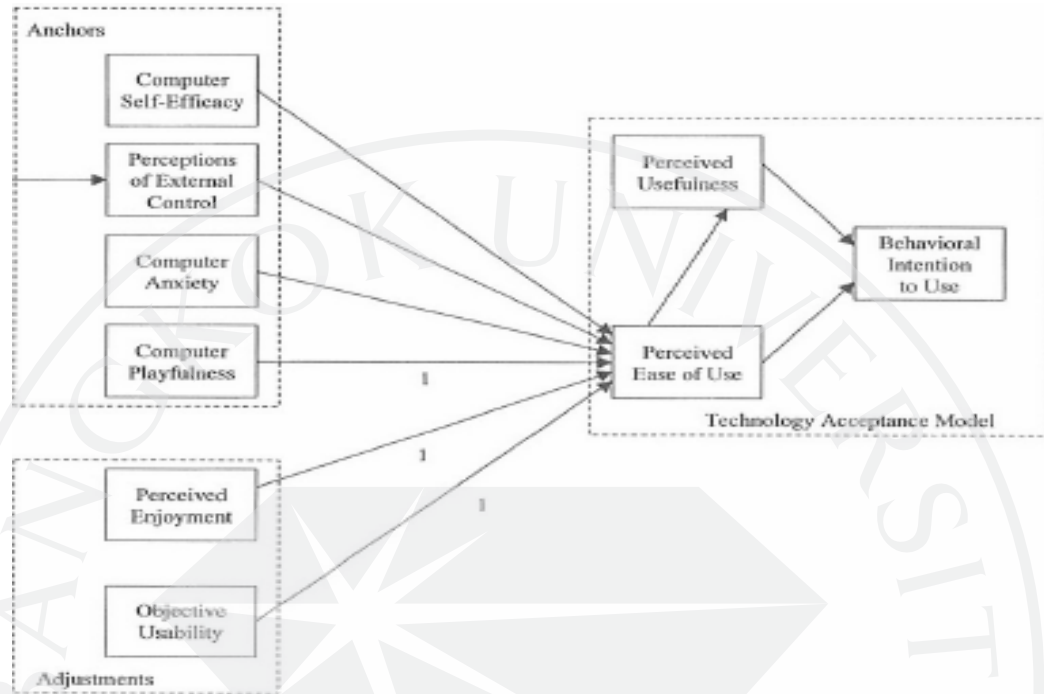
Source: Venkatesh, V. (2000, December). Determinants of perceived ease of use:

Integrating control, intrinsic motivation, and emotion into the technology

acceptance model. Information Systems Research, 11 (4), 342-365.

2.2.3   Social Dimension

The social constructs in the context of IS technology adoption is based on

Theory of Planned Behavior (TPB) by Ajzen (1985) which is founded on social

cognitive theory. TPB asserts that specific salient beliefs influence given behavioral

perceptions and subsequent actual behaviors (Ajzen, 1985, 1988 and 1991).

TPB further stipulated that the three beliefs that will influence three perceptual

constructs. They are the behavioral beliefs that influence attitudes toward behavior,

the normative beliefs that affect subjective norm, and the control beliefs that shape

perceived behavioral controls. These three constructs will in turn establish the

relationship to behavioral intentions and actual behaviors (see Figure 2.8).

Figure 2.8: Theory of Planned Behavior
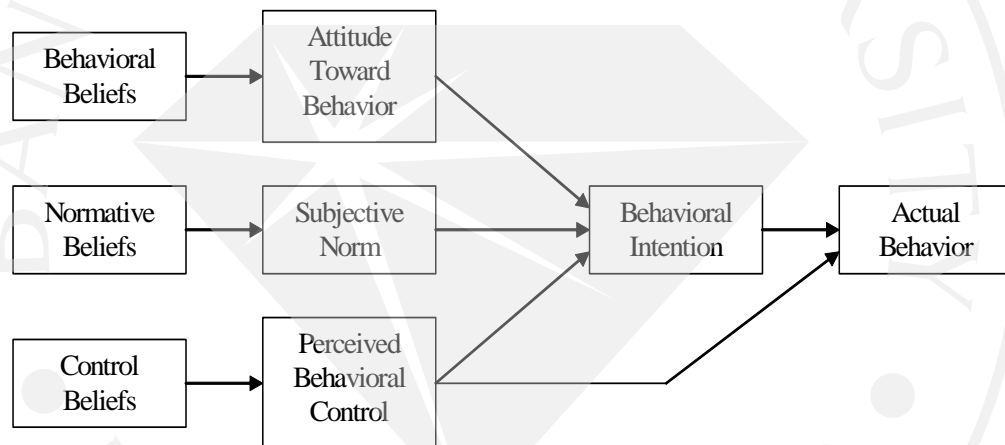
Source: Ajzen, I. (1985). From intentions to actions: A theory of planned behavior.

In Action control: From cognition to behavior (p.11-39). J. Kuhl and J.

Beckmann (eds.), Heidelberg: Springer.

In the same vein, Rogers (1995) also asserted that the nature of the social

system, such as the norms of the system and the degree to which the communication

network structure was highly interconnected in which the innovation was diffusing,

affected the rate of adoption of an innovation (Roger, 1995). The social influences set

out in Roger's study (1995) can be classified into two types: (1) the informational

influences, and (2) the normative influences. Whilst the informational influences refer

to the direct acceptance of influences from the evidence of reality, the normative

influences happen when an individual is influenced by the expectation of others

(Handelman & Arnold, 1999).

Webster (1991) examined the possible influences (word-of-month

communication, past personal experiences, advertising, and sale promotion) on

consumer expectations of service quality toward professional and non-professional

services. The findings of the study indicated that word-of-mouth communication

demonstrated the most influential variable, compared to other factors on expectations

of the quality of services. Furthermore, face-to-face messages had proven to play a

significant role in influencing consumer attitudes and behaviors toward technology

(Webster, 1991). In short, the Word-of-Mouth (WOM) communication could be

considered as an influential external variable for predicting the user acceptance of

technology. The proceedings are the illustration of informational influences and

normative influences.

With the support from prospect theory, Herr et al. (1991) indicated that a

stronger effect occurred when information about a product is unfavorable rather than

favorable, and when information was verbal rather than written. On the other hand,

the social normative influences with respect to individual's adoption of technology

could be peers or friends of the potential adopter (Cale & Eriksen, 1994).

2.2.4   Marketing Dimension

The key objective of advertising is to match the advertising appeal to

consumer attitudes and thus to stimulate the viewers to purchase. In the field of

advertising research, the semantic judgment and cognitive response are the two

traditional approaches, commonly used in assessing the effectiveness of advertising.

Research rooted in these two methods has revealed strong empirical evidence that the

attitude component is feeling-based (Edell et al., 1987).

Many well known advertising models, such as the Cone and Belding

Advertising (Vaughn, 1986) and the Rossiter-Percy Grid (Rositter et al., 1991), are

also based their concepts on affection and cognition. The Cone and Belding

Advertising Model differentiates the affective and the cognition-based attitudes by

using a "think-feel" dimension. On the other hand, the Rossiter-Percy Grid introduces

and analyzes the motivational dimension of attitudes to distinguish the affective and

the cognitive-based attitudes.

Many scholars, namely Childers et al. (2001) and Shim et al. (2001), also use the concepts of cognition and affect in their models dealing with online purchase intention.

Shim et al. (2001) empirically illustrated that attitudes, subjective norms, perceived behavior controls, and Internet purchase experiences had the relationship with the intention to use Internet for information search. In addition, they discovered that there were both direct and indirect relationships among antecedents such as users' attitudes toward Internet shopping, previous Internet purchase experience, and Internet purchase intension as shown in Figure 2.9.

Figure 2.9: Shim et al.'s Model for Predicting Online Purchase Intentions
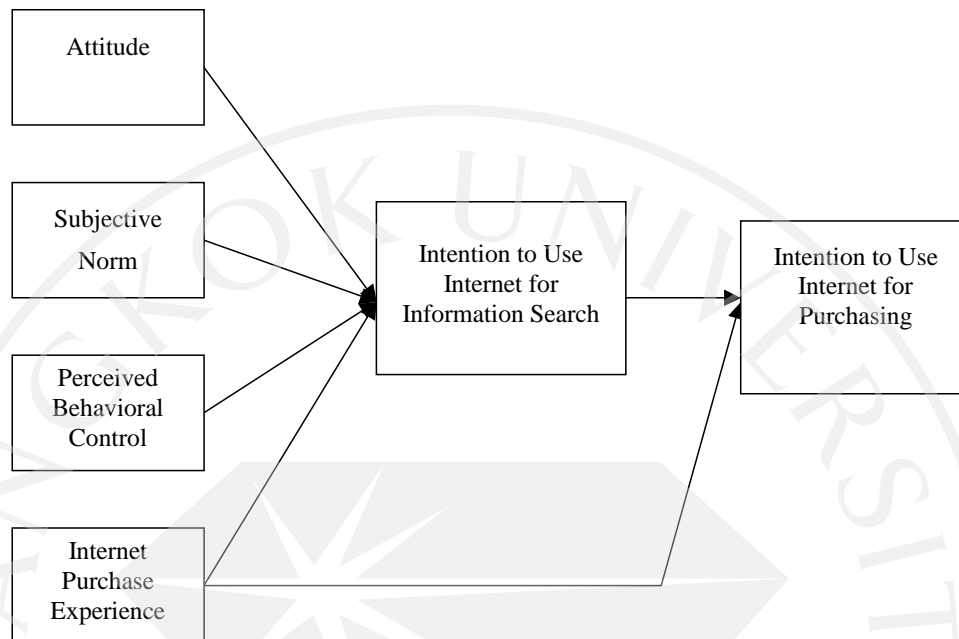
Source: Shim, S., Eastlick, M.A. and Warrington, L, P. (2001). An online prepurchase

intentions model: The role of intention to search. Journal of Retailing (77),

397-416.

In the same token, Childers et al. (2001) introduced three new constructs,

which included navigation, convenience, and sub-experience of online shoppers as the

key predictors of online shopping attitudes. In their research, they prescribed that

these three constructs directly influence usefulness, ease of use and enjoyment as

shown in Figure 2.10.

Figure 2.10: Childers et al.'s Model for Online Retail Shopping Behavior
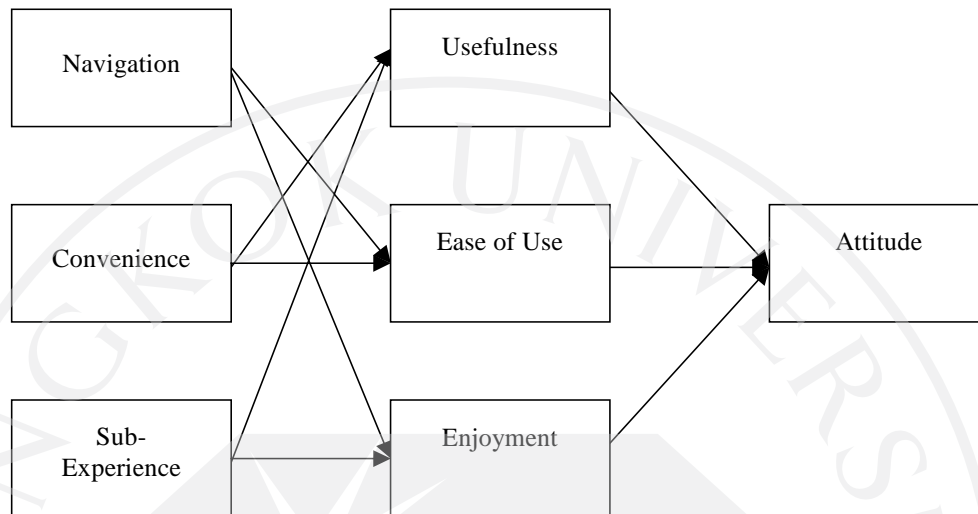
Source: Childers, T. L., Carr. C. L., Peck, J. and Carson, S. (2001). Hedonic and

utilitarian motivations for online retail shopping behavior. Journal of

Retailing, (77), 511-535

Having focused on the various technology acceptance models, the innovative

decision process, as well as key determinants in the technology acceptance models,

the following section will address the reason why an individual chooses to continue

using a technology, product, or service.

2.3   Continuance Adoption Determinants

Many studies in the literature indicate that the users' intention in continual

adoption is determined by their satisfaction with the use of IS. The continuance

adoption literature includes the original works of (1) Bailey and Pearson's (1983)

satisfaction theories, (2) Parasuraman et al.'s (1988) service quality model

(SERVQUAL), and (3) Bhattacherjee's (2001) expectation-confirmation model. The

subsequent sections will discuss each theory in depth.

2.3.1   Satisfaction Theories

The definition of user satisfaction has been variously associated with terms of

"felt need," "system acceptance," "perceived usefulness," "MIS appreciation,"

"feelings" about a system (Ives et al., 1983) and more generally, "attitudes and

perception." (Lucas, 1975)

Previous works in the literature on user-satisfaction (e.g., Bailey & Pearson,

1983; Ives et al., 1983; Igbaria & Zviran, 1996; Zviran, 1992; and Sengupta & Zviran,

1997) in IS research aim to measure the effectiveness and acceptance of IS. Bailey

and Pearson (1983) developed a 39 question instrument for measuring user

satisfaction, and tested it on 32 managers from eight organizations. Their work is

regarded as the most important contribution to the development of a tool for

measuring and analyzing user satisfaction (Conrath et al., 1990). The study by

DeLone and McLean (1992) also confirmed that Bailey and Pearson's tool was a

reliable instrument after analyzing over 100 empirical papers pertaining to measures

of the effectiveness of IS during 1981 to 1987. DeLone and McLean introduced six

major dimensions of success: system quality, information quality, use, user

satisfaction, individual impact and organizational impact, as shown in Figure 2.11.

Figure 2.11: DeLone and McLean's (1992) Model of IS Success
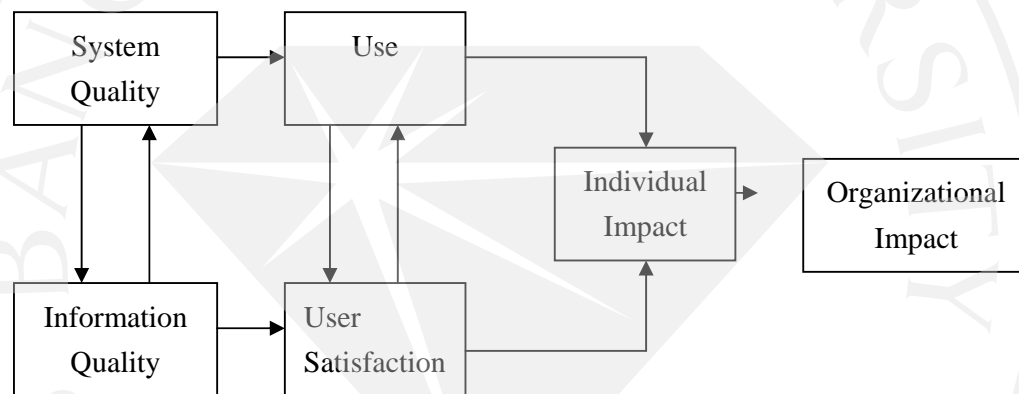
Source: DeLone, W. and McLean, E. (1992). Information system success: The quest

for the dependent variable. Information Systems Research, 3 (1), 60-95.

Parasuraman et al. (1994) introduced a transaction-specific conceptual model.

They proposed that when customers undergo a specific transaction, the service

quality, product quality and price would determine the overall satisfaction, as shown

in Figure 2.12.

Figure 2.12: Components of Transaction-Specific Evaluations
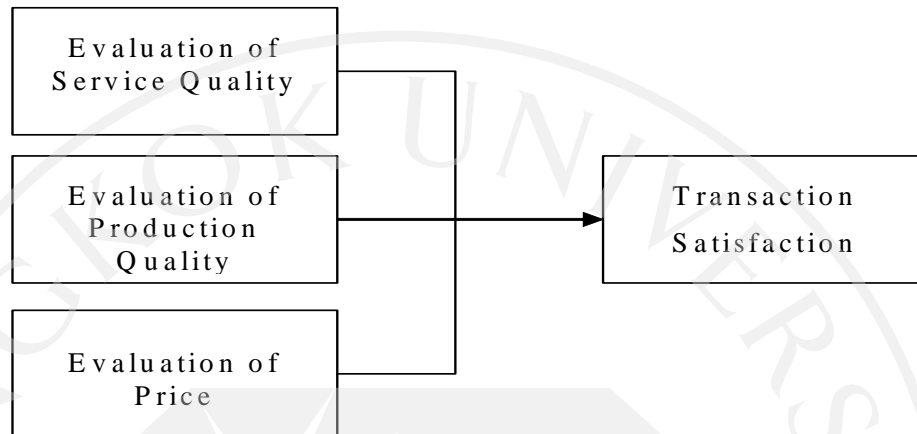
Source: Parasuraman, A, Zeithaml, Valarie A, Berry, Leonard L. (1994, Fall).

Alternative scales for measuring service quality: A comparative assessment

based on psychometric and diagnostic criteria. Journal of Retailing(70) Iss.3,

201 (30 pages)

2.3.2   Service Quality Model (SERVQUAL)

According to Lewis and Booms (1983), service quality referred to a measure

of how well the service level delivered matches customer expectations, as they

conceived that delivering quality services meant conforming to customer expectations

on a consistent basis.

Parasuraman et al. (1988) introduced the service quality model with five

service quality dimensions, leading to customer behavior intention on a 22-item scale.

The concept of the theory followed that customers applied similar criteria in

measuring service quality in all types of services. Those five service quality

dimensions were reliability, responsiveness, assurance, empathy, and tangibles.

Parasuraman et al. (1988) stated that "(1) reliability refers to the ability to perform the

promised service credibly and accurately; (2) responsiveness is the willingness to help

promptly; (3) assurance denotes the knowledge and courtesy of employees and their

ability to inspire trust and confidence; (4) empathy is defined as the provision of

caring individualized attention to customers; and lastly (5) tangibles represent

physical facilities, equipment, and appearance of personnel." Figure 2.13 presents the

dimension of SERVQUAL.

