Influence of Computer Self-Efficacy On Information Technology Adoption

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ABSTRACT

The main objective of this study is to identify the antecedents as well as the effects of computer self-efficacy on information systems acceptance and use. The study is conducted in the context of social networking sites adoption. 255 respondents from Bangkok, Thailand participated in this research. Structural equation modelling techniques have been employed to analyse the data collected. Results reveal that basic computer knowledge and previous computer experience positively influence an individual's computer self-efficacy as well as their intention to use social networking programs. Results also show that Social factors do not play a major role in improving an individual's computer self-efficacy. Computer self-efficacy is found to be directly influencing perceived usefulness and indirectly influencing intention to use an information system.

Keywords
Social Networking, computer self-efficacy, Information Systems adoption, Computer Anxiety

INTRODUCTION

Self-efficacy has its roots originated from the Social Cognitive Theory (Bandura, 1986) where self-efficacy is defined as one's confidence in his or her abilities to perform a task successfully. Social Cognitive Theory suggests that individuals who have more confidence in their skills and abilities will exert more effort to perform a task, persists longer to overcome any difficulties than those who have less confidence in their abilities (Hasan, 2006). Based on the general concept of self-efficacy, Compeau & Higgins, (1995) defined the concept of Computer Self-Efficacy as one's confidence about his or her abilities to perform a computer related task successfully.

Information systems (IS) researchers have focused on understanding the relationship between computer self-efficacy and various computer related tasks (Fagan & Neill, 2003; Hauser, Paul, & Bradley, 2008; Malliari, 2012). However, few researches have been conducted to study the factors influencing an individual's computer self-efficacy levels. Therefore, one of the objectives of this paper is to investigate the important antecedents of computer self-efficacy. This research work also examines the effect of computer self-efficacy on information technology adoption. One of the most recent advancements of information and communication technologies of this era is the rise and growth of social networking sites. This research work examines the relationship between an individual's self-efficacy and his intention to use social networking sites, too.

SOCIAL NETWORKING SITES

Social networking sites are "online service/platforms that help in building and maintaining social relationships among people with similar interests/activities" (Mital & Sarkar, 2011). Boyd & Ellison, (2007, p.211) defined Social networking Sites as "an internet based application that allows its users to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, (3) view and traverse their list of connections and those made by others within the system".

Social networking sites provide a platform that enables the exchange of pictures, texts, videos, or even hyperlinks to other websites between users with common interests. In order to attract more attention and popularity, most of the SNS started offering online games, virtual property shopping, etc. to entertain their users. The most popular Social Networking sites today are Facebook, Twitter, LinkedIn, Hi5, Tagged, YouTube, and Google Plus. Social networking sites have millions of users and these numbers are growing day by day. In Thailand, today's most popular social networking site "Facebook" has more than 14 Million users.

Due to the recent advancements in the telecommunication technologies such as 3rd Generation mobile services (3G) and its upgrades, it is possible to access the Internet from any mobile devices such as cellular phones, Personal Digital Assistants (PDA), and tablet PCs, etc. According to AIS, the leading mobile phone service provider in Thailand, it is estimated to have nearly 12 Million mobile Internet users in Thailand. Most popular Social Networking Sites among Thai people are Facebook, Twitter, Hi5, Friendster and Google Plus.

The rest of the paper is organized as follows: Firstly, the relevant literature related to computer self-efficacy is reviewed. Then, the conceptual model and hypotheses of this study are presented. Next, the details of the research methodology and the results obtained from the study's empirical investigations are presented. Lastly, the outcomes, implications and limitations of this study are discussed.

LITERATURE REVIEW AND HYPOTHESES

The following sections present the existing literature related to the fields of Computer Self-Efficacy as well as the proposed hypotheses in this research work.