Figure 2.13: Dimension of Service Quality

```
┌─────────────────────┐
│ Competitor Service  │
│ Quality Ratings     │
│                     │
│ Reliability         │            ┌──────────────┐
│                     │            │  Consumer    │
│ Responsiveness      │──────────► │  Behavioral  │
│                     │            │  Intentions  │
│ Assurance           │            └──────────────┘
│                     │
│ Empathy             │
│                     │
│ Tangibles           │
└─────────────────────┘
```
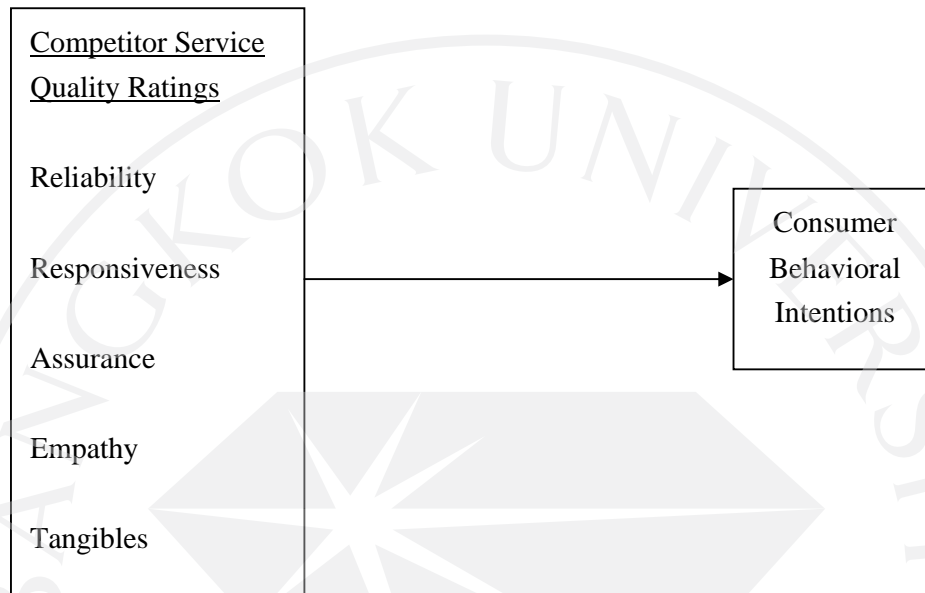
Source: Parasuraman , A., Zenithaml, V. and Berry, L. (1988). SERVQUAL: A

multiple-item scale for measuring consumer perceptions of service quality.

Journal of Retailing, 64 (1), 12-37.

Johnson and Sirikit (2002) applied Parasusraman's (1988) SERVQUAL model

in their study on the competitive advantages and service quality in the Thai

telecommunication industry. Their findings indicated that the telecommunication

industry received strong rating on tangible dimension of service quality, and obtained

lower score on the empathy dimension.

2.3.3 Post Acceptance Model (PAM)

Oliver (1980) proposed expectation-confirmation theory (ECT), which is

widely applied in consumer behavior studies to assess consumer satisfaction, post-

purchase behavior, and service marketing in general (Anderson & Sullivan, 1993;

Patterson et al., 1997 and Dabholkar et al., 2000). The key constructs and

relationships under ECT are illustrated in Figure 2.14

Figure 2.14: Expectation-Confirmation Theory (ECT)
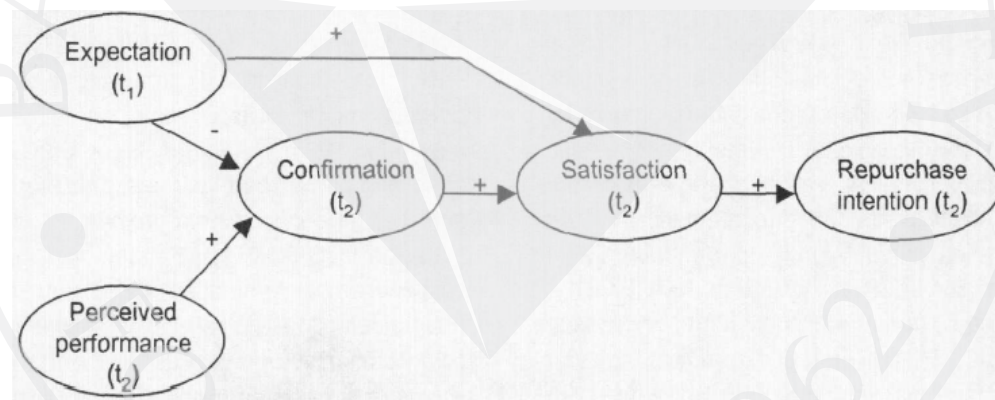
Note: t_1 = pre-consumption variable; t_2 = post-consumption variable

Source: Oliver, R.L. (1980). A cognitive model for the antecedents and consequences

of satisfaction. Journal of Marketing Research (17), 460-469.

Bhattacherjee (2001) introduces the post-acceptance model (PAM) of IS usage

based on the ECT framework. The process of IS continuance intention under the PAM

framework (instead of repurchase intention in ECT) is shown in Figure 2.15.

Information system users' continuance decision is similar to consumers'

repurchase decision in that both decisions (1) follow an initial (acceptance or

purchase) decision, (2) are influenced by the initial experience in using IS or products,

and (3) can potentially lead to the ex-post reversal of the initial decision

(Bhattacherjee, 2001), as shown in Figure 2.15.

Figure 2.15: A Post-Acceptance Model (PAM) of IS Continuance
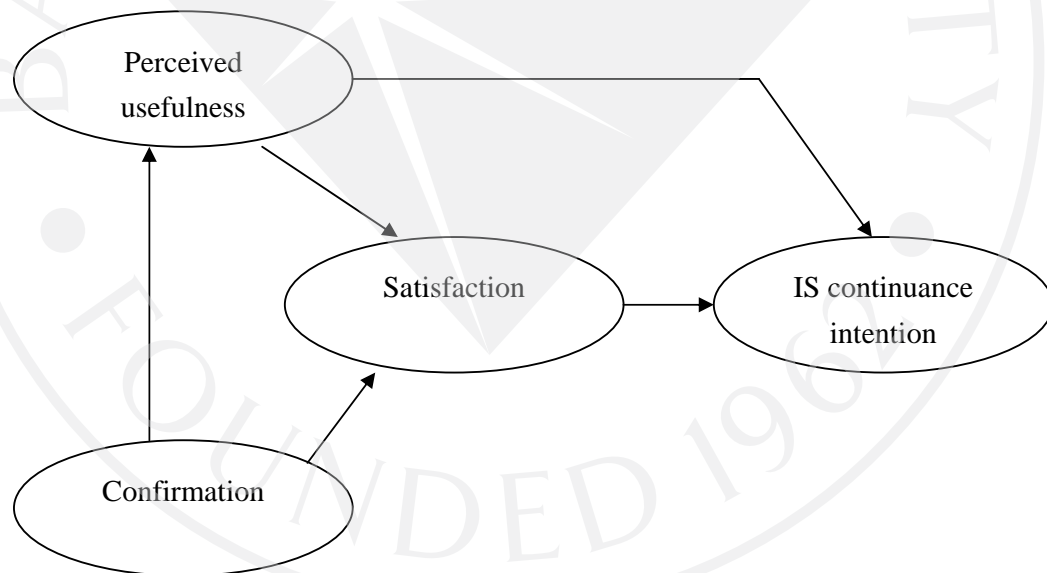
Source: Bhattacherjee, A. (2001). Understanding information systems continuance:

An expectation-confirmation model. MIS Quarterly, 25 (3), 351-370.

In addition, PAM is similar to TAM (Davis et al., 1989) as it employs an

individual cognitive factor for predicting continued IS use, and reflects the belief-

affect-intention causality characteristics of most IS use theories. On the other hand,

PAM differs from TAM significantly. First, PAM explains post acceptance behavior,

whilst TAM focuses on initial acceptance. Second, PAM is a richer model in terms of

studying the continuance behaviors than TAM because it includes unique post-

acceptance variables (satisfaction, confirmation). Finally, TAM cannot provide a

reasonable explanation of the acceptance-discontinuous anomaly based on a common

set of pre-acceptance variables (Bhattacherjee, 2001).

2.4   Important Literature Related to ICT Diffusion

Apart from the literature on initial and continuous acceptance determinants of

ICT adoption, there are numerous studies that apply Diffusion of Innovation Theory

(DIT) with organizational, inter-organizational and also environmental factors. For

instance, Lee (2003a) developed a conceptual framework on ICT adoption and

diffusion model based on an integration framework of the various studies namely

Institutional Theory, TAM, and DIT.

The emphasis of the study is on the importance of external factors (global

economy and government policies), innovation (usefulness, ease of use, and self-

efficiency), and imitation (subjective norm, and word-of-month) factors. Lee's

(2003a) framework for ICT diffusion is illustrated in Figure 2.16.

Figure 2.16: The Framework for Korean ICT Diffusion
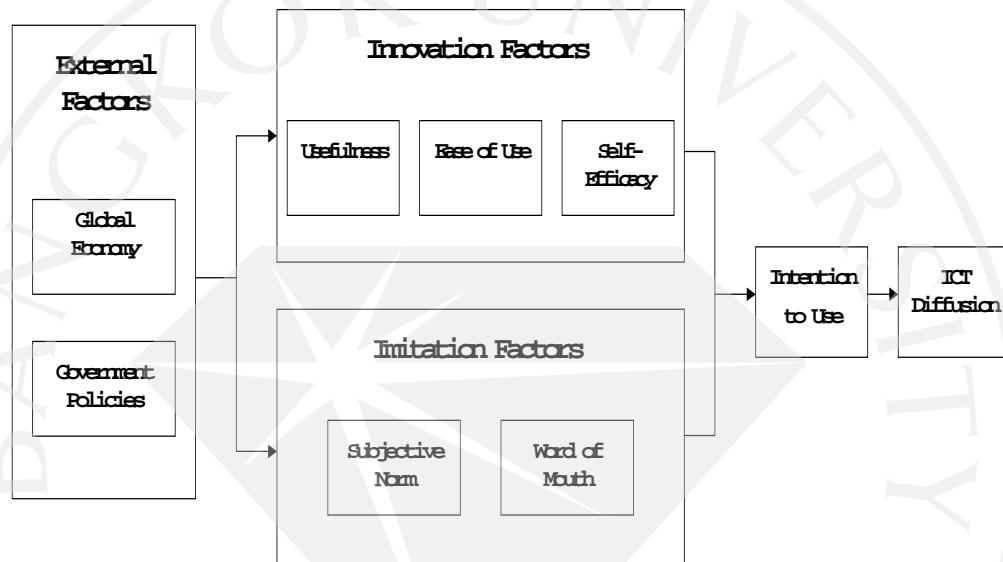
Source: Lee, S.M. (2003). Korea: From a land of morning calm to ICT hotbed.

Academy of Management Executive, 17 (2), 7-8.

This dissertation attempts to examine the initial and continuous acceptance of

ICT diffusion in Thailand. The initial acceptance study will investigate the

relationship between innovation and imitation influences among the diffusion factors,

which are based on Lee's (2003a) framework for Korean ICT diffusion conceptual

model. However, the analysis on external factor will be omitted from this study.

In addition, the continuous acceptance of ICT diffusion will be measured by

PAM. A three-dimensional satisfaction concept will be explored through usability,

mobility, and content. Details of the model will be covered in the research framework

section.
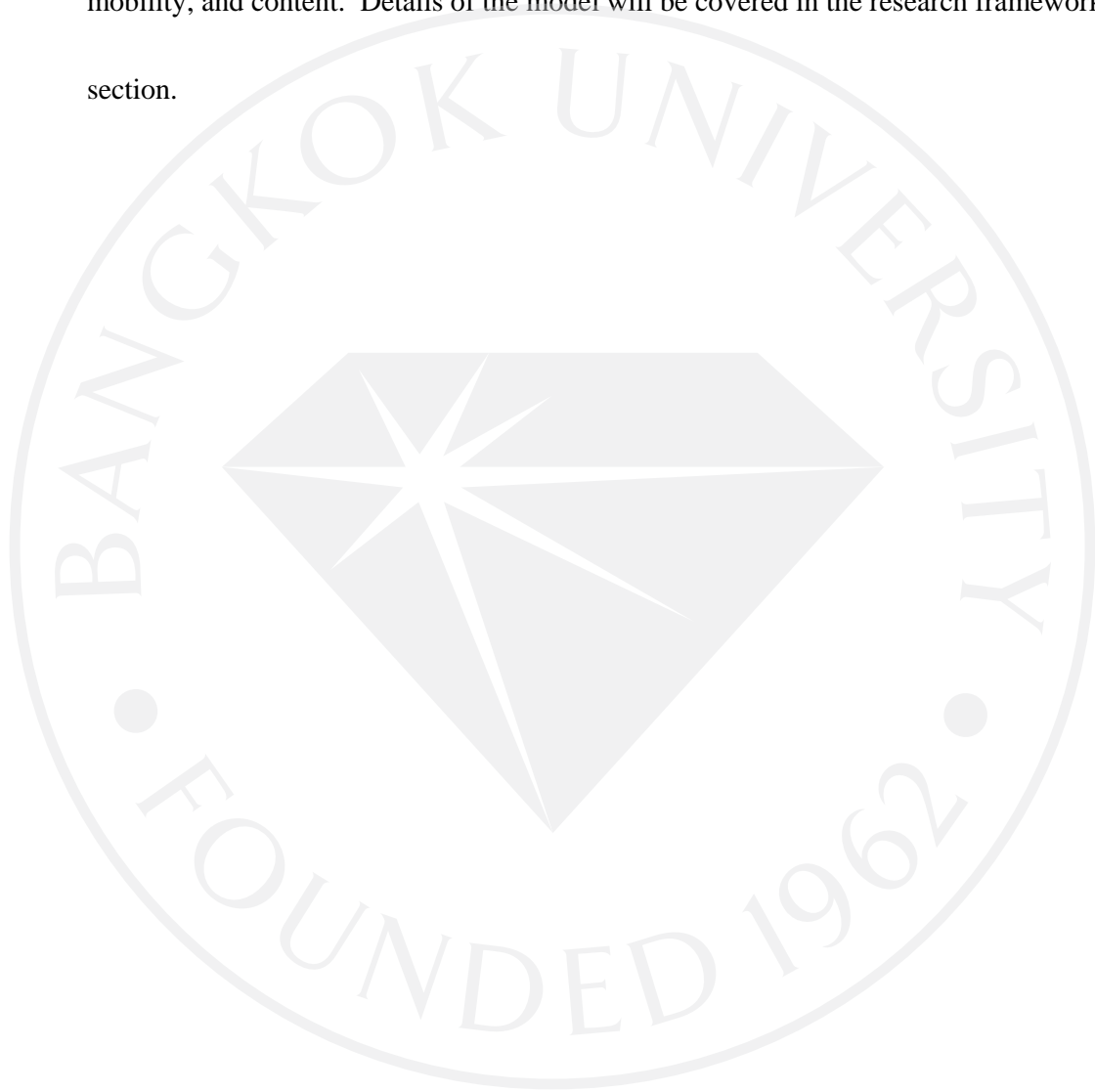
CHAPTER THREE

RESEARCH FRAMEWORK

This chapter discusses the research model and provides an integrative view of

the variables of interest in this study. The structure of this chapter consists of three

parts. First, the variables used in the model will be defined and discussed. Second, it

will present the empirical evidence relating to each variable. Finally, based on TAM in

the literature review, the research hypotheses will be discussed.

3.1   Research Model

The purposes of this study are two folds: (1) the research proposes to examine

the key factors affecting mobile phone users in the initial intention to accept this ICT,

based on such interacting dimensions as technology, motivation, social, and

marketing; (2) it investigates which satisfaction determinants have an effect on mobile

phone users in the intention to continue acceptance of ICT, with respect to the

continuance acceptance models.

The proposed research model is based on the work of Lee (2003a) – a

framework for Korean ICT diffusion model. The scope of this study will limit and

focus only on imitation and innovation factors influencing the initial intention to

adopt mobile phone. Whilst external factors, namely global economy and government

policy are excluded from the model, advertising is incorporated in the imitation

factors. Accordingly, the framework for Thailand ICT adoption model is proposed as

shown in Figure 3.1.

Figure 3.1: Propose Framework for Thailand ICT Adoption Model
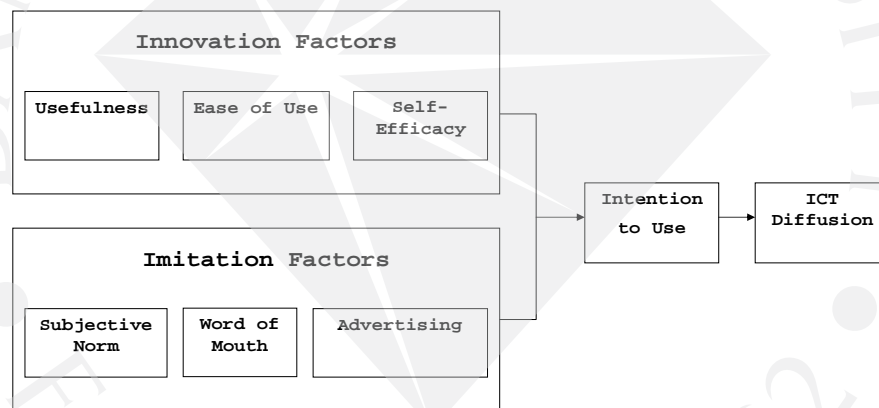
As the success of ICT diffusion depends both on the initial acceptance and the

continuance adoption, this research introduces some key satisfaction determinants,

rooted in the structures of technology acceptance and continuance adoption models, as

prescribed in Chapter Two.

3.2   Research Questions and Hypotheses Development

This research aims to shed light on the following two questions.

A) Which imitation and innovation factors affect the initial adoption of

mobile phone and the degree of the respective influence of each factor?

B) Which continuance determinants affect the intention to continue usage of

mobile phone and the degree of the respective influence of each factor?

The study will employ quantitative approach to assess the relationships among

initial-acceptance and post-acceptance constructs. The quantitative analysis is divided

into two parts – initial adoption and post-adoption of mobile phones with a set of

hypotheses (namely Hypothesis A, and B) to address the relations between the

dependent and independent variables.

Hypothesis A is based on the studies of Ajzen and Fishbein (1980), Davis

(1989), Compeau et al. (1995a-b, 1999), Mathieson (1991), and Taylor and Todd

(1995), whilst hypothesis B is founded on the studies of Bailey and Pearson (1983),

DeLone and McLean (1992), Parasuraman et al. (1985 and 1988), Dabholkor et al.

(2000), and Bhattacherjee (2001).

3.2.1   Study of Initial ICT Adoption: Hypothesis A

The literature review suggests that technology, motivation, social, and market

dimensions strongly affect the end-users' intentions to adopt ICT, in accordance with

Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Diffusion

of Innovation Theory (DIT), and institutional theory. The proposed conceptual model

for Hypothesis A is shown in Figure 3.2.