COMPUTER SELF-EFFICACY

Computer self-efficacy construct is based on Bandura's (1977) construct of self-efficacy and its role in Social Cognitive Theory (Bandura, 1986). Self-efficacy is defined as one's confidence in his or her abilities to perform tasks successfully. Self-efficacy by itself is not a measure of one's skills, but represents what the individuals believe they can do based on their abilities or skills. Compeau & Higgins, (1995) later adapted the concept of self-efficacy from Social Cognitive Theory and used in the context of Information Systems which is generally known as computer self-efficacy. Figure 1 illustrates the computer self-efficacy model proposed by Compeau & Higgins, (1995). Compeau & Higgins, (1995) defined computer self-efficacy as "an individual's ability to apply his or her computer skills to a wider range of computer related tasks". Therefore computer self-efficacy represents an individual's perception of his abilities to use computers to perform a task. We can find many similar definitions of computer self-efficacy from previous

literatures. Marakas, Yi, & Johnson, (1998, p.128) defined computer self-efficacy as "an individual's perception of efficacy in performing specific computer related tasks within the domain of general computing". Therefore computer self-efficacy is not about what an individual has done with computers before, but his judgments about what he or she could do in the future.
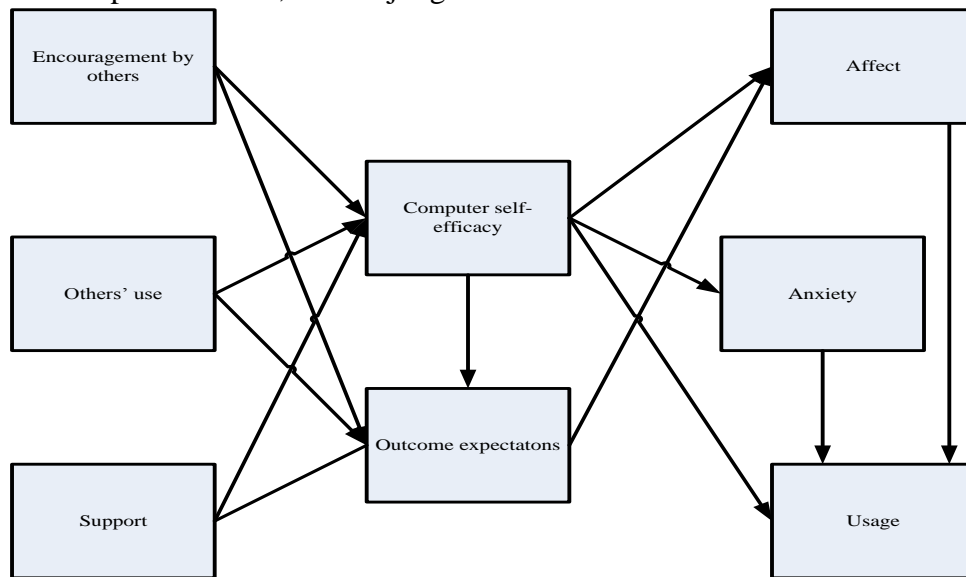
Figure 1: Computer self-efficacy model adapted from Compeau & Higgins (1995)

Compeau & Higgins, (1995) abstracted three important dimensions in the context of computer self-efficacy. They are 1) Magnitude, 2) Strength and 3) Generalizability. The magnitude of the computer self-efficacy indicates an individual's level of computer capability expected. An individual with high magnitude of computer self-efficacy might be able to complete more difficult tasks using computers than those with lower magnitudes of computer self-efficacy. On the other hand, the strength of computer self-efficacy refers the level of conviction about his judgment. The strength of computer self-efficacy measures the level of confidence an individual has regarding his or her ability to perform various computer related tasks. Finally, the generalizability of computer self-efficacy reflects the degree to which the judgment is limited to some particular computer related tasks. Individuals with high computer self-efficacy generalizability are expected to be able to use various software applications and hardware systems more competently than those with lower computer self-efficacy generalizability.

ANTECEDENTS OF COMPUTER SELF-EFFICACY

Compeau & Higgins, (1995) found out that computer self-efficacy is greatly influenced by encouragement of others within the individual's reference group. In another work related to computer self-efficacy, Henry & Stone, (1994) proved that management support is positively influencing an individual's computer self-efficacy. Recently, Fagan & Neill, (2003) found that organizational support is an important antecedent of computer self-efficacy in business environments. This research paper uses the construct "Social factors" to represent the influence of reference groups, colleagues and management support in reinforcing an individual's computer self-efficacy. He & Freeman (2010, p.229) suggested that "with encouraging words from people one trusts, an individual will be more confident in his or her ability and will exert more effort

into using computers". Therefore Social factors are expected to positively influence one's computer self-efficacy.

Hypothesis 1: *Social factors positively influence computer self-efficacy in the context of Social networking adoption.*

Computer knowledge and prior computer experiences are considered to be other important influencing factors of computer self-efficacy. Computer knowledge refers to the extent of knowledge an individual possess regarding the use of computers (He & Freeman, 2010). Previous computer experience refers to the frequency of past computer usage for different tasks and purposes. Previous literature (Compeau & Higgins, 1995b; He & Freeman, 2010; Henry & Stone, 1994) gave empirical evidence for the positive relationship between previous computer experience and computer self-efficacy. Based on the above literature, this research proposes the following hypotheses to test.

Hypothesis 2: *The level of computer knowledge positively influences an individual's computer self-efficacy.*
Hypothesis 3: *Previous computer experience positively influences an individual's computer self-efficacy.*

EFFECTS OF COMPUTER SELF-EFFICACY

Computer anxiety is considered to be an important construct related to the computer self-efficacy. Computer anxiety refers to an unpleasant emotional reaction experienced by individuals while using computers (Fagan & Neill, 2003). Thatcher & Perrewe, (2002) defined computer anxiety as the anxiety about the implications of computer usage such as loss of important data or fear of possible mistakes. Feelings of anxiety surrounding computers will negatively influence computer usage (Tung & Chang, 2008). A number of previous literature support the negative relationship between computer anxiety and computer self-efficacy (Compeau & Higgins, 1995a; Fagan & Neill, 2003; He & Freeman, 2010; Thatcher & Perrewe, 2002; Wixom & Todd, 2005). Based on the above analysis, this research proposes the following hypotheses to be tested in the context of social networking sites adoption.

Hypothesis 4: *The higher the individual's computer self-efficacy, the lower his/her associated computer anxiety.*
Hypothesis 5: *The higher the individual's computer anxiety, the lower his/her intention to use computers.*

Computer self-efficacy is significantly influencing an individual's behavioral intention to use an information system. Many studies have been conducted in this regard. In a recent study conducted by Alenzi et al (2010), it is found that computer self-efficacy is positively influencing student's intention to use e-learning systems. Yi and Hwang (2003) found that self-efficacy is one of the significant predictors of intention to use web-based information systems. Hence it is expected that the relationship between self-efficacy and intention to use online social networking sites will be positive and direct. Based on the above, this research proposes the following hypothesis to test:

Hypothesis 6: *The higher the individual's computer self-efficacy, the higher his/her intention to use computer applications such as accessing Social networking sites.*

Perceived usefulness is the degree to which the user believes that a specific technology will increase his or her job performance (Davis, 1989). In the context of social networking, we can define perceived usefulness as the extent to which a user believes that using social networking sites will enhance his or her productivity and effectiveness. Previous literatures in technology adoption (Holden & Rada, 2011; Igbaria & Iivary, 1995; Venkatesh, 1996) evidenced that the higher an individual's computer self-efficacy, the more he/she perceives using the information system to be useful. In addition, it is well proven from many previous studies in European and American context that perceived usefulness positively influences an individual's intention to use an information system. This study tests the positive relationship between computer self-efficacy, perceived usefulness and intention to use among Asian online users especially in the context of social networking adoption with the following hypotheses.