Figure 3.2: Research Model for Initial Adoption: Hypothesis A
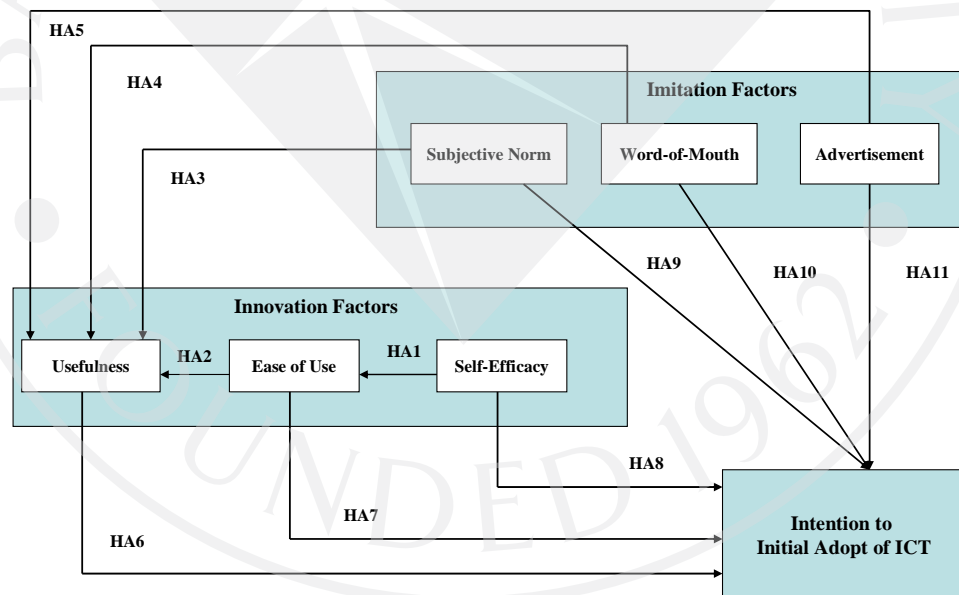
3.2.1.1 Self-Efficacy: HA1 and HA8

Bandura (1986) defines self-efficacy as:

> People's judgments of their capabilities to organize and execute courses of
>
> action required to attain designated types of performances. It is concerned not
>
> with the skills one has but with judgments of what one can do with whatever
>
> skills one possesses (p.391).

Computer self-efficacy is considered as one of the key influencing factors in mobile

phone adoption. In the context of using an IS or IT, computer self-efficacy represents

"an individual's perceptions of his or her ability to use computers in the

accomplishment of a task, rather than reflecting simple component skills" (Compeau,

and Higgins, 1995).

According to the prior studies, there is strong evidence that a person's

computer self-efficacy significantly affects the perceived ease of use (Igbaria & Iivari,

1995; and Venkatesh, 2000). In this respect, Igbaria and Iivari (1995) developed a

computer usage model, based on Bandura's social cognitive theory, to investigate the

effect of computer self-efficacy on an individual's computer anxiety, which in turn,

influences perceived ease of use, perceived usefulness, and system usage. They

conducted a survey of 450 microcomputer users to test the proposed model. Their

finding demonstrated a strong direct affect of the computer self-efficacy on the perceived ease of use, while showing only an indirect impact on the perceived usefulness through the perceived ease of use.

In addition, Venkatesh and Davis (1996) introduced a model of the antecedents and determinants of ease of use. The result reported that ease of use was strongly affected by computer self-efficacy. Venkatesh (2000) further developed from prior studies and extended TAM. He discovered that ease of use was affected not only by computer self-efficacy, but also by computer anxiety, computer playfulness, perceived enjoyment, and objective usability.

Accordingly, this research hypothesizes as follows:

HA1: SELF-EFFICACY WILL HAVE A POSITIVE DIRECT AFFECT ON PERCEIVED EASE OF USE OF MOBILE PHONES.

On the other hand, several IS studies have demonstrated a strong link between self-efficacy and individual reactions to computing technology, both in terms of adoption and usage of computers (Compeau & Higgins, 1995b; Hill et al., 1987; and Taylor & Todd, 1995). Furthermore, Compeau and Higgins (1995a), Gist (1989) and Webster and Martocchio (1993) also unveiled that the impact of self-efficacy on learning to use computers and computer software.

Compeau and Higgins (1995a) indicated that a person's self-efficacy

regarding computers significantly affected the user's expectations. In 1999, Compeau

et al. further developed a social cognitive model to test the influence of computer

efficacy, outcome expectations, effect, and anxiety on computer usage. Data were

gathered from 394 end users over a one-year interval, based on longitudinal study.

The findings provide confirmation that self-efficacy and outcome expectations

(performance) impact on an individual's affective and behavior reactions to

information technology (Compeau et al., 1999). In same vein, Hill et al. (1987)

conducted two different studies to investigate the relationship between computer self-

efficacy and readiness to use IT, and found that computer self-efficacy was an

important factor in determining individuals' decision to use computers.

Therefore, the second hypothesis follows:

HA8: SELF-EFFICACY   WILL   BE   A   SIGNIFICANT   PREDICTOR   OF

INTENTION TO ADOPT MOBILE PHONES.

3.2.1.2 Ease of Use: HA2 and HA7

Perceived ease of use is defined as "the degree to which a person believes that

using a particular system would be free of effort" (Davis, 1989, p. 320). There is an

extensive empirical evidence that perceived ease of use is significantly linked to

intention (usage), both directly and indirectly via its impact on perceived usefulness

(e.g., Davis et al. 1989, Venkatesh, 1999).

Based on TAM, we hypothesize as follows:

HA2: PERCEIVED EASE OF USE WILL HAVE A POSITIVE DIRECT AFFECT

ON PERCEIVED USEFULNESS OF MOBILE PHONES.

HA7: PERCEIVED EASE OF USE WILL BE A SIGNIFICANT PREDICTOR OF

INTENTION TO ADOPT MOBILE PHONES.

3.2.1.3 Perceived Usefulness: HA6

Davis (1989) defines perceived usefulness, as "the degree to which a person

believes that using a particular system would enhance his or her job performance".

Previous literatures have supported the role of perceived usefulness as a strong

determinant of user intention and usage behavior over time (Davis et al., 1989; Igbaria

et al., 1994; Taylor & Todd, 1995b; Venkatesh & Davis, 2000). Thus, it is clear that

perceived usefulness are not simply important initial determinants of intention: they

remain important over the long term. From the above statement, it is proposed that

perceived usefulness will be a significant predictor of intention to adopt mobile

phones.

HA6:   PERCEIVED USEFULNESS WILL BE A SIGNIFICANT PREDICTOR OF

INTENTION TO ADOPT MOBILE PHONES.

3.2.1.4 Subjective Norm: HA3 and HA9

According to theory of reasoned action (TRA), subjective norm is defined as

the degree to which an individual believes that people who are important to her/him

think she/he should perform the behavior in question (Fishbein & Ajzen, 1975). In

this study, subjective norms involve those motivations that persuade individuals, who

do not use technology to use it, if their peers or others whose beliefs may be important

to them think they should use the technology.

In earlier studies, Davis failed to show direct relationship between subjective

norm and behavior intention (use). Therefore, subjective norm is not included in

TAM. In the same line, Hartwick and Barki (1994) found weak linkage between

subjective norm and other variables in their study. However, Thompson et al. (1991)

found a relationship between subjective norm and computer utilization in a

manufacturing company. Many recent IS studies also asserted that there existed a

significant effect of subjective norm on behavior intention (Igbaria et al., 1994; Taylor

and Todd, 1995; Jackson et al., 1997; and Venkatesh and Davis, 2000). In addition,

Venkatesh and Davis (2000) also affirmed that subjective norms had the direct

relationship with perceived usefulness.

Hence, the hypotheses between subjective norms, perceived usefulness and

intention to adopt mobile phones are proposed as follows:

HA3: POSITIVE SUBJECTIVE NORM WILL HAVE A DIRECT AFFECT ON

        PERCEIVED USEFULNESS OF MOBILE PHONES.

HA9: POSITIVE SUBJECTIVE NORM WILL BE A SIGNIFICANT PREDICTOR

        OF INTENTION TO ADOPT MOBILE PHONES.

3.2.1.5 Word-of-Mouth (WOM): HA4 and HA10

        WOM communication defines as "oral, person-to-person communication

between a receiver and a communicator whom the receiver perceives as being non-

commercial, concerned a brand, a product or a service" (Arndt, 1967). Prior studies

evidence that WOM significantly affect consumer behavior (Eliashberg, et al., 2000).

Lee (2003a) stated that word-of-mouth communication is a determinant of the world

leading ICT adoption by Koreans because most are Internet users living in close

proximity to one another, usually in huge apartment complexes. It is noted that WOM

influences heavily on e-customers who are networked. Through e-communities, we

hypothesize that WOM affect significantly on perceived usefulness and also is a

significant predictor of intention to adopt mobile phones.

HA4: A POSITIVE WORD-OF-MOUTH WILL HAVE A DIRECT AFFECT ON

PERCEIVED USEFULNESS OF MOBILE PHONES.

HA10: A POSITIVE WORD-OF-MOUTH WILL BE A SIGNIFICANT

PREDICTOR OF INTENTION TO ADOPT MOBILE PHONES.

3.2.1.5 Advertising: HA5 and HA11

There are two district streams of research. Advertising research provides

evidence that feelings are elicited by ads. Social cognition research gives a useful

framework for analyzing the relationships among feelings, judgments of the

advertisement characteristics, and the measures of advertising outcomes. In this

study, we explore both cases.

Previous studies, namely Lincoln et al. (1981) and Wansink et al. (1998),

suggested that effective advertising has a positive impact on consumer attitudes. In

the same vein, Rogers and Chen (2002) indicated that the relative advantage through

advertising confined potential adopters in viewing innovation (a brand, product, or

service that are perceived as new to the decision maker) as offering advantages over

previous ways of performing the same task.

Hence, the last hypotheses are as follows:

HA5:   EFFECTIVE ADVERTISING WILL HAVE A POSITIVE AFFECT ON

PERCEIVED USEFULNESS OF MOBILE PHONES.

HA11: EFFECTIVE ADVERTISING WILL BE A SIGNIFICANT PREDICTOR OF

INTENTION TO ADOPT MOBILE PHONES.

Table 3.1 provides a summary of hypotheses A and related references.
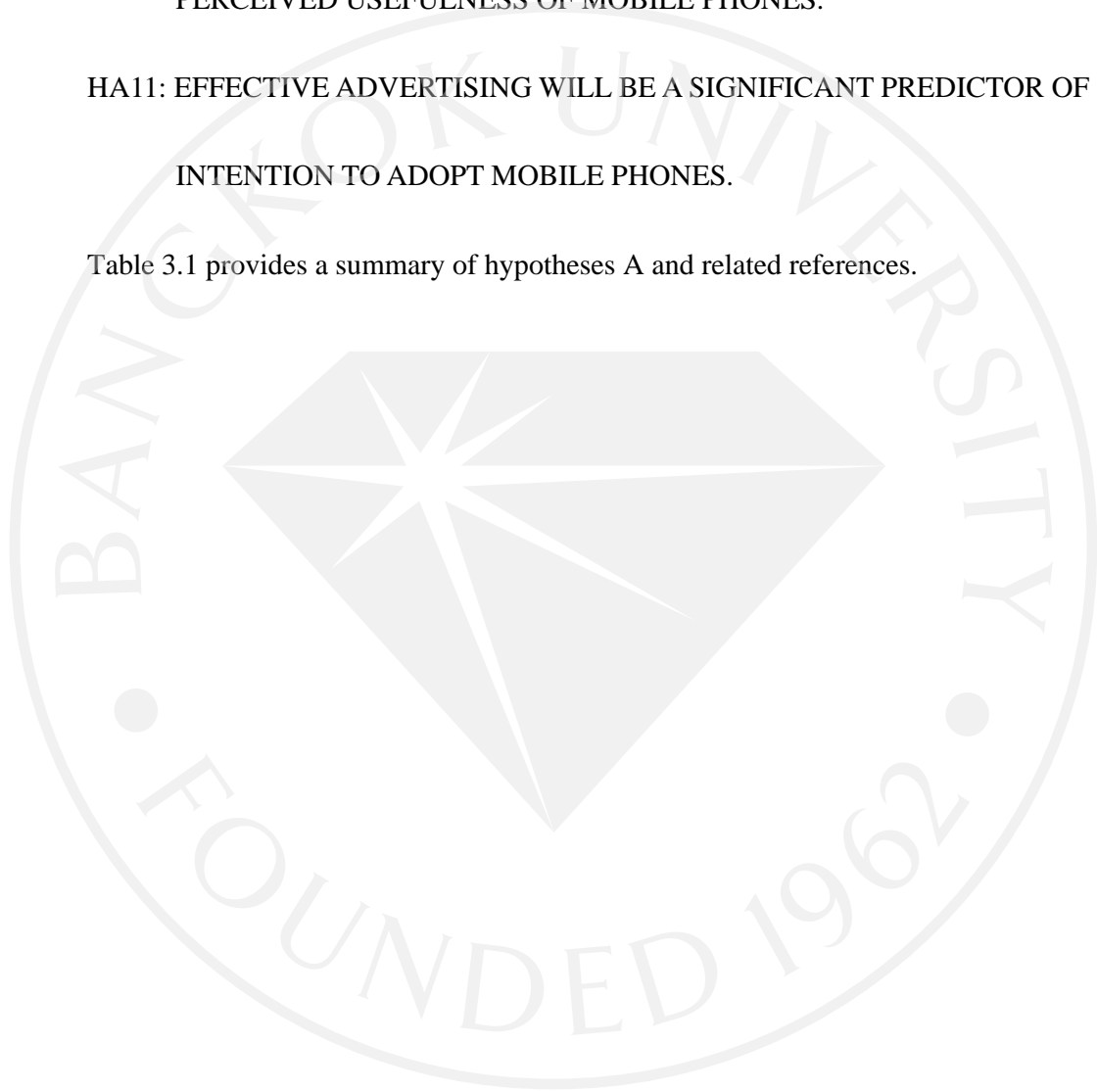
Table 3.1: Summary of Hypotheses and Relevant References

Hypotheses A	Relevant References
HA1: Self-efficacy will have a positive direct affect on perceived ease of use of mobile phones. HA8: Self-efficacy will be a significant predictor of intention to adopt mobile phones.	Bandura, 1986 Compeau and Higgins, 1995a-b, 1999 Venkatesh and Davis, 1996 Venkatesh, 2000 Igbaria, and Iivari, 1995 Gist, 1989
HA2: Perceived ease of use will have a positive direct affect on perceived usefulness of mobile phones. HA7: Perceived ease of use will be a significant predictor of intention to adopt mobile phones.	Davis et al., 1989 Venkatesh, 1999 Venkatesh, 2000
HA6: Perceived usefulness will be a significant predictor of intention to adopt mobile phones.	Davis et al, 1989 Taylor and Todd, 1995 Venkatesh and Davis, 2000
HA3: Positive subjective norm will have a direct affect on perceived usefulness of mobile phones. HA9: Positive subjective norm will be a significant predictor of intention to adopt mobile phones.	Fishbein and Ajzen, 1975 Thomson et al., 1991 Taylor and Todd, 1995 Venkatesh and Davis, 2000 Lee, 2003a
HA4: A positive word-of-mouth will have a direct affect on perceived usefulness of mobile phones. HA10: A positive word-of-mouth will be a significant predictor of intention to adopt mobile phones.	Eliashberg et al., 2000 Lee, 2003a
HA5: Effective advertising will have a positive affect on perceived usefulness of mobile phones. HA11: Effective advertising will be a significant predictor of intention to adopt mobile phones.	Lincoln et al., 1981 Wansink et al., 1998 Rogers and Chen, 2002

3.2.2 Study of Post ICT Adoption: Hypothesis B

The second part of the research is to investigate the mechanism by which

mobile phone adopter continuance is examined through satisfaction determinants.

This study will be focus on the interaction between the roles of satisfaction evaluation

factors (namely usability, mobility, and content) and intention for continuance in

adopting of mobile phones. Hence, the research model for post-adoption of mobile

phones involves hypothesis B shown in Figure 3.3.

Figure 3.3: Research Model for Post Adoption: Hypothesis B
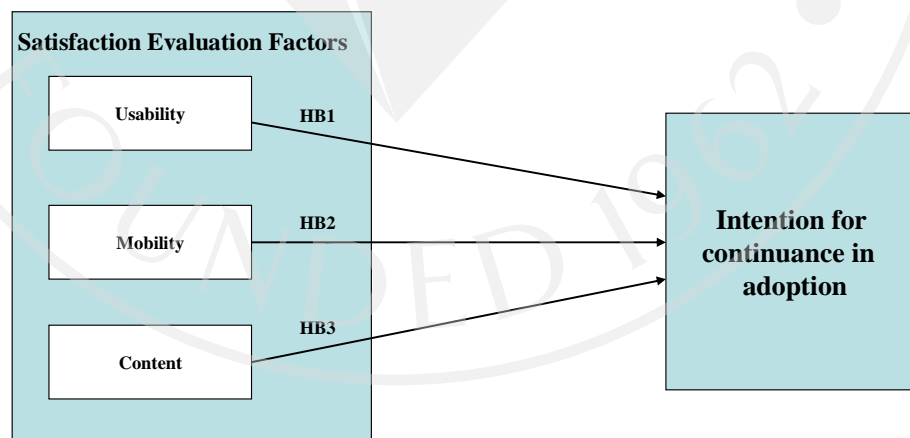
Many IS studies have assessed the success of an application through the measurement of user satisfaction (Bailey & Pearson, 1983; Delone & Mclean, 1992; Doll & Torkzadeh, 1988; Ives & Olson, 1984; and Ives et al., 1983). End-user satisfaction refers "the affective attitude towards a specific computer application by someone who interacts with the application directly" (Doll & Torkzadeh, 1988, p. 261). In general, satisfaction is also defined as a post choice evaluative judgment concerning a specific purchase decision (Bearden & Tell 1983; Churchill & Suprenant 1982; Oliver 1979, 1980; Oliver & DeSarbo 1988; and Susarla et al., 2003).

Based on Bhattachejee's post-acceptance model (PAM), we apply PAM to investigate the continuing usage of mobile phones. PAM is based on Expectation-Confirmation Theory (ECT), which is adapted from the consumer behavior literature to study consumer satisfaction, post-purchase behavior, and service marketing (Oliver, 1980; Anderson & Sullivan, 1993; and Dabholkar et al., 2000).

PAM fits well for evaluating the post acceptance behavior as it is a richer model than TAM to study the continuance behavior with post-acceptance variables such as satisfaction, and confirmation. Bhattacherjee (2001) also reported that this model potentially led to ex post reversal of initial decision, and indicated that end user satisfaction levels were positively associated with their IT continuance intention.

Similarly, Bailey and Pearson, 1983; Melone, 1990; DeLone and McLean, 1992; and

Klenke, 1992 also examined the end-user satisfaction in conjunctions with the success

of IS system.