Hypothesis 7: *The higher the individual's computer self-efficacy, the higher his/her perception towards usefulness of computer applications such as using Social networking sites.*
Hypothesis 8: *The higher the individual's perceived usefulness, the higher his/her intention towards using computer applications such as Social networking sites.*

Based on the above mentioned literature, a conceptual model is developed. Figure 2 shows the proposed research model in this study.
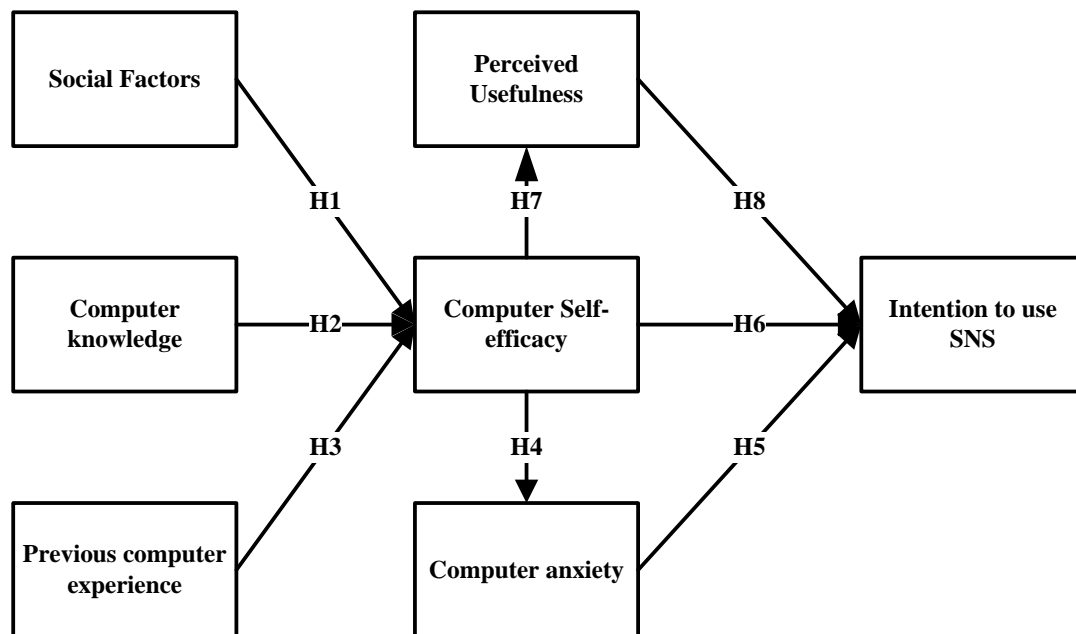
Figure 2: Proposed research model

RESEARCH METHODOLOGY

Sample

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The sample consists of 255 respondents from Bangkok Metropolitan areas. The majority of the respondents are undergraduate students of a leading Business Management University in Thailand. 300 self-administered questionnaires were distributed. After the screening of filled up questionnaires for missing data and other errors, 255 useful responses were received.

Measures and Validation

All the items in the questionnaire developed were adapted from the previous empirically tested literatures in order to ensure the validity and reliability. 6 items for Computer knowledge, 4 items for previous computer experience, 4 items for Computer Anxiety, and 6 items for computer self-efficacy were taken from (He & Freeman, 2010). The instruments for measuring the latent variable Social factors were adapted from Wixom (2005) and Holden (2011). The measuring instruments for perceived usefulness and intention to use were adapted from (Davis, 1989). All the items were slightly modified in order to fit in the context of social networking sites adoption.

RESULTS

Demographic profile of the respondents were analysed and summarized in Table 1.

Gender	Frequency	Percentage	Cumulative percentage
Male	110	43.10	43.10
Female	145	56.90	100.00
Age			
Less than 30	247	96.90	96.90
30-40	7	2.70	99.60
40-50	1	0.40	100.00
Education			
High School	16	6.30	6.30
College diploma	21	8.20	14.50
Undergraduate	204	80.00	94.50
Graduate	14	5.50	100.00
Student Status			
Freshman	46	18.00	18.00
Sophomore	94	36.90	54.90
Junior	47	18.40	73.30
Senior	61	23.90	97.30
Not a student	7	2.70	100.00
Income(in Thai Baht)			
Less than 10,000	117	45.90	45.90

10000-29,999	130	51.00	96.90
30000-49,999	4	1.60	98.40
50,000-80,000	1	0.40	98.80
Higher than 80,000	3	1.20	100.00
Most favorite SNS			
Facebook	178	69.80	69.80
Twitter	7	2.70	72.50
Hi5	1	0.40	72.90
YouTube	69.00	27.10	100.00
Usage per day			
Less than 1 hour	32.00	12.50	12.50
1-3 hours	130.00	51.00	63.50
3-5 hours	59.00	23.10	86.70
More than 5 hours	34.00	13.30	100.00
Frequency of usage(per day)			
1-3 times	61.00	23.90	23.90
3-5 times	70.00	27.50	51.40
5-10 times	61.00	23.90	75.50
More than 10 times	63.00	24.70	100.00
Device used for SNS access			
PC/Laptop	100.00	39.20	39.20
iPhone	118.00	46.30	85.50
Blackberry	13.00	5.10	90.60
Tablets	14.00	5.50	96.10
Other smart devices	10.00	3.90	100.00

Table 1: Demographic profile of the respondents

It is observed that more than half of the respondents were female undergraduate students. The majority of the respondents have a monthly income of 10,000 Baht to 25,000 Baht. Facebook is found to be the most popular and favourite social networking portal among Thai SNS users. YouTube is also quite popular among Asian online users. Most of the respondents admitted that they spent 1-3 hours per day on online social networking. It is surprising that nearly 14% of the respondents were spending more than 5 hours per day for social networking activities. This shows the huge popularity of online media, especially social networking, among Asian youngsters.

Measurement model results

As a pre-requisite for the validity of the model, reliability analysis (refer Table 2) has been conducted and generated favourable results. The Cronbach's Alpha values were calculated for

each construct. Alpha values were ranging from 0.70 to 0.85 indicating high overall internal consistency among the items under each of the constructs.

Items	Cronbach's Alpha
Computer Knowledge	0.833
Previous Computer experience	0.708
Social Factors	0.784
Anxiety	0.789
Computer Self-efficacy	0.858
Perceived Usefulness	0.815
Intention to Use	0.85

Table 2: Reliability test results

Before evaluating the fitness of the conceptual model presented in Figure 1, it is necessary to define a measurement model to verify the 27 measurement variables written to reflect the seven latent variables in a reliable manner. The overall fitness of the measurement model is evaluated through the Confirmatory Factor Analysis (CFA). The overall fitness of the measurement model and the adequacy of the factor loadings were determined from the results of the CFA conducted using AMOS version 18. The results of the measurement model analysis (Figure 3) indicated that the model is a good fit to the data collected. The standardized loading estimates for all the items were higher than 0.7 which indicates adequate convergent validity.

$\chi2$ /df	NFI	IFI	TLI	CFI	RMSEA
1.653	0.90	0.94	0.93	0.94	0.05

**Figure 3:** Measurement model fit indices

To ensure that the measurement model is measuring distinct constructs perfectly, discriminant analysis has been performed. In the discriminant analysis, this research compared the Average Variance Extracted (AVE) between any two constructs with the square of the parameter estimates between those constructs. It is found that the AVE is always greater than the squared correlation estimates and hence determined the adequate discriminant validity. Overall, the measurement model exhibited sufficient convergent validity, reliability and convergent validity.

Structural model results

Once the fitness of the measurement model is confirmed, the fitness of the structural path has been evaluated. The efficacy of the model and the proposed hypotheses were tested using the Structural Equation modelling (SEM) tools of AMOS 18 program. Constructs such as Social Factors and Computer Anxiety were removed in the final model due to their insignificant effect