With the reference to the literature review, this research proposes that end user

satisfaction has a positive effect on the continuance intention to adopt mobile phones.

Parasuraman et al. (1994) introduced a transaction-specific conceptual model. The

model emphasized that the customer satisfaction would be assessed through the

evaluation of service quality, production quality, and price.

Within the framework of this study, we propose to evaluate the satisfaction

factors of mobile phone adopters within three constructs namely usability, mobility

and content. These factors in turn lead to the intention for continuance in adopting

mobile phones.

3.2.2.1 Usability: HB1

Shackel (1984, p.50) defined usability as:

…the capability (of a system) to be used by humans easily (to a specified

level of subjective assessment such as comfort, confidence, and satisfaction)

and effectively (to a specified level of performance such as time and errors

in carrying out operations) by the specified range of users, given specified

user support, to fulfill the specified range of tasks, within the specified range of environmental scenarios.

In brief, usability of a product is defined in terms of its effectiveness, efficiency, and satisfactory performance in completing the user's task (Dzida, 1996). Parasuraman et al. (1994) purported that the product usability criteria for evaluating customer satisfaction included durability, technical sophistication, and ease of use. However, Chan (2004) recommended that the usability of software systems included effectiveness, efficiency, flexibility, ease to remember, and satisfaction.

In light of the product usability, mobile manufacturers and software companies are adding more functions to mobile phones, such as mobile banking, mobile Karaoke, mobile gaming, and mobile voting to attract consumers' attention.

This research proposes that usability - the effectiveness, efficiency, and satisfaction – positively affects the intention to continue to use mobile phones, as hypothesized below.

HB1:   USABILITY POSITIVELY AFFECTS THE INTENTION TO CONTINUE

ADOPTING MOBILE PHONES.

3.2.2.2 Mobility: HB2

Mobility is defined as the ease of access (Taylor et al., 1996). The rapidly

expanding technology of cellar communication, wireless LAN, and satellite services

promise to make it possible for mobile users to access information anywhere and at

any time (ubiquity). With such advantages, business entities would be able to reach

customers anywhere at anytime. By the same token, users can get the information

they are interested in, whenever they want regardless of where they are, via Internet-

enabled mobile devices.

Nowadays, mobile phones feature better connectivity, voice and picture

quality, smaller size, lighter weight, access to emails, and enable to take photographs.

Therefore, Henderson (2003) reported that the mobile users could access mobile

phones anytime, anywhere, and at a low cost. Hence, we propose the following

hypothesis:

HB2:   MOBILITY POSITIVELY AFFECTS THE INTENTION TO CONTINUE

        ADOPTING MOBILE PHONES.

3.2.2.3 Content: HB3

Content is defined as a critical element to continuous usage of mobile phones

(Liang & Ku, 1999). The importance of content on the intention to continuance

adoption is highlighted in the work of Walczuch et al. (2001), Davenport (2000), and

Brenner (1998). First, Walczuch et al. (2001) contended that the users' re-visitation of

web-site is mainly influenced by contents, privacy, incentive schemes, online special

events, brand loyalty, personalization, reminders, and navigation of the site. Second,

Davenport (2000) noted a broad offering of website content created the intention to

continual usage by viewers. Finally, Brenner (1998) reported that the security of users

demonstrated a positive effect on intention to continual usage. In short, this study

proposes to define content as functionality and privacy of mobile content, and

hypothesizes as follows:

HB3:   THE QUALITY OF CONTENT POSITIVELY AFFECTS THE INTENTION

TO CONTINUE IN ADOPTING MOBILE PHONES.

Table 3.2 provides the summary of hypotheses concerning past ICT adoption.

Table 3.2 Summary of Hypotheses B and Relevant References

Hypotheses B	Relevant References
HB1: Usability positively affects the intention to continue adopting mobile phones.	Parasuraman et al., 1994 Barnes and Vidgen, 2003
HB2: Mobility positively affects the intention to continue adopting mobile phones.	Henderson, 2003
HB3: The quality of content positively affects the intention to continue adopting mobile phones.	Walczuch et al., 2001 Davenport, 2000 Brenner, 1998

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

This chapter presents research methodologies utilized in this research, and the operational measures of the variables employed, and the rationale for the selection of research methodologies.

4.1   Research Methodology

To empirically test the research model and the hypotheses of this study, this study proposes to quantitatively assess the hypothesis by conducting a five-point Likert-type scale based survey, as well as to evaluating the data using statistical analyses based on LISREL and SPSS.

The initial and post adoption of mobile phone surveys were conducted in Thailand, targeting mobile phone users as the population sample. The respondents were asked questions regarding the research hypotheses based on their perceptions of mobile phones prior to and after their usage. Specifically, the survey asked the respondents to rate the extent to which they felt or agreed with perception measurements described by the statements on the scale of 1 through 5, where 1 represents strongly disagree, and 5 represents strongly agree.

Finally, the research results will be statistically analyzed by using path

analysis via LISREL version 8.53 and multiple regression via SPSS version 12.0 to

test the research hypotheses.

4.2   Data Collection

During the past few years, the Thai government has introduced many

initiatives in developing ICT infrastructure toward the knowledge-based economy.

According to the national ICT policy IT2010 framework, the key initiatives attempt to

achieve the following ICT objectives (Thuvasethakul, 2002):

(1)   Building human capital

(2)   Promote innovation, and

(3)   Invest in information infrastructure and promote the information

        industry

Under this framework, the action plans for ICT promotion were identified as

follows:

(1)   To raise the technological capability of the country, as classified by the

        UNDP Technological Achievement Index from being in the "Dynamic

        Adopters" group, to the "Potential Leader" group, by 2010.

(2)   To increase the proportion of "Knowledge Workers" in the country

        from 12% (in 2001) to 30%, by 2010.

(3)   To increase the share of "Knowledge-Bases Industries" within the

        overall economy to 50% by 2010.

To achieve these goals, the government has identified five main flagships to

be developed. They are e-Society, e-Education, e-Government, e-Commerce, and e-

Industry.

This research conducted a survey on mobile phone users in Bangkok,

Thailand. The study was conducted in Bangkok as it provides an opportunity to study

mobile phone adoption in a developing country. In turn, it will also assist us to

determine the future potential of mobile commerce activities in Thailand.

The questionnaire was originally designed in English and then translated into

Thai. To prevent any cultural bias and control validity, the Thai version of

questionnaire was checked by the experts and translated back into English to ensure

that there was no bias or loss of meaning during the translation, prohibiting an

understanding of the questionnaire. There were no significant differences between the

two versions.

The five-point Likert-type scale was applied in the questionnaire to measure

the variables of interest. Then, a pilot study was conducted among 40 participating

post-graduate students at Bangkok University. On the basis of the results of the pilot

study, the questionnaire was revised two twice. Finally, the questionnaires were

distributed to mobile phone users and potential users in one of the private universities

in Bangkok, Thailand during April 26, 2004 and June 12, 2004.

4.3   Target Population and Its Characteristics

The target sample for this study is chosen as a group of post-graduate business

students at a leading private university in Bangkok, Thailand, as this group represents

convenience sampling indicating both the current and the future users of mobile

phones. The respondents were asked to reflect on their reasons for adopting the

mobile phone and their satisfactions after using the mobile phone. The respondents

were asked to complete a questionnaire during the class time.

A total of 600 questionnaires were distributed to the subjects. However, 365

sets of questionnaires were returned, resulting in the response rate of 57 percent. Out

of 365 return questionnaires, 342 sets were complete and useable. The characteristics

of the respondents are as follows: (1) the average age of respondent is 30 years old,

and (2) 260 respondents were female, whilst the remaining 81 were male, with 1

refusing to state his/her gender.

The data show that, on average, 312 out of 342 respondents have changed

their mobile phones as often as 3.5 times since they have acquired their first mobile

phones. The reasons for changing their mobile phones are as follows: (1) bad

connection (7%) (2) bad voice quality (5%) (3) outdated design (29%) (4) bulky size

(24%) (5) out of order (27%) and (6) loss of mobile phones (8%).

In addition, it is also reported that 149 out of 342 respondents, representing

44% have changed their mobile phone operators, since they first started using mobile

phones. Mainly, the respondents rated better pricing, accounting for 46%, as the key

reason for changing the mobile phone operator. The other reasons include 1) limited

access area (28%), 2) bad voice quality (4%), 3) bad customer service (8%), 4) no

longer needed (2%) and 5) free cell phone plan (11%).

4.4   Variable Operationalization

Most of the variables described in the research model are measured by items

written in the form of statements. To start with, the respondents were asked to indicate

the extents of their agreement or disagreement with the statements concerning mobile

phones on a five-point Likert-type scale ranging from (1) strongly disagree to (5) strongly agree.

Next, the respondents' scores for each variable were obtained by summing across the scores, corresponding with each variable. Question items that were not relevant to an individual would carry the not applicable (N/A) designation.

Concerning operationalization, the statements describing the model constructs were adopted from prior related empirical studies on TAM and continuance adoption models. For example, perceived ease of use and perceived usefulness were adopted from Davis (1989), and Taylor and Todd (1995). Self-efficacy was measured and adopted from Bandura (1892), and Compeau and Higgins (1995). Other variables used in the study are shown with the measurement items along with the corresponding reference in Table 4.1.

Table 4.1 Variables and Measurement Items for the Study of Initial Adoption

Variables & References	Measurement Items
Perceived Usefulness (Davis, 1989; Moore and Benbasat, 1991; Taylor and Todd 1995)	I believe a mobile phone would help me do my job better
	I think a mobile phone would improve some of my task performance
	I believe advantages of using a mobile phone would outweigh disadvantages
Perceived Ease of Use (Davis, 1989; Taylor and Todd, 1995)	I think mobile phones are easy to use
	I believe mobile phones are easy to use to send messages
	I think mobile phones are easy to learn how to use
Self –efficacy (Bandura, 1982; Compeau and Higgins, 1995a-b, 1999)	I am comfortable using a mobile phone
	If I want, I can easily operate any of the functions on my mobile phone
	I believe I can use the functions on my mobile phone even if there is no one around to show me how to use it
Subjective Norm (Fishbein and Ajzen, 1975, Mathieson, 1991)	People who influence what I do on my job think I should use a mobile phone
	People who are important to me think I should use a mobile phone
Word of Mouth (Lee, 2003a)	My friends or acquaintances tell me that a mobile phone is necessary
	My friends or acquaintances tell me that a mobile phone is helpful in daily life
Advertising (Dube et al., 1996)	While watching TV or reading newspapers ads on mobile phones
	I feel that mobile phones are necessary
	I feel that mobile phones are fashionable
	I feel that mobile phones are attractive
Intention to Adopt	I intend (ed) to use a mobile phone some day

4.4.1   Variables and Operationalization for Initial Adoption

In this study, Perceived Usefulness is defined as "the degree to which a person believes that using particular system would enhance his or her job performance" (Davis, 1989). In simple terms, people tend to use or not use the mobile phone to the extent that they believe it will help them perform their job better.

Davis stated that Perceived Ease of Use referred to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p.320). In brief, users will accept mobile phones, when they perceive the application of mobile phones is easy to use, compared to other applications.

In connection with Davis's questionnaire on perceived ease of use (1989), statements were modified to make them relevant to mobile phones. The statements, representing perceived ease of use in the questionnaire included "I think that mobile phones are easy to use," "I believe that mobile phones are easy to use to send messages," and "I think that mobile phones are easy to learn how to use."

The next variable is Perceived Self-efficacy, which represents "the individual's perception of her or his own ability to use a computer competently in the accomplishment of a task" (Compeau & Higgins, 1995). Also, Bandura (1982, p.122) defined the perceived self-efficacy as "people's beliefs about their capabilities to

exercise control over their own level of functioning and over events that affect their lives." Finally, Venkatesh (2000) reported that self efficacy's internal is related to knowledge.

Representing the fourth variable, Subjective Norm is defined as the perceived pressure to perform or not to perform the behavior (Fishbein & Ajzen, 1975). According to Diffusion of Innovation Theory (DIT) from the perspective of diffusion of a communication network, there are two types of social influence namely (1) normative influence, which occurs when individuals confirm to use the expectations of others and (2) informational influence, which occurs when individuals accept information as evidence of reality (Rogers, 1995).

In this research, we propose that that the subjective norm represents the normative influence, whereas word-of-mouth and advertising represent the informational influence. Such proposal is made in accordance with Manhajan et al. (1990), who proposed that consumers were influenced by two sources, which are word of mouths through interpersonal networks, and advertising through mass media.

With regards to the informational influence, Word-of-Mouth (WOM) is defined as "oral, person-to-person communication between a receiver and a communicator whom the receiver perceives as being non-commercial, concerned a

brand, a product or a service" (Arndt, 1967). In this study, we will purport that

positive word-of-mouths should motivate more diffusion of mobile phone users

among mobile phone users.

Finally, Advertising is defined as the business of drawing public attention to

goods and services (http://www.thefreedictionary.com/advertising). According to the

advertising literature research, it is suggested that advertising creates the attitude as a

determinant of purchase behavior.

4.4.2   Variables and Operationalization for Post Adoption

In terms of post-adoption, this research proposes three variables, namely

usability, mobility, and content. First, Usability (UT) is referred to as effective,

efficient, and satisfying performance of the user's task (Dzida, 1996). However, Chan

(2004) evaluates usability of software systems as effectiveness, efficiency, flexibility,

easy to remember, and satisfaction. Referring to ISO9241 standard (ISO, 1988), task

performance measurements are based on objective measures or observations of user

behaviors such as how well the users can achieve a specific task, and how much the

user likes to use the system.

Secondly, Mobility (MT) is defined as the ease of access (Taylor et al., 1996).

Presently, mobile phones features the improvement on better connectivity, voice and

picture quality, smaller size, lighter weight, access to emails, and digital camera

enabled. With the constant research and development by mobile phone manufacturers,

size and weight of handsets and other added features, e.g., radio, etc. have

significantly increased the mobility of cellular subscribers.

Finally, Liang and Ku (1999) stated that "Content (CT) is a critical element to

continuous usage of mobile phones." Presently, new contents are available for mobile

phone users in Thailand. These new features include short message system (SMS),

email, mobile payments, mobile banking, mobile gaming, digital photo transmission

(MMS), mobile karaoke, and mobile shopping. In the same line, Davenport (2000)

noted a broad offering of website content created the intention to continue usage by

viewers. In addition, Brenner (1998) also reported that the security on privacy of users

had a positive affect on the intention to continuance adoption. The details of

measurement items for the above three variables on post-adoption of mobile phones

are shown in Table 4.2.

Table 4.2: Variables and Measurement Items for Study on Post-Adoption

Variables & References	Measurement Items
Usability (ISO, 1988; Parasuraman et al., 1994; Barnes and Vidgen, 2003)	I accomplish some of my daily tasks using a mobile phone.
	I like to use a mobile phone on my daily tasks.
	I am satisfied with using mobile phones in my daily task.
Mobility (Taylor et al., 1996; Henderson, 2003)	I am satisfied with my mobile phone's connection with other networks at any time or place.
	I am satisfied with the size of my mobile phone.
	I am satisfied with my mobile phone's weight.
	I am satisfied with my mobile phone's voice quality.
Content (Brenner,1998; Liang and Ku, 1999; Walczuch et al., 2001)	I am satisfied with my mobile phone's connection with Internet or email
	I am satisfied with my mobile phone's functions, such as down loading music, e-payment, notice of my schedule
	I am satisfied with my mobile phone's security system in m-payment in m-transactions such as e-remittance or e-payment.
	I am satisfied with my mobile phone's telesecurity.
	I am satisfied with my mobile phone company's privacy information protection.

4.5   Analytical Methodology

The statistical methods for examining the study of Hypothesis A: the intention

to initial adoption include (1) Reliability Test, (2) Factor Analysis, (3) Covariance

Matrix, (4) Confirmatory Factor Analysis, and (5) Path Analysis – to affirm goodness

fit of the model via LISREL 8.53 to determine the reliability and validity of the

research model, and to examine the degree and significance level of influence of each

factor on the initial adoption of mobile phones.

In testing for Hypothesis B: the post intention to adopt, SPSS v.12 is used to

conduct the following tests, which are (1) Reliability Test, (2) Factor Analysis, and

(3) Multiple Regressions, to determine the reliability and validity of the research

model and satisfaction evaluation factors and their degrees of significance toward the

intention to continue using of mobile phones.

CHAPTER FIVE

RESEARCH FINDINGS AND ANALYSIS

This chapter provides statistical analysis of the survey results with respect to the following research questions.

1) Which determinants are important in affect the initial intention to adopt mobile phones?

2) Which determinants are important in affect the continuous intention to adopt mobile phones?

3) In comparison to the findings between developing (Thailand) and developed countries (Korea), what is their similarities and differences on the diffusion process – particularly on the determinates affecting on the initial and post adoption of mobile phone?

Specifically, this chapter presents the results of the study and discusses reliability and validity tests of the measurement variables, as well as the statistical tests of the research hypotheses.

5.1   Determinants Affecting the Initial Intention to Adopt Mobile Phones

5.1.1   Reliability and Validity of Research Model for Hypothesis A

Reliability tests were conducted using SPSS program. This study reveals that reliability test is statistically significant. According to the values of Cronbach's alpha exceeded 0.6034 for all variables under the study. Therefore, reliability for the study variables is considered acceptable, as shown in Table 5.1.

Table 5.1: Results of Reliability Test for Initial Adoption Determinants

Variables	# of items	Values of Cronbach's α
Usefulness	3	.8328
Ease of use	3	.8042
Self-efficacy	3	.8326
Subjective norm	2	.8814
Word of mouth	2	.8798
Advertising	3	.6034
Intention to initially adopt	2	.7551

To test the validity of the measurement items, the principal component factor analysis using the varimax rotation approach was conducted. The results of factor analysis for variables of the initial intention to adopt are shown in Table 5.2.

Table 5.2: Results of Factor Analysis of Initial Intention for Adoption Determinants

	Usefulness	Ease of Use	Self-Efficacy	Word of Mouth	Subjective Norm	Mass Advertising
USE2	.877					
USE1	.876					
USE3	.757					
EASE3		.857				
EASE1		.833				
EASE2		.692				
EFF2			.904			
EFF3			.889			
EFF1			.628			
WOM2				.907		
WOM1				.903		
SN1					.901	
SN2					.857	
AD3						.805
AD2						.707
AD1						.550
Eigen values	2.459	2.316	2.283	1.914	1.767	1.611
% of Variance	15.369	14.473	14.266	11.965	11.043	10.071
Cumulative %	15.369	29.843	44.109	56.074	67.117	77.188

Confirmatory factor analysis (CFA) was performed to investigate construct

validity. Table 5.3 shows the standardized factor loadings (Lambda) with t-values (at

$p<0.05$) obtained from the covariance matrix of initial intention for adoption

determinants. The results of the analysis indicate that the squared multiple

correlations of most of the variables yielded above 0.50 as shown in Table 5.4. Thus,

the research model is confirmed as reliable and valid.

Table 5.3: Covariance Matrix of Initial Intention for Adoption Determinants

Covariance Matrix

observed variables

	usef1	usef2	usef3	ease1	ease2	ease3	effi1	effi2	effi3	subn1	subn2	wom1	wom2	adv1	adv2	adv3	int1	int2
usef1	0.776																	
usef2	0.609	0.884																
usef3	0.405	0.430	0.654															
ease1	0.234	0.187	0.226	0.601														
ease2	0.131	0.120	0.140	0.388	0.851													
ease3	0.151	0.092	0.170	0.461	0.448	0.791												
effi1	0.227	0.182	0.170	0.318	0.365	0.378	0.825											
effi2	0.096	0.038	0.017	0.199	0.406	0.291	0.513	1.118										
effi3	0.101	0.102	0.029	0.223	0.387	0.359	0.601	0.908	1.299									
subn1	0.185	0.176	0.200	0.220	0.216	0.190	0.229	0.105	0.145	0.745								
subn2	0.236	0.264	0.249	0.239	0.266	0.187	0.214	0.152	0.175	0.649	0.902							
wom1	0.098	0.177	0.123	0.044	0.153	0.073	0.120	0.145	0.098	0.295	0.428	1.196						
wom2	0.154	0.175	0.167	0.073	0.148	0.043	0.112	0.086	0.097	0.301	0.385	0.960	1.249					
adv1	0.254	0.302	0.245	0.134	0.248	0.126	0.157	0.224	0.154	0.297	0.378	0.455	0.481	0.959				
adv2	-0.041	0.066	0.019	0.029	0.055	0.045	-0.069	-0.127	-0.091	0.205	0.242	0.397	0.330	0.255	1.146			
adv3	0.160	0.136	0.190	0.200	0.193	0.187	0.125	0.122	0.103	0.210	0.254	0.250	0.277	0.378	0.312	0.704		
int1	0.253	0.243	0.255	0.277	0.207	0.231	0.237	0.149	0.168	0.306	0.331	0.142	0.178	0.327	0.183	0.307	0.761	
int2	0.192	0.255	0.222	0.208	0.280	0.190	0.224	0.308	0.253	0.370	0.429	0.274	0.238	0.387	0.230	0.374	0.549	1.051

Table 5.4: Results of Confirmatory Factor Analysis of Initial Adoption Determinants

Variables	Lambda	t-value	Squared Multiple Correlation
Subjective norm			
SUBJEC1	0.72	17.11	0.70
SUBJEC2	0.92	19.93	0.89
Word-of-mouth			
WOM1	0.98	18.15	0.81
WOM2	0.98	17.50	0.76
Self-efficiency			
EFFI1	0.62	13.51	0.47
EFFI2	0.89	17.56	0.70
EFFI3	0.99	18.50	0.76
Ease of use			
EASE1	0.62		0.65
EASE2	0.63	12.06	0.47
EASE3	0.73	13.51	0.67
Usefulness			
USEFUL1	0.74		0.73
USEFUL2	0.79	15.10	0.71
USEFUL3	0.54	12.66	0.45
Advertising			
ADVER1	0.71	13.13	0.52
ADVER2	0.45	7.20	0.18
ADVER3	0.54	11.54	0.41

5.1.2   Goodness of Fit of the Research Model

To determine the goodness of fit of the proposed research model, this study

applies path analysis using structural equation modeling (SEM), based on LISREL 8.

According to Bollen (1993), this programme is equipped with the maximum

likelihood estimation, which is suitable for testing structural equation models that

have well-developed underlying theory. Specifically, the analysis will examine the

goodness of fit of the model, and the postulated individual casual links.

With regard to the goodness of fit of the model, this research employs the

multiple fit criteria, which include chi-square with the degree of freedom, goodness-

of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normalized fit index (NFI),

non-normalized fit index (NNFI), comparative fit index (CFI), and root mean square

error of approximation (RMSEA).

Chi-square statistic, which is an intuitive index for measuring the goodness

of fit between data and a model, was not used because of its sensitivity to sample size

(Chau, 1997; Hartwick & Barki, 1994). The empirical evidence suggests that for a

good model fit the following criteria must be met. First, chi-square/degrees of

freedom should be less than 3.0, whilst GFI, NFI, NNFI, and CFI should be greater

than 0.90. Second, AGFI should be greater than 0.80, and RMSR should be less than

0.10 (Henry and Stone, 1994; Hoyle, 1995). Accordingly, these benchmarks are

adopted in the data interpretation.

In terms of the goodness of fit, the proposed model appears statistically

significant. Table 5.5 summarizes the values observed in the study in comparison with

the recommended values of the common model fit indices.

Table 5.5: Analysis of Overall Model Goodness of Fit Using Common Fit Indexes

Model Goodness of Fit Indexes	Result obtained from the study	Recommended Statistical Values
Chi-square χ^2	381.64 (.000)	Significant ($p < 0.001$)
Chi-square/ degree of freedom χ^2 / df	3.2342 (118)	Less than 5: Good fit; and less than 2: overfitting (Medsker et al., 1994)
Parsimony Goodness of Fit Index (PGFI)	0.61	0 to 1 higher values, more parsimonious. (Mulaik, et al., 1989)
Goodness of Fit Index (GFI)	0.88	Higher than 0.90 is better (Jöreskog and Sörbom, 1989)
Adjusted Goodness of Fit Index (AGFI)	0.83	Higher than 0.80 is better (Gefen et al., 2000)
Comparative Fit Index (CFI)	0.91	Higher than 0.90 is better (Hair et al., 1998)
Normalized Fit Index (NFI)	0.88	Higher than 0.90 is better (Chin and Todd, 1995)
Non-normalized Fit Index (NNFI)	0.88	Higher than 0.90 is better (Henry and Stone, 1994)
Parsimony Normalized Fit Index (PNFI)	0.68	Higher is better (James et al., 1982)
Root Mean Square Error of Approximation (RMSEA)	0.086	< 0.08 good < 0.05 excellent (Browne and Cudesk, 1992)

As shown in Table 5.5, even though some indexes fail to meet the

recommended minimum levels, they are close enough to suggest that the model fit is

reasonably adequate and appropriate to assess the results for the structural model. For

instance, the goodness of fit index (GFI), the normalized fit index (NF), and the non-

normalized fit index (NNF) are close to the recommended value of 0.90 (0.88)

(Jöreskog and Sörbom, 1989).

In addition, the value of adjusted goodness of fit index (AGFI) of this research

model is 0.83, which is higher than the recommended values at 0.80 (Gefen et al.,

2000). Lastly, James et al. (1982) suggested that the higher the value of parsimony

normalized fit index the better the goodness-of-fit index of the model.

5.1.3   Results and Discussion of Research Model for Hypothesis A

Data analysis for hypothesis A reveals that there exist causal paths among the

individual variables postulated by the model. According to statistical results, such

constructs as ease of use, subjective norm and advertising exhibit a significant direct

positive affects on mobile phone users' attitudes, as well as on his or her initial

intention to adopt the technology with the standardized path coefficients of 0.16, 0.22

and 0.72 respectively. However, the results show that self-efficacy, usefulness and

word of mouth (WOM) has a negative significant affect on mobile phone users'

attitude toward his or her initial intention to adopt the technology with the

standardized path coefficients of 0.08, 0.07 and 0.31 accordingly.

In connection with the eleven hypotheses outlined in chapter three, the

results of the research model and their relationship for hypothesis A are shown in

Table 5.6.

Table 5.6: Summary of the Findings and Tests for Hypotheses A

Hypothesis	Relationship	Path Coefficient	t- Value	Results
HA1	Self-efficacy and Ease of use	0.53	8.34	Supported
HA8	Self-efficacy and Intention to adopt	0.08	1.07	Not Supported
HA2	Ease of use and Usefulness	0.19	3.09	Supported
HA7	Ease of use and Intention to adopt	0.16	2.29	Supported
HA3	Subjective Norm and Usefulness	0.17	2.12	Supported
HA9	Subjective Norm and Intention to adopt	0.22	2.84	Supported
HA4	Word of Mouth and Usefulness	-0.10	-1.17	Not Supported
HA10	Word of Mouth and Intention to adopt	-0.31	-3.31	Not Supported
HA5	Advertising and Usefulness	0.34	2.97	Supported
HA11	Advertising and Intention to adopt	0.72	5.56	Supported
HA6	Usefulness and Intention to adopt	0.07	1.00	Not Supported

From Table 5.6, it appears that mass advertising is the most significant factor

(highest t-value at 5.56) influencing the initial intention to adopt mobile phones with

subjective norm and ease of use as the followers. In addition, there is a high inter-

relationship between self-efficacy and ease of use; and ease of use and usefulness

with t-values of 8.34 and 3.09 respectively (t-value of 1.96 at 0.05 significant levels).

Details of the results are discussed below, and Figure 5.1 shows the finding of

relationship paths for hypotheses A.

Figure 5.1: Path Coefficients of Research Model for Hypotheses A
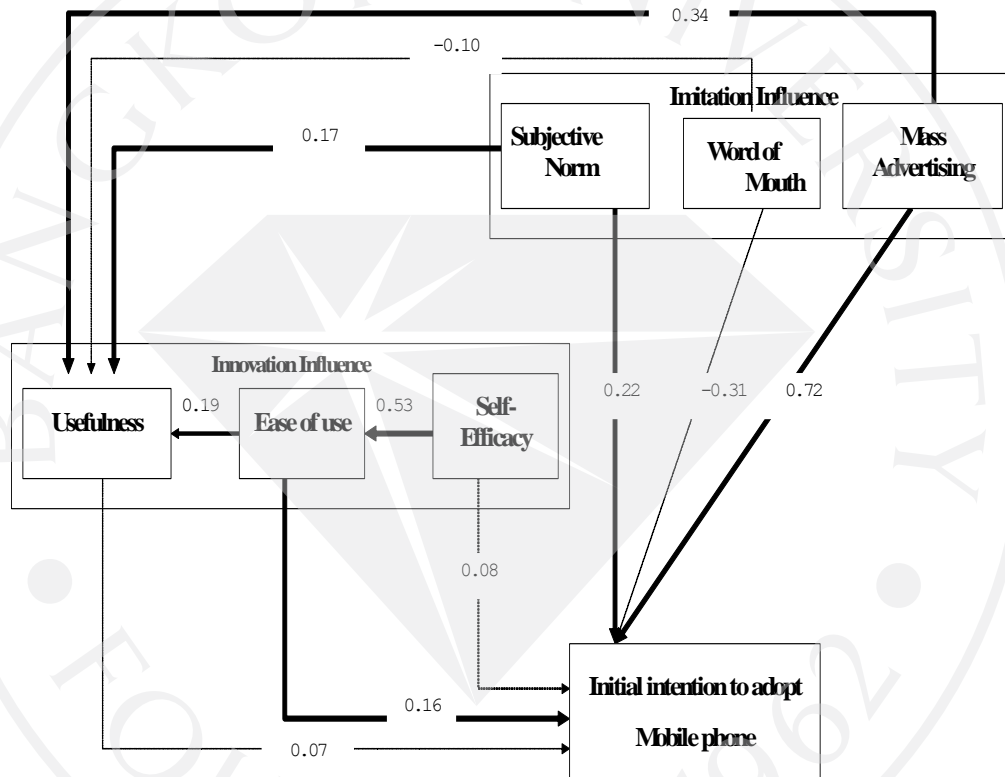
According to IS literature reviews, usefulness and self-efficacy are the most

important factors in ICT adoption. Surprisingly, the result indicated that the degree of

influence of usefulness and self-efficacy are insignificantly influencing the initial

intention to adopt mobile phones with the minimum t-value of 0.07 and 0.08

respectively. Likewise, this research discovered that word-of mouth negatively affects

the intention to adopt mobile phone, as well as portrays negative impacts on usefulness.

A plausible explanation is that Thai mobile phone users have frequently changed their mobile phones due to the reasons as previous mentioned such as out of order, old-fashioned design, bad connection, bulky size, and lost of phone. At present, the mobile phone operators at present are competed heavily with massive advertisement on television regarding to its network reliability. Also, mobile phone manufacturers circulated massive advertisements in newspapers and leaflets of the department stores to gain the awareness of mobile phone up-to-date features.

Thus, mobile phone users might have responded that word of mouth and usefulness were not important, compared to advertising and ease of use in the intention to adopt the mobile phone. Also, the mobile phone respondents may have already acknowledged the usefulness of mobile phone from external media sources, e.g., advertising on television, newspaper, radio, and etc., and they might perceive that word of mouth has no direct implication to their understanding of mobile phones' usefulness.

To support this finding, Rogers (1995) has suggested that word of mouth and advertising effects may differ among different market segment in term of innovation

diffusion studies. It can be inferred that Thailand may be at the early stage of growth

cycle of new product. Roger (1995) mentions that earlier adopters are likely to have

greater exposure to mass media communications than later adopters.

With the recent growth of Thailand's penetration rate for mobile market --

growing by more than 100% in both 2001 and 2002, and the number of mobile

subscribers reached 22 million users in 2003 from only 1.9 million users in 1998

(Paul Budde Communication Pty Ltd, 2004). We believe that the mobile phone life

cycle is different from that of the late 19th century. The results of this statistical

analysis might have been different if this survey had been conducted in earlier years

of mobile phone adoption. In addition, it is interesting to note that subjective norm

and advertising enhance the mobile phone adopters' perceived usefulness of ICT in

Thailand.

In addition, the statistical result indicated that self-efficacy was negatively

influencing the initial intention to adopt mobile phones. With the introduction of Thai

menu on mobile phone few years ago, mobile phone is easier to operate than before.

Also, since the target population is graduate student, the college students nowadays

are trained to use email and computer for class assignments. Therefore, the

respondents may have gained higher level of IT skills and perceived that self-efficacy

has no direct affect on the relationship with the initial intention to adopt mobile

phones.

5.2   Determinants Affecting Continuous Intention to Adopt Mobile Phones

From the target population and its characteristics section outlined in Chapter

Four, the results indicated that mobile phone users had changed their phones

frequently (312 out of 342 respondents), and had changed more than three to four

times since they first acquired their mobile phones. The reasons of changing mobile

phones included out of order, old-fashioned design, bulky size, loss of the phone, etc.

Despite these pitfalls, they still continued using the mobile phone, as it might have

become a ubiquitous product in their daily life.

5.2.1   Reliability and Validity of Research Model for Hypothesis B

As shown in Table 5.7, Cronbach's alpha of every variable was greater than

0.76 in the reliability test, thus reliability of the measurement instrument was

relatively high (Cronbach, 1971).

Table 5.7: Results of Reliability Test on Variables for Continuance Intention to Adopt

Description of Variables	No. of items used	Values of Cronbach's Alpha (α)
Usability	3	.7860
Mobility	4	.7643
Content	5	.8225
Intention to continuance	1	–

For testing validity of the measurement items, the result of factor analysis on the intention to continuance adoption of mobile phones indicates that usability, mobility and content factors load to each factor at values greater than 0.5 (see Table 5.8). Therefore, this confirms that the measurement items have high validity.

Table 5.8: Results of Factor Analysis for Continuance Intention to Adopt

	Usability	Mobility	Contents
Usability1	.893		
Usability2	.892		
Usability3	.810		
Mobility1		.873	
Mobility2		.852	
Mobility3		.731	
Mobility4		.605	
Content1			.828
Content2			.813
Content3			.765
Content4			.753
Content5			.672

5.2.2   Results and Discussion of Research Model for Hypotheses B

The multiple regression analysis method is used to investigate the factors

affecting the intention to continuance for mobile users. According to Mcclave et al.

(2001), multiple regression models are defined as the probabilistic models that include

more than one independent variable. The form of this research model is illustrated as

follows:

POST INTENTION TO CONTINUE ADOPTING MOBILE PHONE (Y):

$$Y = \{\beta_1 * USABILITY + \beta_2 * MOBILITY + \beta_3 * CONTENT\}$$

The multiple regression analysis shows that usability, mobility, and content

variables are significantly positively related to the intention to continue using mobile

phones, as hypothesized in this research. The standard coefficient scores of mobility

and content variables are somewhat in the same line (.317 versus .303) except the

usability variables (.204), which represent a slightly lower value (see Table 5.9).

Table 5.9: Results of Regression for Continuance Intention to Adoption

Factor Name	β Standardized Coefficient	p-value
Usability	.204	.000*
Mobility	.317	.000*
Content	.303	.000*

R^2 = .355
F = 47.447
* = where p <.05

The results show that mobile phone users are concerned with mobility,

content, and usability in the order of importance in their decision making process

whether to continue to use mobile phones. The results of Hypotheses B tests are

summarized in Table 5.10.

Table 5.10: Summary of the Findings for Hypotheses B

Hypothesis	Relationship	Standardized Coefficient Value	Results
HB1	Usability positively affects the intention to continue adopting mobile phones.	0.204	Supported
HB2	Mobility positively affects the intention to continue adopting mobile phones.	0.317	Supported
HB3	The quality of content positively affects the intention to continue adopting mobile phones.	0.303	Supported

The reason that content is as important as mobility can be attributable to heavy advertisements on value added contents by mobile phone operators such as mobile stock, mobile game, mobile karaoke, mobile TV, mobile shopping, etc. Therefore, the respondents may perceived that content is an essential feature for continuous usage of mobile phones.

In this study, mobility is defined as network connectivity, and dimension of mobile phone as previously elaborated in Chapter Two. From the standardized coefficient stand point, mobility receives the highest score compared to the other determinants. According to descriptive analysis of the survey data, 312 respondents stated the reasons for changing their mobile phones due to the bulky size at 24% while limited access at 28%. In short, this study confirms that mobility is the key determinant in post intention to continue using mobile phones.

In brief, ranking from the highest to lowest in importance, the determinants that affect the post intention to continue adoption of mobile phones are mobility, content, and usability, respectively as shown in Figure 5.2.