and poor fitness indices. Figure 4 presents the Final Structural model of this research. Table 3 and 4 provides the hypotheses test results and the SEM fitness indices.
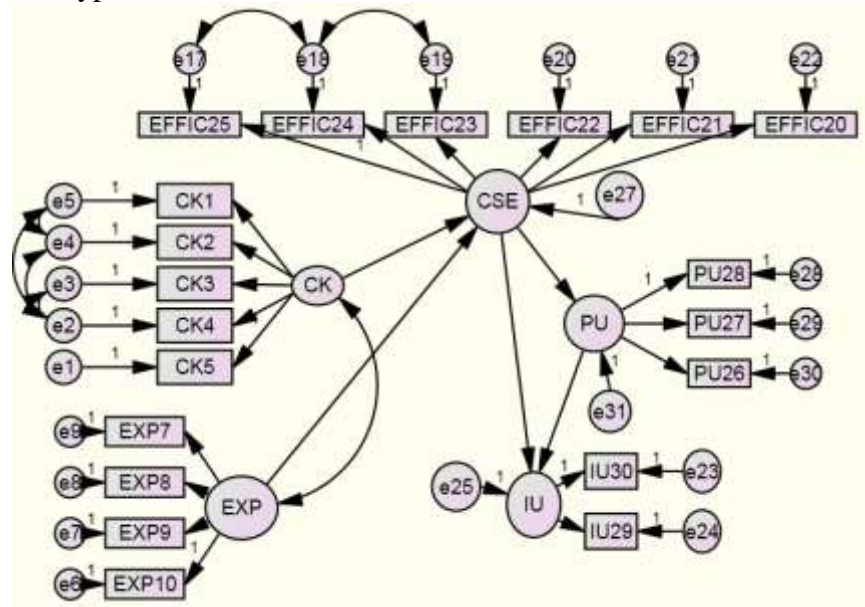
Figure 4: Final Structural Model

Hypothesis	Independent variable	Dependent variable	Standardized estimates	P level	Hypothesis Accepted?
H1	Social Factors	Computer Self-Efficacy	0.119	0.078	No
H2	Computer Knowledge	Computer Self-Efficacy	0.338	0.000	Yes
H3	Previous Computer experience	Computer Self-Efficacy	0.394	0.000	Yes
H4	Computer Self-Efficacy	Computer anxiety	0.008	0.913	No
H5	Computer anxiety	Intention to Use	-0.08	0.163	No
H6	Computer Self-Efficacy	Intention to Use	0.143	0.030	Yes
H7	Computer Self-Efficacy	Perceived Usefulness	0.479	0.000	Yes
H8	Perceived Usefulness	Intention to Use	0.67	0.000	Yes

Table 3: Hypotheses testing results

$\chi2$ /df	RMR	GFI	NFI	RFI	CFI	RMSEA
2.05	0.07	0.9	0.92	0.93	0.92	0.065

Table 4: SEM Fit Indices

DISCUSSION

The results of the analysis based on the data collected among 255 online Social networking users in Thailand shows mixed results. Three of the eight hypotheses were rejected. Results revealed that the relationship between social factors and an individual's computer self-efficacy is not significant. This research paper uses the construct "Social factors" to represent the influence of reference groups, colleagues and management support in reinforcing an individual's computer self-efficacy. Though social factors are expected to be a significant factor in influencing an individual's intention to use an information system, many research works (Compeau and Higgins, 1995a) related to computer self-efficacy found that organizational and management support, and support, involvement and supervision from others negatively influence their computer self-efficacy. If individuals with lower computer self-efficacy can always call someone to help them while they face difficulties in using computer systems, they may never be forced to sort things out by themselves which may negatively influence their computer self-efficacy levels. In another study by Sheng et al. (2003), it is found that other's involvement and supervision have no influence on an individual's computer self-efficacy.

It is found that anxiety doesn't play a significant role among online users especially in the context of social networking. Computer anxiety refers to an unpleasant emotional reaction experienced by individuals while using computers (Fagan & Neill, 2003). This study is focused on the individual's intention to use Social networking sites. It is believed that outcome expectations of using social networking sites overcame their anxiety in using computer based systems. Previous studies on computer anxiety indicate that prior computer education, previous experience etc. will reduce their computer anxiety. Since the respondents in this study are university students, their level of computer anxiety might be very low. In this study we proposed that feelings of anxiety surrounding computers will negatively influence computer usage. Though the result indicate a negative effect of anxiety on intention to use, it is not statistically significant.