Figure 5.2: Results of Test on Research Model for Hypotheses B
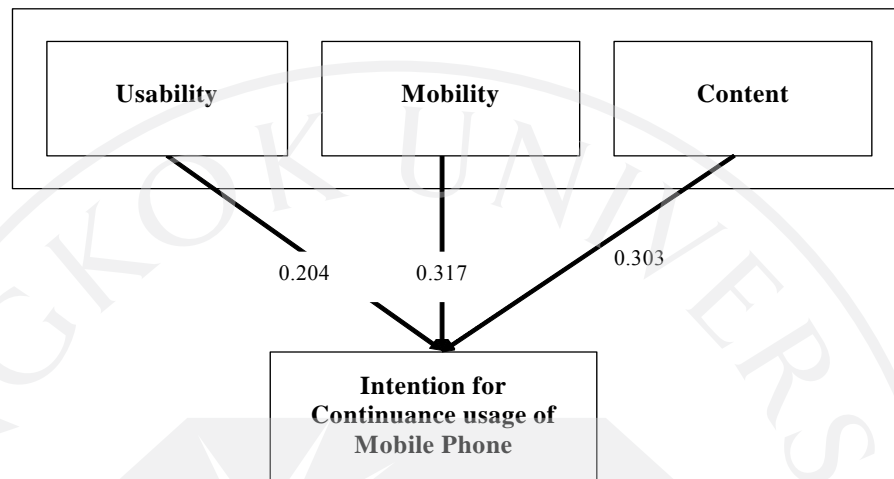
5.3   Comparative Study of the Diffusion process between a Developing (Thailand)

       and a Developed ICT Country (Korea)

       A similar study of mobile technology adoption was conducted in Korea, with the

target population being college students from local Korean universities. The

questionnaires were distributed to mobile phone users and potential users in eight

Korean universities from March 15, 2003 and April 12, 2003, as college students

represented some of the primary current and future users of mobile phones. Data

were collected from 610 subjects. Complete and useable questionnaires were received

from 594 respondents. Characteristics of sample population were as follows:

undergraduate students (72.6%), graduate students (24.9 %), others (1%) and missing

data (1.5 %). Finally, the average age of respondents was 26.16.

From the study by Lee, S. G. (2003), the results showed that self-efficacy in

innovation factors and subjective norm in imitation factors were not significant to the

initial intention to adopt mobile phones. The determinants that exhibited direct

positive affects on the initial intention to adopt mobile phones in Korea included

advertising, word of mouth (WOM), ease of use, and usefulness. Table 5.11 illustrates

the summary of the findings on the relationship between determinants and the initial

intention to adopt mobile phones in Thailand and Korea.

Table 5.11: Comparative Summary of the Findings on the Relationships between

Determinants and the Initial Intention to Adopt Mobile Phones in Thailand and Korea

Hypothesis	Relationship	Developing Country - Thailand		Developed Country - Korea	
		Path Coefficient	Results (support -yes/ not support -no)	Path Coefficient	Results (support -yes/ not support -no)
HA1 HA8	Self-efficacy and Ease of use Self-efficacy and Intention to Adopt	0.53 0.08	Yes No	0.56 -0.035	Yes No
HA2 HA7	Ease of use and Usefulness Ease of use and Intention to adopt	0.19 0.16	Yes Yes	0.15 0.48	Yes Yes
HA3 HA9	Subjective norm and Usefulness **Subjective norm and Intention to adopt**	0.17 0.22	Yes **Yes**	0.18 -0.0012	Yes **No**
HA4 HA10	**Word of mouth and Usefulness** **Word of mouth and Intention to adopt**	-0.10 -0.31	**No** **No**	0.36 0.19	**Yes** **Yes**
HA5 HA11	**Advertising and Usefulness** Advertising and Intention to adopt	0.34 0.72	**Yes** Yes	0.16 0.52	**No** Yes
HA6	**Usefulness and Intention to adopt**	0.07	**No**	0.19	**Yes**

It is noted that the relationship between subjective norm and intention to adopt

is positive in Thailand but the result is negative in Korea. Ajzen (1980) reported that

subjective norm was the important determinant of behavioral intention. However,

Venkatesh and Davis (2000) suggested that user acceptance research investigating the

direct affect of subjective norm on intention to adopt mobile phones yielded mixed

results.

Thus, we purport that Thai respondents may perceive that the peers such as working colleagues, friends and relatives encourage mobile phone usage. Therefore, Thai respondents believe that subject norm has a direct positive affect on intention to adopt mobile phones. This is in line with Taylor and Todd (1995) who found a significant affect word of mouth and intention to adopt mobile phones are not supported in Thailand's model, while they are statistically significant in Korea. Empirically, Rogers (1995) argued that although advertising might be important in the initial stages of information of subjective norm on intention to adopt IT products.

It is also interesting to note that the relationships between word of mouth and usefulness; and between dissemination, the main mechanism driving innovation diffusion after product takeoff was word of mouth. Similarly, Goldenberg et al.'s (2002) findings on the word of mouth process revealed that the major role of marketing efforts in the initial stage of the process diminished after 16% of the market became informed. When the information dissemination reached the halfway mark (i.e., 50% of all individual were informed), the impact of the marketing efforts diminished further, and word of mouth became the main force propelling the process.

According to the International Telecommunication Union, the penetration rate of mobile phones per 100 inhabitants in Korea recorded 69.37, compared to only

26.04 in Thailand (ITU, 2002). In terms of the rate of growth for mobile subscribers

from 1998 to 2003, Thailand saw a higher growth rate of 71.3%, compared to 59.5%

in Korea. Accordingly, it can be inferred from the statistics that Korea mobile phones

market may be in the saturation stage with users growing at a slower pace, while the

Thai mobile phone market remains in the early stage of adoption, with the number of

subscribers growing at an increasing rate (see Table 5.12).

Table 5.12: A comparative Summary of Mobile Phone Users in Korea and Thailand

Country	Cellular Mobile Subscribers			
	Year 1998 (million)	Year 2003 (million)	Per 100 inhabitants in 2003	As % of total mobile subscribers in 2003
Korea	14.018	33.591	69.37	59.5
Thailand	1.977	16.117	26.04	71.3

Source: Paul Budde. (2004). Thailand-key statistics telecommunications market and

regulatory overview. Paul Budde Communication Pty Ltd, 2004.

In short, as Thailand is still at the early stage of mobile phone adoption, word

of mouth process may not have a direct impact on the intention to adoption mobile

phones. On the other side of the coin, as Korea is considered operating in the later

stages of ICT dissemination, Korean respondents may experience that word of mouth

process directly affects their intention to adopt mobile phones. With Thailand's

mobile phone penetration rate considered at the lower score than Korea, the

information (channel through media such as advertising) on usefulness of mobile

phone is not yet well exposed in Thailand. Therefore, Thai respondents may perceive

that massive advertising create awareness for mobile phone's usefulness in contrast to

Korea respondents.

For the study of the post intention to continuance adoption of mobile phones,

the findings indicate that the relationship between content and intention to

continuance adoption of mobile phone is supported in Thailand's model, as opposed

to the reverse result in Korea's model. The reason that content did not influence the

continuance adoption of mobile phones is due to the fact that most Korean

respondents may use their mobile phones primarily to communicate with each other

(Lee, S.G., 2003). As such, Korean respondents perceived that content is not a key

determinant for continuous usage of mobile phones.

With the booming GPRS technology via mobile operators, many contents are

presently available for Thai mobile phone users, e.g., mobile game, mobile karaoke,

mobile ticketing, to name a few. Therefore, Thai respondents, especially university

students, may perceive that content has become part of their daily activities and is a

key determinant for continuous usage of mobile phones. Table 5.13 provides a

comparative summary of the findings on the relationship between determinants and

the post intention to adopt mobile phone in Thailand and Korea.

Table 5.13 Comparative Summary of the Findings on the Relationship between

Determinants and the Post Intention to Adopt Mobile Phone in Thailand

and Korea

Hypothesis B	Relationship	Developing Country - Thailand		Developed Country - Korea	
		Significant Value	Results (support-yes/ not support -no)	Significant Value	Results (support-yes/ not support - no)
HB1	Usability positively affects the intention to continue adopting mobile phones.	0.204	Yes	0.382	Yes
HB2	Mobility positively affects the intention to continue adopting mobile phones.	0.317	Yes	0.255	Yes
HB3	The quality of content positively affects the intention to continue adopting mobile phones.	0.303	**Yes**	0.033	**No**

CHAPTER SIX

CONCLUSION

The last chapter of this dissertation presents a summary of the research,

including a review of the purpose of the study, the research methodology, and the

findings. It also addresses the contribution and limitations of the study, as well as

suggestions for future research.

6.1   Summary of the Study

In this study, two research models based on TAM and post acceptance model

are proposed to investigate the relationship between the initial and the continual

acceptance factors of mobile technologies and user' intention to use mobile phones.

In terms of the initial adoption, the first research model proposed eleven

hypotheses to examine the relationship between determinant factors and the initial

intention to adopt mobile phones. The research methodology deployed is a survey.

Data were collected from graduate students at a private university in Thailand as they

represent both current and potential users of mobile phones and mobile services.

Statistical analysis using path analysis via LISREL 8 is applied in data interpretation.

The findings indicated that ease of use, subjective norm, and mass advertising

exhibited direct relationships with the intention to initial adoption of mobile

technologies, with the exception of self-efficacy, usefulness and word of mouth. In addition, subjective norm and mass advertising indirectly affect intention to initial adoption through usefulness.

The second research model investigated the relationship between the intention to continuance adoption and satisfaction determinants. The study developed three hypotheses to answer the research question. Statistical analysis using multiple regressions was employed. The results revealed that all constructs, namely usability, mobility, and content strongly affected the intention to continuance adoption. Also, the study revealed that mobility is considered the most important significant determinant. In conclusion, Thai respondents perceived that content, mobility, and usability are the significant elements to having satisfaction customers to continue using mobile phones. The findings of all hypotheses testing in this study are summarized in Table 6.1.

Table 6.1: Summary of Hypotheses Tests

Hypotheses	Statistically Significant - Supported-Yes - Not Supported-No
Research Model A HA1: Self-efficacy will have a positive direct affect on perceived ease of use of mobile phones.	Yes
HA8: Self-efficacy will be a significant predictor of intention to adopt mobile phones.	No
HA2: Perceived ease of use will have a positive direct affect on perceived usefulness of mobile phones.	Yes
HA7: Perceived ease of use will be a significant predictor of intention to adopt mobile phones.	Yes
HA3: Positive subjective norm will have a direct affect on perceived usefulness of mobile phones.	Yes
HA9: Positive subjective norm will be a significant predictor of intention to adopt mobile phones.	Yes
HA4: A positive word-of-mouth will have a direct affect on perceived usefulness of mobile phones.	**No**
HA10: A positive word-of-mouth will be a significant predictor of intention to adopt mobile phones.	**No**
HA5: Effective advertising will have a positive affect on perceived usefulness of mobile phones.	Yes
HA11: Effective advertising will be a significant predictor of intention to adopt mobile phones.	Yes
HA6: Perceived usefulness will be a significant predictor of intention to adopt mobile phones.	No
Research Model B HB1: Usability positively affects the intention to continue adopting mobile phones.	Yes
HB2: Mobility positively affects the intention to continue adopting mobile phones	Yes
HB3: The quality of content positively affects the intention to continue adopting mobile phones.	Yes

Finally, the comparative study of the findings of the research questions for both models between Korea and Thailand was conducted. Comparatively, the results of both Thailand and Korea yielded some interesting findings on the relationship between initial intention to adopt and determinant factors. For Korea, self-efficacy and subjective norm are not significant factors for the intention of initial adoption of mobile phones. In contrast, usefulness, word of mouth and self-efficacy are the factors that are not significant to the intention of initial adopting mobile phones in Thailand. In addition, Thai respondents perceived that subjective norm and mass advertising indirectly affect intention to initial adoption through usefulness. On the other hand, Korea respondents perceived that subjective norm, word of mouth, and mass advertising indirectly affected the intention to initial adoption through usefulness.

For the second research model, it is interesting to find that content has no direct relationship to the intention to continuous adoption of mobile phones in Korea. However, it is noted that Thai respondents perceived content as a critical element to encourage customers to continue using mobile phones. Similarly, the respondents from both countries (Korea and Thailand) perceived that usability and mobility determinants are key motivators that affect the intention to post adoption of mobile phones.

6.2   Contributions of Research

This study makes several contributions in terms of theoretical implications and practical implication as follows.

Theoretical Implication

This study suggests a new framework for ICT adoption in Thailand. The results report that intention for initial adoption is affected by usefulness channeled through subjective norm and advertising. Interestingly, the results also suggest that word of mouth has a negative affect on intention for the initial adoption of mobile phones in Thailand, while word of mouth has a positive effect on intention for the initial adoption of mobile phones in Korea. Based on previous literature, Rogers (1995) suggested that word of mouth and advertising affects might differ among different market segments. The results indicate that Korea is at the later stage of ICT adoption where word of mouth is the key factor in the initial adoption of mobile phones. On the other hand, Thailand is still at the early stage of ICT adoption where mass advertising is a key factor in the initial adoption of mobile phones.

Also, it is important to note that several MIS researchers have bypassed the importance of integrating other fields of research in their studies. This study integrated the dimension of marketing research with IS research in the areas of

diffusion and innovation studies.

Practical Implication

For the managerial perspective, this research provides new insights to mobile operators for improving their mobile functionalities and features. For instance, mobile phone manufacturer will be able to comprehend reasons for changing mobile phones. With this information, mobile manufacturers will be able to discover the key factors in encouraging the use of mobile phones. Hence, they will strategically plan and design products according to the need of mobile phone users in the market.

With the reference to the intention to initial adoption of mobile phones, the results suggest that word of mouth has a negative affect in Thailand; in contrast, it has a positive affect in Korea. Since both countries yield different results, it is advised that marketing managers should develop strategies to provide effective promotion medias (advertising or word of mouth) for different segments and products.

In addition, it is noted that content is a key driving force in post adoption of mobile technologies in Thailand. Thus, mobile operators need to team up with content providers to develop and launch more attractive contents for the mobile phone users. This is necessary to retain the current mobile subscribers and to capture additional market share of mobile phone subscribers.

6.3   Limitations of Research and Suggestions for Future Study

As with any study, several limitations are imposed on this research. First,

mobile phones are not the representative of all ICT devices. To obtain consistent

results, the study should include as many ICT devices as possible. Second, the target

population was mostly college students. Since the characteristics of mobile phone

users may be different from their age, education, economic status and work

experience, data collection should be done from a wide range of respondent groups

for improving generalizability of the study results, and it may also increase external

validity of this study. Third, there may be other individual and system variables that

may affect the intention to use mobile phones, and may enhance our understanding of

the ICT diffusion process. Fourth, a longitudinal study that measures the diffusion

stage in key variables in terms of their relationships to behavioral intention for ICT

adoption may shed more light on the ICT diffusion process.

Despite the limitations described above, this research makes contribution to

ICT innovation literature, especially in developed and developing countries for future

research. For future research, the research framework used in this study should be

conducted in other developed and developing countries to discover other valuable

information that may make further contribution to ICT literature.

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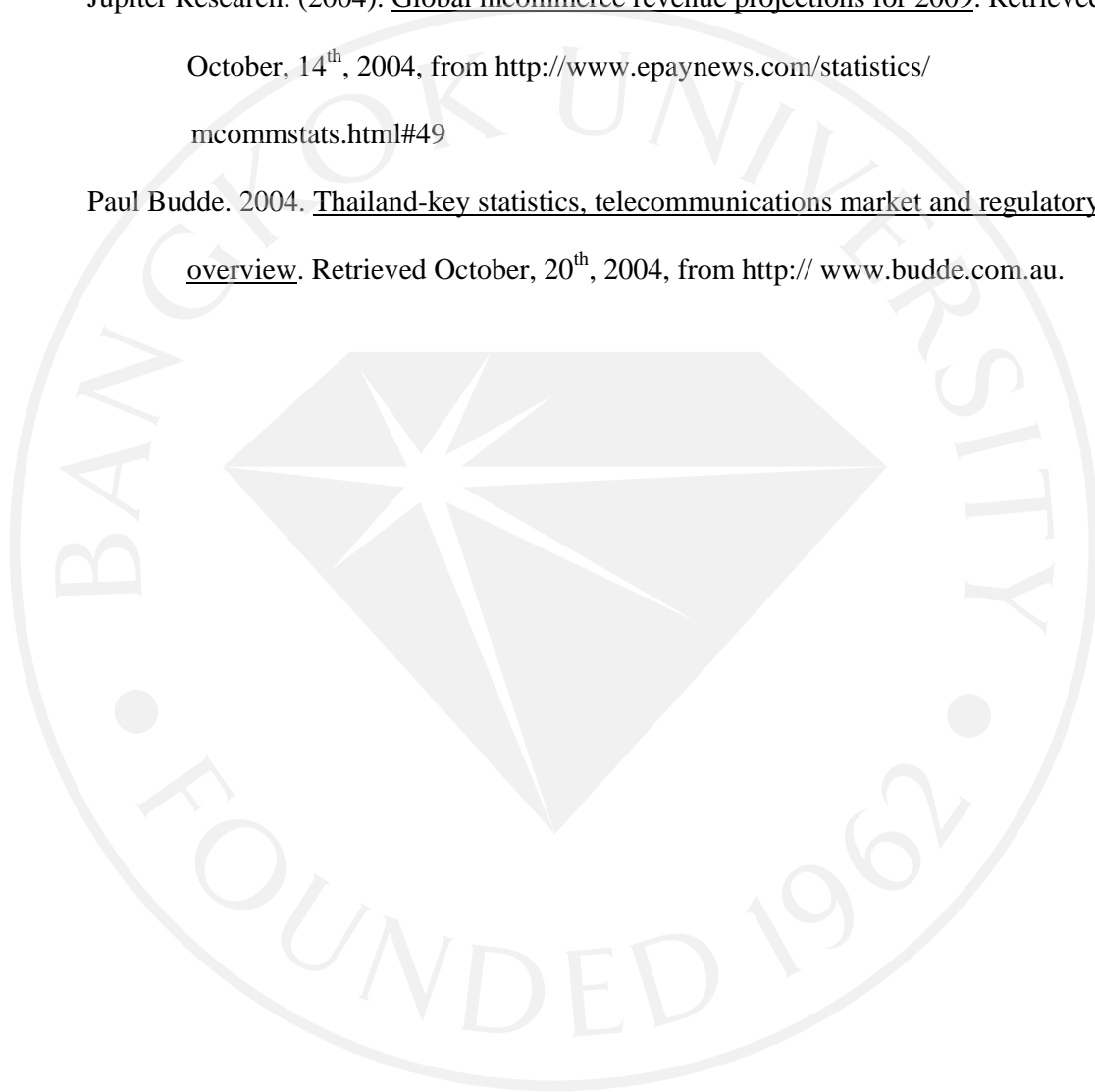
APPENDIX

Appendix A: The Survey Questionnaire

<div align="right">March 22, 2004</div>

Dear Respondents:

The Department of Management of the University of Nebraska-Lincoln is conducting a short survey research regarding adoption of the mobile phone. The purpose of this survey is to analyze how the initial decision of a customer to use the mobile phone affects his/her continuous use. It takes less than 10 minutes to answer the questions. Please fill out and return it to us as soon as possible.