While considering the antecedents of computer self-efficacy, it is found that computer knowledge and previous computer experience significantly influence one's computer self-efficacy. The results are consistent with many previous literatures. The more an individual is used to using various computer applications such as social networking programs, the higher his computer self-efficacy is. Having prior computer knowledge before using an application also helps to increase his computer self-efficacy.

It is also determined that computer self-efficacy is directly related to the perceived usefulness of an information system as well as the intention to use the systems. In fact, computer self-efficacy significantly influences perceived usefulness compared to intention to use. The positive relationship between perceived usefulness and intention to use is also found to be highly significant. Figure 5 exhibits the modified final model of this study.

Comparing the results with those of the previous literatures, we can conclude that Asian online users possess similar characteristics of the online users from other parts of the world. In a study

conducted among Finnish online users, Igbaria and Iivari (1995) found that previous computer experience significantly influence an individual's computer self-efficacy. These results are identical to those of the study conducted among United States undergraduate students (Henry and Stone, 1994). In another study conducted among American students, Venkatesh and Davis (1996), proved that computer self-efficacy positively influence an individual's perceived usefulness of an information system.
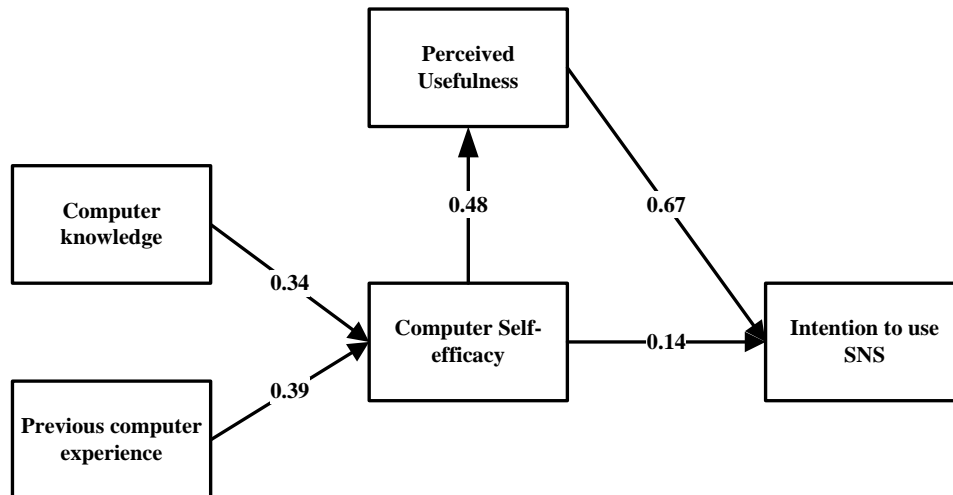
Figure 5: Final Model

Results of this study may have wide practical implications. Though the study is focused on the social networking users, its main objective was to identify the antecedents and effects of computer self-efficacy. The results will help various managements to implement computer programs or applications successfully. Having good knowledge about the sources of computer self-efficacy will help the management to place their employees in appropriate computer training programs. Providing adequate knowledge and training will help the employees to improve their computer self-efficacy which in turn might produce favorable results for the firm.

Secondly, this study shows the growing popularity of the Internet and Internet based applications such as social networking. Marketing companies, online vendors and other e-Business providers can develop new strategies and business models to utilize the growing demand of social networking sites among Asian online users.

It is estimated that nearly 45% of the Internet population comes from the Asian region. By conducting a study across Asian online users, this study contributes more knowledge to the body of Information Systems adoption researches among Asian region.

Limitations

A major limitation of the study is its sample selection and size. Most of the respondents were students of a leading private University in Thailand. Only Thai people were included in this study. Behavioral intention may change based on age and culture. Hence, further cross cultural studies including respondents of various age groups and cultures are recommended in order to validate the results from the study. Similarly, further studies are recommended to include

samples from other Asian countries such as from India, China, Singapore etc. which are quite different in terms of online consumer behaviors.

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