The data will be held in strict confidence. No reference will be made to the information of individual respondents in any report. Only aggregated and summarized information will be reported. If you would like a copy of the final report of this study, please let us know. We will be happy to send you a copy by email.

Your cooperation will be greatly appreciated.

Sincerely yours,

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Survey on Mobile Phone Adoption and Diffusion

I. Individual Information

1. Please indicate your occupation.

Agriculture, Forestry, and Fishing	( )	**Mining**	( )
Building and Construction	( )	**Manufacturing**	( )
Telecommunication	( )		
Finance, Insurance, and Real Estate	( )	**Services**	( )
Public Administration, Healthcare	( )	**other** ----------------------------	

If you are a fulltime student,

Undergraduate Student　　( )　　**Fulltime Graduate Student**　　( )

2. When did you acquire your first mobile phone?

(　　　) year (　　　) month　**(Please fill this question out, even if an approximate date)**

3. How many times have you changed your mobile phones?

(　　） times **(Please fill this question out, even if approximate times)**

If changed, why did you change your product(s)? (multiple choice)

------(1) bad connection　　------(2) bad voice quality　　------(3) old-fashioned design

------(4) bulky size　　　------(5) out of order　　　------ (6) lost　　(7)other -------------------------
-----

4. How many times have you changed your mobile phone company?

(　　　) times

If yes, why did you change the company? (multiple choice)

------ (1) better price offer　　------ (2) limited access area　------ (3) bad voice quality

------ (4) bad customer service　------ (5) no longer needed　　(6) free cell phone plan　(7) other -------------

5. Now, what kind of mobile phone do you have?

product brand name (　　　　　　　　) such as Nokia, Samsung, LG , etc.

wireless company　　(　　　　　　　　) such as AIS, DTAC, ORANGE, and HUTCH

6. What is your Age: (　　) years

7. Gender: male (　　)　**female** (　　)

8. email address:_____

II Reasons for using the mobile phone (<u>Before you use mobile phone</u>)

The following questions are about your perception or opinions on the mobile phone. There is no right or wrong answer. Simply circle the number coming closest to your opinion.

(1=strongly disagree 3 = neutral 5= strongly agree)

I believe a mobile phone would help me do my job better	1 2 3 4 5
I think that a mobile phone would improve some of my task performance	1 2 3 4 5
I believe advantages of using a mobile phone would outweigh disadvantages	1 2 3 4 5
I think that mobile phones are easy to use	1 2 3 4 5
I believe that mobile phones are easy to use to send messages	1 2 3 4 5
I think that mobile phones are easy to learn how to use	1 2 3 4 5
I am comfortable using a mobile phone	1 2 3 4 5
If I want, I can easily operate any of the functions on my mobile phone	1 2 3 4 5
I believe I can use the functions on my mobile phone even if there is no one around to show me how to use it	1 2 3 4 5
People who influence what I do on my job think I should use a mobile phone	1 2 3 4 5
People who are important to me think I should use a mobile phone	1 2 3 4 5
My friends or acquaintances tell me that a mobile phone is necessary	1 2 3 4 5
My friends or acquaintances tell me that a mobile phone is helpful in daily life	1 2 3 4 5
While watching TV or newspapers ads on mobile phones;	
I feel that mobile phones are necessary	1 2 3 4 5
I feel that mobile phones are fashionable	1 2 3 4 5
I feel that mobile phones are attractive	1 2 3 4 5
I intend (ed) to use a mobile phone some day	1 2 3 4 5
I intend (ed) to buy a mobile phone some day	1 2 3 4 5

Do you own mobile phone? ------ (Yes)   ------ (No)

III Satisfaction with the mobile phone <u>(After you use mobile phone)</u>

The following questions are about your experience in using your own mobile phone. There is no right or wrong answer. Simply circle the number coming closest to your opinion. <u>Please respond the questions below if you use a mobile phone.</u>

(1=strongly disagree 3 = neutral 5= strongly agree; N/A: not applicable)

I accomplish some of my daily tasks using a mobile phone	1 2 3 4 5 (N/A)
I like to use a mobile phone on my daily tasks	1 2 3 4 5 (N/A)
I am satisfied with using mobile phones in my daily task	1 2 3 4 5 (N/A)

(1=strongly dissatisfied 3 = neutral 5= strongly satisfied; N/A: not applicable)

I am satisfied with my mobile phone's connection with other networks at any time or place	1 2 3 4 5 (N/A)
I am satisfied with the size of my mobile phone	1 2 3 4 5 (N/A)
I am satisfied with my mobile phone's weight	1 2 3 4 5 (N/A)
I am satisfied with my mobile phone's voice quality	1 2 3 4 5 (N/A)
I am satisfied with my mobile phone's connection with Internet or email	1 2 3 4 5 (N/A)
I am satisfied with my mobile phone's functions, such as down loading music, e-payment, notice of my schedule	1 2 3 4 5 (N/A)
I am satisfied with my mobile phone's security system in m-payment in m-transactions such as e-remittance or e-payment	1 2 3 4 5 (N/A)
I am satisfied with my mobile phone's telesecurity	1 2 3 4 5 (N/A)
I am satisfied with my mobile phone company's privacy information protection	1 2 3 4 5 (N/A)
Overall, I am satisfied with my own mobile phone	1 2 3 4 5 (N/A)
Overall, I enjoy my mobile phone	1 2 3 4 5 (N/A)

(1=strongly disagree 3 = neutral 5= strongly agree; N/A: not applicable)

I intend to continuously use mobile phones	1 2 3 4 5 (N/A)

Thank you very much for participating in this survey.

แบบสอบถามความคิดเห็น

22 มีนาคม 2547

เรียนท่านผู้ตอบแบบสอบถาม:

เนื่องด้วยทางคณะบริหารจัดการแห่งมหาวิทยาลัย Nebraska-Lincoln ได้จัดทำการสำรวจความคิดเห็นสำหรับงานวิจัยเรื่องการยอมรับโทรศัพท์มือถือ โดยมีจุดประสงค์เพื่อศึกษาและวิเคราะห์ความสำคัญของการตัดสินใจใช้โทรศัพท์มือถือจากความรู้สึกและประสบการณ์ในการใช้ในครั้งแรก ทางคณะผู้จัดทำใคร่ขอความร่วมมือจากท่านในการตอบแบบสอบถามชุดนี้ซึ่งใช้เวลาไม่เกิน 10 นาทีในการตอบแบบสอบถาม

ข้อมูลต่างๆ ในแบบสอบถามนี้ใช้เพื่อทำงานวิจัยเท่านั้น และจะไม่มีการนำไปเผยแพร่ที่ใดทั้งสิ้น หากท่านต้องการทราบผลการวิจัย กรุณาแจ้งความจำนงของท่านมายังคณะผู้จัดทำ

ขอขอบคุณทุกท่านที่ให้ความร่วมมือ

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<u>แบบสอบถามความคิดเห็นในการตัดสินใจใช้หรือไม่ใช้โทรศัพท์มือถือ</u>

I. **ข้อมูลส่วนบุคคล** (กรุณาทำเครื่องหมายกากบาท "X")

1. กรุณาระบุอาชีพของท่าน

   เกษตรกรรม/อาหารและเครื่องดื่ม ( )   อสังหาริมทรัพย์และก่อสร้าง ( )

   อุปโภค/ บริโภค ( )   พลังงาน ( )

   สถาบันการเงิน ( )   บริการ ( )

   อุตสาหกรรม ( )   อื่นๆ (โปรดระบุ)_____( )

2. ระดับการศึกษา

   อนุปริญญา ( )   ในกรณีศึกษาอยู่ (โปรดระบุ)

   ปริญญาตรี ( )   - ปริญญาโท Full-time ( )

   ปริญญาโท ( )   - ปริญญาโท Part-time ( )

   สูงกว่าปริญญาโท ( )   - อื่นๆ (โปรดระบุ)_____

3. ท่านอายุเท่าไหร่? ( ) ปี

4. เพศ: ชาย ( )   หญิง ( )

5. ท่านซื้อโทรศัพท์มือถือเครื่องแรกของท่านเมื่อใด?

   ( ) ปีพ.ศ.ที่ซื้อ   ( ) เดือนที่ซื้อ (หากท่านจำไม่ได้กรุณาระบุปีและเดือนคร่าวๆ)

6. ท่านเปลี่ยนโทรศัพท์มือถือของท่านกี่ครั้ง ?

   ( ) ครั้ง (<u>กรุณาระบุจำนวนครั้งคร่าวๆ</u>)   ( )ไม่เคย (ข้ามไปข้อ7)

   กรุณาระบุเหตุผลที่ท่านเปลี่ยนโทรศัพท์มือถือ ? (สามารถเลือกได้มากกว่า 1 ข้อ)

   ------(1) สัญญาณไม่ดี   ------(2) คุณภาพเสียงไม่ดี

   ------(3) รูปลักษณ์โทรศัพท์ล้าสมัย ------(4) ขนาดใหญ่เกินไป ------(5) เครื่องชำรุด

   ------(6) สูญหาย ------(7) อื่นๆ (โปรดระบุ)_____

7. ท่านเปลี่ยนบริษัทเครือข่ายโทรศัพท์มือถือกี่ครั้ง ?

   ( ) ครั้ง (<u>กรุณาระบุจำนวนครั้งคร่าวๆ</u>)   ( )ไม่เคย (ข้ามไปข้อ8)

   กรุณาระบุเหตุผลที่ท่านเปลี่ยนเครือข่ายโทรศัพท์มือถือ ? (สามารถเลือกได้มากกว่า 1 ข้อ)

   ------ (1) อัตราค่าบริการถูกกว่าเดิม   ------ (2) เครือข่ายสัญญาณมีจำกัด

   ------ (3) คุณภาพเสียงไม่ดี   ------ (4) บริการหลังการขายไม่ดี

------ (5) ไม่จำเป็นต้องใช้   ------ (6) บริการเสริมพิเศษ

------ (7) อื่นๆ (โปรดระบุ)_____

8.   ท่านใช้บริการมือถือยี่ห้อ และ เครือข่ายใด ?

มือถือยี่ห้อ   ------ (1) Nokia   ------ (2) Samsung ------ (3) Ericsson

                  ------ (4) Motorola ------ (5) Panasonic   ------ (6) อื่นๆ(โปรระบุ)

ผู้ให้เครือข่าย   ------ (1) AIS   ------ (2) DTAC   ------ (3) ORANGE

                  ------ (4) HUTCH

II.   เหตุผลในการใช้โทรศัพท์มือถือ <u>(ก่อนที่ท่านจะใช้โทรศัพท์มือถือ)</u>

คำถามต่อไปนี้แสดงถึง**ความคิดเห็น**ของท่านในการตัดสินใจใช้โทรศัพท์มือถือ

กรุณาวงกลม "O" เลข 1 ถึง 5 ที่ใกล้เคียงกับความคิดเห็นของท่านมากที่สุด

(1 = ไม่เห็นด้วยมากที่สุด 2 = ไม่เห็นด้วย 3 = เฉยๆ 4 = เห็นด้วยมาก 5 = เห็นด้วยมากที่สุด)

ท่านเชื่อว่าโทรศัพท์มือถือสามารถช่วยให้ท่านทำงานของท่านได้ดีขึ้น	**1**	**2**	**3**	**4**	**5**
ท่านคิดว่าโทรศัพท์มือถือช่วยเพิ่มผลงานในการทำงานของท่าน	1	2	3	4	5
ท่านคิดว่าการใช้โทรศัพท์มือถือมีข้อดีมากกว่าข้อเสีย	1	2	3	4	5
ท่านคิดว่าโทรศัพท์มือถือง่ายต่อการใช้งาน	1	2	3	4	5
ท่านคิดว่าโทรศัพท์มือถือง่ายในการส่งข้อความ	1	2	3	4	5
ท่านคิดว่าวิธีในการใช้โทรศัพท์มือถือเป็นเรื่องง่าย	1	2	3	4	5
ท่านสามารถใช้โทรศัพท์ได้อย่างคล่องแคล่ว	1	2	3	4	5
ท่านคิดว่าท่านสามารถใช้คำสั่งต่างๆบนโทรศัพท์มือถือของท่านได้ครบทุกคำสั่ง	1	2	3	4	5
ท่านคิดว่าท่านสามารถใช้คำสั่งต่างๆบนโทรศัพท์มือถือของท่านได้ครบทุกคำสั่งแม้ว่าไม่มีใครสาธิตวิธีการใช้ให้ท่านดู	1	2	3	4	5
สังคมในปัจจุบันนี้มีอิทธิพลต่อการใช้โทรศัพท์มือถือของท่าน	1	2	3	4	5
สังคมในปัจจุบันนี้มีอิทธิพลสำคัญต่อการใช้โทรศัพท์มือถือของท่าน	1	2	3	4	5
คำบอกเล่าของเพื่อนและบุคคลทำให้ท่านต้องใช้โทรศัพท์มือถือ	1	2	3	4	5
คำบอกเล่าของเพื่อนและบุคคลทำให้ท่านเชื่อว่าการใช้โทรศัพท์มือถือนั้นมีประโยชน์ในชีวิตประจำวัน	1	2	3	4	5

ขณะที่ท่านดูโฆษณาโทรศัพท์มือถือทางโทรทัศน์หรือทางหนังสือพิมพ์นั้น:

- ท่านรู้สึกว่าโทรศัพท์มือถือเป็นสิ่งจำเป็น	1	2	3	4	5
- ท่านรู้สึกว่าการใช้โทรศัพท์มือถือตามกระแสนิยม	1	2	3	4	5
- ท่านรู้สึกว่าโทรศัพท์มือถือน่าสนใจ	1	2	3	4	5
ท่านตั้งใจจะใช้โทรศัพท์มือถือ	1	2	3	4	5
ท่านตั้งใจจะซื้อโทรศัพท์มือถือ	1	2	3	4	5

III. ความพึงพอใจในการใช้โทรศัพท์มือถือ(หลังจากที่ท่านใช้โทรศัพท์มือถือ)

คำถามต่อไปนี้เกี่ยวกับความพึงพอใจของท่านหลังจากใช้โทรศัพท์มือถือ กรุณาวงกลม "O" เลข 1 ถึง 5 ที่ใกล้เคียงกับความคิดเห็นของท่านมากที่สุด (1 = น้อยมาก 2 = ค่อนข้างน้อย 3 = ปานกลาง 4 = ค่อนข้างมาก 5 = มากที่สุด; N/A = ไม่เกี่ยวข้อง)

ท่านสามารถทำงานประจำวันบางอย่างได้โดยผ่านโทรศัพท์มือถือ	1	2	3	4	5	N/A
ท่านชอบใช้โทรศัพท์มือถือในการทำงานประจำวัน	1	2	3	4	5	N/A
ท่านพอใจกับการใช้มือถือในการทำงานในชีวิตประจำวัน	1	2	3	4	5	N/A
ท่านรู้สึกพอใจในคุณภาพสัญญาณของโทรศัพท์มือถือของท่านในการติดต่อกับเครือข่ายอื่นทุกเวลาทุกสถานที่	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับขนาดของโทรศัพท์มือถือของท่าน	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับน้ำหนักโทรศัพท์มือถือของท่าน	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับคุณภาพเสียงของโทรศัพท์มือถือของท่าน	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับการใช้งาน Internet และ e-mail โดยผ่านโทรศัพท์มือถือของท่าน	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับคำสั่งต่างๆบนโทรศัพท์มือถือของท่านเช่นการดาวน์โหลดเพลง การชำระเงินผ่านโทรศัพท์มือถือ การแจ้งตารางเวลาของท่าน	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับระบบความปลอดภัยของโทรศัพท์มือถือของท่านในการทำธุรกรรมทางการเงินผ่านโทรศัพท์มือถือ เช่นการโอนเงิน หรือ การชำระเงินผ่านโทรศัพท์มือถือ	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับระบบรักษาความปลอดภัยในการใช้โทรศัพท์มือถือ (Telesecurity)	1	2	3	4	5	N/A
ท่านรู้สึกพอใจกับนโยบายการรักษาข้อมูลส่วนบุคคลของผู้ให้บริการโทรศัพท์มือถือ	1	2	3	4	5	N/A
กล่าวโดยรวมท่านรู้สึกพอใจกับโทรศัพท์มือถือของท่าน	1	2	3	4	5	N/A
กล่าวโดยรวมท่านรู้สึกสนุกกับการใช้โทรศัพท์มือถือ	1	2	3	4	5	N/A
ท่านตั้งใจจะใช้โทรศัพท์มือถือต่อไป	1	2	3	4	5	N/A

ขอขอบคุณทุกท่านที่ให้ความร่วมมือ

Appendix B: Data Analysis

DATE: 8/ 7/2004
TIME: 0:45

L I S R E L 8.51

BY

Karl G. J"reskog & Dag S"rbom

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The following lines were read from file D:\¿¬±¸¹æ¹ý·Ð\Thaiint.LS8:

title Barriers thai-initial
observed variables usef1 usef2 usef3 ease1 ease2 ease3 effi1 effi2 effi3
subn1 subn2 wom1 wom2 adv1 adv2 adv3 int1 int2
covariance matrix
.776
.609 .884
.405 .430 .654
.234 .187 .226 .601
.131 .120 .140 .388 .851
.151 .092 .170 .461 .448 .791
.227 .182 .170 .318 .365 .378 .825
.096 .098 .017 .199 .406 .291 .513 1.118
.101 .102 .029 .223 .387 .359 .601 .908 1.299
.185 .176 .200 .220 .216 .190 .229 .105 .145 .745
.236 .264 .249 .239 .266 .187 .214 .152 .175 .649 .902
.098 .177 .123 .044 .153 .073 .120 .145 .098 .295 .428 1.196
.154 .175 .167 .073 .148 .043 .112 .086 .097 .301 .385 .960 1.249
.254 .302 .245 .134 .248 .126 .157 .224 .154 .297 .378 .455 .481 .959
-.041 .066 .019 .029 .055 .045 -.059 -.127 -.091 .205 .242 .397 .330 .255 1.146

.160 .136 .190 .200 .193 .187 .125 .122 .103 .210 .254 .250 .277 .378 .312 .704
.253 .243 .255 .277 .207 .231 .237 .149 .168 .306 .331 .142 .178 .327 .183 .307 .761
.192 .255 .222 .208 .280 .190 .224 .308 .253 .370 .429 .274 .238 .387 .230 .374 .549
1.051

sample size 342
latent variables: use ease effi subn wom adv int
relationships:
usef1 usef2 usef3 = use
ease1 ease2 ease3 = ease
effi1 effi2 effi3 = effi
subn1 subn2 = subn
wom1 wom2 = wom
adv1 adv2 adv3 = adv
int1 int2 = int

ease = effi
use = ease subn adv wom
int = use ease effi subn adv wom

path diagram
options mi ad=off
method of Estimation: Maximum Likelihood
End of Program

Sample Size =   342

Barriers thai-initial

    Covariance Matrix

	usef1	usef2	usef3	ease1	ease2	ease3
usef1	0.78					
usef2	0.61	0.88				
usef3	0.41	0.43	0.65			
ease1	0.23	0.19	0.23	0.60		
ease2	0.13	0.12	0.14	0.39	0.85	
ease3	0.15	0.09	0.17	0.46	0.45	0.79
int1	0.25	0.24	0.26	0.28	0.21	0.23
int2	0.19	0.26	0.22	0.21	0.28	0.19
effi1	0.23	0.18	0.17	0.32	0.36	0.38
effi2	0.10	0.10	0.02	0.20	0.41	0.29
effi3	0.10	0.10	0.03	0.22	0.39	0.36
subn1	0.18	0.18	0.20	0.22	0.22	0.19
subn2	0.24	0.26	0.25	0.24	0.27	0.19
wom1	0.10	0.18	0.12	0.04	0.15	0.07

wom2	0.15	0.17	0.17	0.07	0.15	0.04
adv1	0.25	0.30	0.24	0.13	0.25	0.13
adv2	-0.04	0.07	0.02	0.03	0.06	0.04
adv3	0.16	0.14	0.19	0.20	0.19	0.19

Covariance Matrix

	int1	int2	effi1	effi2	effi3	subn1
int1	0.76					
int2	0.55	1.05				
effi1	0.24	0.22	0.82			
effi2	0.15	0.31	0.51	1.12		
effi3	0.17	0.25	0.60	0.91	1.30	
subn1	0.31	0.37	0.23	0.10	0.14	0.74
subn2	0.33	0.43	0.21	0.15	0.17	0.65
wom1	0.14	0.27	0.12	0.14	0.10	0.29
wom2	0.18	0.24	0.11	0.09	0.10	0.30
adv1	0.33	0.39	0.16	0.22	0.15	0.30
adv2	0.18	0.23	-0.06	-0.13	-0.09	0.20
adv3	0.31	0.37	0.13	0.12	0.10	0.21

Covariance Matrix

	subn2	wom1	wom2	adv1	adv2	adv3
subn2	0.90					
wom1	0.43	1.20				
wom2	0.39	0.96	1.25			
adv1	0.38	0.46	0.48	0.96		
adv2	0.24	0.40	0.33	0.26	1.15	
adv3	0.25	0.25	0.28	0.38	0.31	0.70

Barriers thai-initial

Number of Iterations = 10

LISREL Estimates (Maximum Likelihood)

Measurement Equations

usef1 = 0.74*use, Errorvar.= 0.21 , Rý = 0.73
                        (0.032)
                        6.45

usef2 = 0.79*use, Errorvar.= 0.25 , Rý = 0.71
   (0.052)   (0.037)
    15.10   6.80

usef3 = 0.54*use, Errorvar.= 0.35 , Rý = 0.45
   (0.043)   (0.031)
    12.66   11.23

ease1 = 0.62*ease, Errorvar.= 0.21 , Rý = 0.65
             (0.027)
             7.82

ease2 = 0.63*ease, Errorvar.= 0.45 , Rý = 0.47
   (0.053)   (0.042)
    12.06   10.63

ease3 = 0.73*ease, Errorvar.= 0.26 , Rý = 0.67
   (0.054)   (0.036)
    13.51   7.39

int1 = 0.68*int, Errorvar.= 0.28 , Rý = 0.62
             (0.039)
             7.29

int2 = 0.78*int, Errorvar.= 0.42 , Rý = 0.59
   (0.067)   (0.053)
    11.54   7.93

effi1 = 0.62*effi, Errorvar.= 0.44 , Rý = 0.47
   (0.046)   (0.039)
    13.51   11.27

effi2 = 0.89*effi, Errorvar.= 0.33 , Rý = 0.70
   (0.050)   (0.044)
    17.56   7.55

effi3 = 0.99*effi, Errorvar.= 0.31 , Rý = 0.76
   (0.054)   (0.051)
    18.50   6.17

subn1 = 0.72*subn, Errorvar.= 0.22 , Rý = 0.70
   (0.042)   (0.033)
    17.11   6.84

subn2 = 0.90*subn, Errorvar.= 0.096 , Rý = 0.89

(0.045)   (0.043)
19.93   2.22

wom1 = 0.98*wom, Errorvar.= 0.23 , Rý = 0.81
   (0.054)   (0.060)
    18.15   3.78

wom2 = 0.98*wom, Errorvar.= 0.30 , Rý = 0.76
   (0.056)   (0.061)
    17.50   4.89

adv1 = 0.71*adv, Errorvar.= 0.46 , Rý = 0.52
   (0.054)   (0.053)
    13.13   8.63

adv2 = 0.45*adv, Errorvar.= 0.94 , Rý = 0.18
   (0.062)   (0.077)
    7.20   12.28

adv3 = 0.54*adv, Errorvar.= 0.42 , Rý = 0.41
   (0.046)   (0.040)
    11.54   10.42

Structural Equations

use = 0.19*ease + 0.17*subn - 0.10*wom + 0.34*adv, Errorvar.= 0.78 , Rý = 0.22
  (0.061)   (0.079)   (0.088) (0.11)   (0.096)
   3.09   2.12   -1.17   2.97   8.21

ease = 0.53*effi, Errorvar.= 0.72 , Rý = 0.28
  (0.064)   (0.096)
   8.34   7.49

int = 0.070*use + 0.16*ease + 0.077*effi + 0.22*subn - 0.31*wom + 0.72*adv,
Errorvar.= 0.34 , Rý = 0.66
  (0.070)   (0.070)   (0.072)   (0.079)   (0.094) (0.13)   (0.085)
   1.00   2.29   1.07   2.84   -3.31   5.56   4.03

Reduced Form Equations

use = 0.10*effi + 0.17*subn - 0.10*wom + 0.34*adv, Errorvar.= 0.81, Rý = 0.19
  (0.034)   (0.079)   (0.088)   (0.11)
   2.96   2.12   -1.17   2.97

ease = 0.53*effi + 0.0*subn + 0.0*wom + 0.0*adv, Errorvar.= 0.72, Rý = 0.28
   (0.064)
    8.34

int = 0.17*effi + 0.24*subn - 0.32*wom + 0.74*adv, Errorvar.= 0.37, Rý = 0.63
   (0.061)   (0.081)   (0.093)   (0.12)
    2.75   2.93   -3.39   6.00

Correlation Matrix of Independent Variables

	effi	subn	wom	adv
effi	1.00			
subn	0.25	1.00		
	(0.06)			
	4.26			
wom	0.13	0.46	1.00	
	(0.06)	(0.05)		
	2.16	9.15		
adv	0.23	0.57	0.63	1.00
	(0.07)	(0.05)	(0.05)	
	3.43	10.57	12.14	

Covariance Matrix of Latent Variables

	use	ease	int	effi	subn	wom
use	1.00					
ease	0.25	1.00				
int	0.42	0.31	1.00			
effi	0.21	0.53	0.36	1.00		
subn	0.34	0.13	0.56	0.25	1.00	
wom	0.20	0.07	0.28	0.13	0.46	1.00
adv	0.39	0.12	0.71	0.23	0.57	0.63

Covariance Matrix of Latent Variables

	adv
adv	1.00

Goodness of Fit Statistics

Degrees of Freedom = 118
Minimum Fit Function Chi-Square = 381.64 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 415.93 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 297.93
90 Percent Confidence Interval for NCP = (239.53 ; 363.92)

Minimum Fit Function Value = 1.12
Population Discrepancy Function Value (F0) = 0.87
90 Percent Confidence Interval for F0 = (0.70 ; 1.07)
Root Mean Square Error of Approximation (RMSEA) = 0.086
90 Percent Confidence Interval for RMSEA = (0.077 ; 0.095)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.00

Expected Cross-Validation Index (ECVI) = 1.53
90 Percent Confidence Interval for ECVI = (1.36 ; 1.72)
ECVI for Saturated Model = 1.00
ECVI for Independence Model = 9.07

Chi-Square for Independence Model with 153 Degrees of Freedom = 3058.51
Independence AIC = 3094.51
Model AIC = 521.93
Saturated AIC = 342.00
Independence CAIC = 3181.53
Model CAIC = 778.17
Saturated CAIC = 1168.75

Normed Fit Index (NFI) = 0.88
Non-Normed Fit Index (NNFI) = 0.88
Parsimony Normed Fit Index (PNFI) = 0.68
Comparative Fit Index (CFI) = 0.91
Incremental Fit Index (IFI) = 0.91
Relative Fit Index (RFI) = 0.84

Critical N (CN) = 140.97

Root Mean Square Residual (RMR) = 0.072
Standardized RMR = 0.086
Goodness of Fit Index (GFI) = 0.88
Adjusted Goodness of Fit Index (AGFI) = 0.83
Parsimony Goodness of Fit Index (PGFI) = 0.61

Barriers thai-initial

Modification Indices and Expected Change

The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
usef2	ease	8.0	-0.12
usef3	int	10.2	0.14
ease1	use	23.6	0.17
ease1	int	11.4	0.13

Modification Indices for LAMBDA-Y

	use	ease	int
usef1	- -	0.79	2.08
usef2	- -	8.03	0.95
usef3	- -	7.36	10.17
ease1	23.60	- -	11.39
ease2	0.23	- -	4.23
ease3	4.76	- -	1.36
int1	4.26	3.33	- -
int2	4.26	3.33	- -

Expected Change for LAMBDA-Y

	use	ease	int
usef1	- -	0.03	-0.07
usef2	- -	-0.12	-0.05
usef3	- -	0.11	0.14
ease1	0.17	- -	0.13
ease2	-0.02	- -	0.10
ease3	-0.09	- -	-0.05
int1	0.12	0.09	- -
int2	-0.13	-0.11	- -

The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
effi1	subn	9.7	0.13
effi3	adv	9.7	-0.16
adv2	effi	16.0	-0.25
adv3	wom	11.8	-0.24

Modification Indices for LAMBDA-X

	effi	subn	wom	adv
effi1	- -	9.71	1.43	4.15
effi2	- -	4.22	0.02	0.01

	effi	subn	wom	adv
effi3	- -	5.34	2.28	9.67
subn1	0.17	- -	2.30	0.00
subn2	0.12	- -	2.30	0.00
wom1	0.33	1.27	- -	0.87
wom2	0.38	1.27	- -	0.87
adv1	3.65	0.67	2.93	- -
adv2	15.97	0.08	5.87	- -
adv3	0.68	1.09	11.79	- -

Expected Change for LAMBDA-X

	effi	subn	wom	adv
	--------	--------	--------	--------
effi1	- -	0.13	0.05	0.09
effi2	- -	-0.09	0.01	0.00
effi3	- -	-0.11	-0.07	-0.16
subn1	0.01	- -	-0.07	0.00
subn2	-0.01	- -	0.08	0.00
wom1	0.03	0.07	- -	-0.10
wom2	-0.03	-0.07	- -	0.10
adv1	0.11	0.07	0.15	- -
adv2	-0.25	0.02	0.21	- -
adv3	0.04	-0.07	-0.24	- -

The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
ease	use	15.0	0.38
ease	int	31.9	0.51

Modification Indices for BETA

	use	ease	int
	--------	--------	--------
use	- -	- -	0.38
ease	14.99	- -	31.86
int	- -	- -	- -

Expected Change for BETA

	use	ease	int
	--------	--------	--------
use	- -	- -	-0.61
ease	0.38	- -	0.51
int	- -	- -	- -

The Modification Indices Suggest to Add the
Path to from   Decrease in Chi-Square   New Estimate

ease	subn	25.4	0.29
ease	adv	18.8	0.28

Modification Indices for GAMMA

	effi	subn	wom	adv
use	0.38	- -	- -	- -
ease	- -	25.36	1.83	18.85
int	- -	- -	- -	- -

Expected Change for GAMMA

	effi	subn	wom	adv
use	-0.05	- -	- -	- -
ease	- -	0.29	0.08	0.28
int	- -	- -	- -	- -

No Non-Zero Modification Indices for PHI

Modification Indices for PSI

	use	ease	int
use	- -		
ease	0.38	- -	
int	- -	- -	- -

Expected Change for PSI

	use	ease	int
use	- -		
ease	0.06	- -	
int	- -	- -	- -

The Modification Indices Suggest to Add an Error Covariance

Between	and	Decrease in Chi-Square	New Estimate
usef2	usef1	15.8	0.31
int1	ease1	13.5	0.07
int1	ease2	8.0	-0.07
effi1	ease1	11.7	0.07
effi2	ease2	10.8	0.09
effi2	int1	8.1	-0.07
effi2	int2	12.5	0.10
effi2	effi1	14.4	-0.17

effi3	ease1	9.6	-0.07
effi3	effi2	72.8	0.77
subn1	effi1	9.7	0.06
adv2	usef1	10.5	-0.10
adv3	usef2	9.3	-0.07

Modification Indices for THETA-EPS

	usef1	usef2	usef3	ease1	ease2	ease3
usef1	- -					
usef2	15.78	- -				
usef3	3.04	1.63	- -			
ease1	3.37	0.38	5.75	- -		
ease2	2.20	0.08	0.13	0.87	- -	
ease3	0.00	5.13	1.55	7.24	2.37	- -
int1	2.58	2.20	2.67	13.49	7.99	0.24
int2	6.84	2.48	0.11	5.64	5.09	1.90

Modification Indices for THETA-EPS

	int1	int2
int1	- -	
int2	- -	- -

Expected Change for THETA-EPS

	usef1	usef2	usef3	ease1	ease2	ease3
usef1	- -					
usef2	0.31	- -				
usef3	-0.07	-0.05	- -			
ease1	0.03	-0.01	0.05	- -		
ease2	-0.03	0.01	-0.01	-0.04	- -	
ease3	0.00	-0.05	0.03	0.13	-0.07	- -
int1	0.03	-0.03	0.04	0.07	-0.07	0.01
int2	-0.06	0.04	-0.01	-0.06	0.07	-0.04

Expected Change for THETA-EPS

	int1	int2
int1	- -	
int2	- -	- -

Modification Indices for THETA-DELTA-EPS

	usef1	usef2	usef3	ease1	ease2	ease3
effi1	4.93	1.64	4.53	11.72	0.00	2.83
effi2	0.16	0.77	5.19	6.52	10.75	3.80
effi3	0.38	0.80	3.15	9.57	0.31	1.23
subn1	0.43	4.69	0.66	1.20	0.68	1.54
subn2	0.43	1.45	0.22	0.78	2.34	1.25
wom1	5.07	4.84	1.37	6.68	0.17	1.77
wom2	2.74	2.05	0.93	1.57	0.01	3.37
adv1	0.19	1.94	0.10	2.86	7.52	0.65
adv2	10.46	2.51	1.22	0.23	0.05	1.67
adv3	0.65	9.32	4.04	4.97	0.22	2.04

Modification Indices for THETA-DELTA-EPS

	int1	int2
effi1	6.79	4.37
effi2	8.10	12.54
effi3	0.44	0.08
subn1	2.10	0.03
subn2	2.92	0.07
wom1	5.15	4.73
wom2	2.17	1.83
adv1	0.38	1.65
adv2	0.00	0.06
adv3	0.80	1.14

Expected Change for THETA-DELTA-EPS

	usef1	usef2	usef3	ease1	ease2	ease3
effi1	0.05	-0.03	0.05	0.07	0.00	0.04
effi2	-0.01	0.02	-0.05	-0.05	0.09	-0.05
effi3	-0.01	0.02	-0.04	-0.07	-0.02	0.03
subn1	0.01	-0.04	0.01	0.02	-0.02	0.02
subn2	-0.01	0.02	0.01	0.01	0.03	-0.02
wom1	-0.05	0.05	-0.03	-0.05	0.01	0.03
wom2	0.04	-0.03	0.02	0.03	0.00	-0.04
adv1	0.01	0.04	0.01	-0.04	0.08	-0.02
adv2	-0.10	0.05	-0.04	-0.01	-0.01	0.04
adv3	0.02	-0.07	0.05	0.05	-0.01	0.03

Expected Change for THETA-DELTA-EPS

	int1	int2

```
           --------   --------
effi1        0.06      -0.06
effi2       -0.07       0.10
effi3       -0.02      -0.01
subn1        0.03       0.00
subn2       -0.04       0.01
 wom1       -0.05       0.06
 wom2        0.04      -0.04
 adv1       -0.02      -0.05
 adv2        0.00       0.01
 adv3        0.02       0.03
```

Modification Indices for THETA-DELTA

```
           effi1     effi2     effi3     subn1     subn2     wom1
          --------  --------  --------  --------  --------  --------
effi1       - -
effi2      14.44       - -
effi3       3.43      72.83      - -
subn1       9.74       5.13      0.29      - -
subn2       1.51       0.07      0.01      0.38      - -
 wom1       0.04       4.75      1.17      4.07      6.98      - -
 wom2       0.07       2.97      1.46      1.52      3.82      0.38
 adv1       0.41       7.25      0.76      0.16      0.22      0.22
 adv2       1.54       6.20      0.10      0.28      0.03      6.57
 adv3       0.03       0.17      0.67      0.03      0.51      3.97
```

Modification Indices for THETA-DELTA

```
           wom2      adv1      adv2      adv3
          --------  --------  --------  --------
wom2        - -
adv1        1.79       - -
adv2        1.36       5.50      - -
adv3        0.03       0.00      6.22       - -
```

Expected Change for THETA-DELTA

```
           effi1     effi2     effi3     subn1     subn2     wom1
          --------  --------  --------  --------  --------  --------
effi1       - -
effi2      -0.17       - -
effi3      -0.09       0.77      - -
subn1       0.06      -0.04     -0.01      - -
subn2      -0.03       0.01      0.00     -0.97      - -
 wom1      -0.01       0.05     -0.03     -0.04      0.06      - -
 wom2       0.01      -0.04      0.03      0.02     -0.04     -7.58
```

```
adv1    -0.02     0.08    -0.03    -0.01     0.01    -0.02
adv2    -0.05    -0.09     0.01     0.01     0.01     0.09
adv3     0.00    -0.01    -0.02     0.00    -0.02    -0.05
```

Expected Change for THETA-DELTA

```
          wom2      adv1      adv2      adv3
        --------  --------  --------  --------
wom2      - -
adv1      0.04      - -
adv2     -0.04     -0.11      - -
adv3      0.00      0.00      0.10      - -
```

Maximum Modification Index is   72.83 for Element (3, 2) of THETA-DELTA

Time used: 0.160 Seconds