INVESTIGATING THE ADOPTION AND USE OF CONSUMER INTERNET TELEPHONY IN THAILAND

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ABSTRACT

This research investigates the factors of influence on the adoption of internet telephony amongst consumers in Thailand, using a model adapted from the Model of Adoption of Technology in the Household (MATH). It is found positive attitudinal factors, like perceived relative advantage and fun using the technology, have significant influence on the adoption while negative attitudinal factors like security and quality concerns show no correlation or predictive power towards the adoption of the technology in the sample. A significant number of respondents use internet telephony, and a majority also pays for internet telephony, effectively bypassing the traditional licensed telephony operators in Thailand. This information is of importance for telecommunication market players, regulators and operators.

INTRODUCTION

Internet telephony is available to the consumer with a computer and a broadband internet connection. When consumer internet first became available, it was predicted that it would replace the current telephony network; however, this has not occurred. Traditionally switched international telephone minutes are continuing to grow (Telegeography, 2007), but internet telephony traffic is also growing and this is having an effect on traditional operator's incomes.

In investigating this area, this researcher found a gap in research in the consumer area, regarding the adoption and use of internet telephony.

The goal of this research is to investigate this gap by investigating the adoption of internet telephony by consumers, in particular, in Thailand. After reviewing the literature, exploratory research was undertaken to determine and collect items of influence on the adoption of internet technology (Voice over Internet Protocol or VoIP technology) by consumers in Thailand, to gain an understanding about the perceptions surrounding VoIP usage, as a starting point for further development of a model and survey. This approach is similar to previous studies on the development of consumer Information Systems Technology (Dwivedi and Choudrie, 2006; Venkatesh and Brown, 2001)

METHODOLOGY

Model Development and Development of Hypotheses

Initially, the Model of Adoption of Technology in the Household (MATH) was used, developed by Venkatesh and Brown, 2001. This model investigates attitudinal beliefs, normative beliefs and control beliefs in the acceptance of new technology. The model was adapted in analogy to the model of consumer broadband internet adoption (Dwivedi and Choudrie, 2006), and construct validity (factor analysis) was undertaken.

The attitudinal components were divided according to the two groupings obtained in the factor analysis, resulting in one 'positive attitudinal ' construct grouping including utility, relative advantage and hedonistic outcomes (fun, enjoyment), and 'negative attitudinal' grouping construct regarding frustration and anxiety.
The control constructs consisted of constructs expected to be barriers, service quality and ease of use.

FIGURE 1: MODEL WITH HYPOTHESES
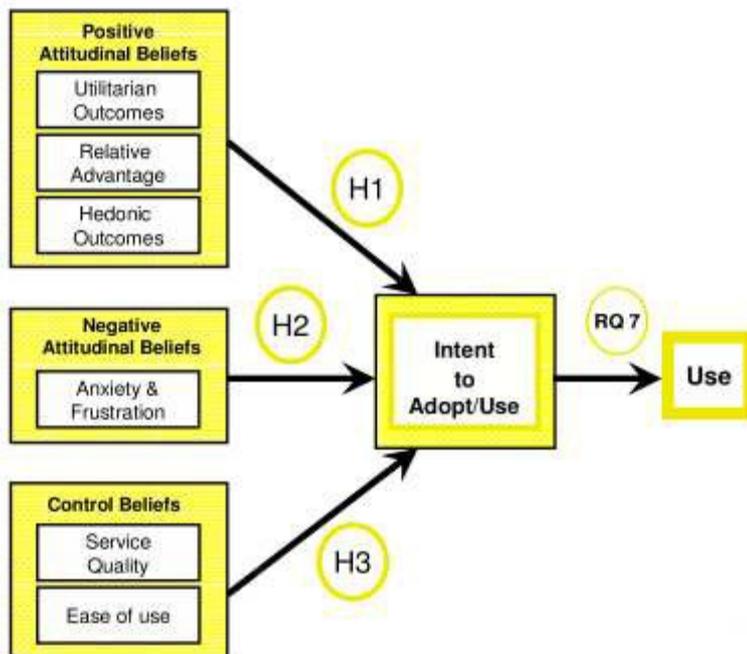
Hypotheses
The following hypotheses were developed:
H0: "Positive attitudinal beliefs", "Negative attitudinal beliefs", and "Control beliefs" do not influence the intent to use Internet telephony.
H1: Positive attitudinal beliefs positively influence the intent to use internet telephony.
H2: Negative attitudinal beliefs negatively influence the intent to use internet telephony.
H3: Control beliefs positively influence the intent to use internet telephony.

Sample

Only users of international telephony were invited to participate in this study and it was assumed that people living geographically distant from their social network (Crepel, 2006) are more likely to engage in long distance communication. Therefore, foreigners living in Thailand were assumed to have a higher likelihood of making international voice communications.

The final sample size, i.e., numbers of responses actually included in the sample was 227 persons.

RESULTS

Data Analysis

Demographic Information

Gender

75% of respondents were male, although with respect to those of Thai nationality, males represented only 36% of the sample.

Age

The age of the respondents was distributed, with more than half of the respondents aged between 20 and 40 years old.

TABLE 1: AGE (N=227)

D2- Age	Frequency	Percent
< 20 years old	6	2.6
20 - 30 years old	55	24.2
31 - 40 years old	61	26.9
41 - 50 years old	44	19.4
51 - 60 years old	29	12.8
> 61 years old	32	14.1
Total	227	100.0

Occupation

The majority of respondents was working (57%), 18.1% retired and 11% reported student status.

TABLE 2: OCCUPATION (N=227)

D4 - Occupation		Frequency	Percent
Valid	Working	130	57.3
	Retired	41	18.1
	Studying	25	11.0
	Working and Studying	17	7.5
	Unemployed	13	5.7
	Total	226	99.6
Missing	System	1	.4
Total		227	100.0

Nationality

The sample showed international diversity – a total of 30 nationalities. The largest group consisted of American nationals (22%), Thai were second with 17%, then UK with 15%, and Australians with 9%. USA, UK, and Australians, therefore, accounted for almost half of the total respondents (45.3%).

The top six nationalities in terms of respondents (USA, Thai, UK, Australian, Indian (9%) and Belgian (7%) accounted for almost 80% of the total respondents. Asian foreigners accounted for 13.6% of the total, with the majority (9.3%) being of Indian nationality.

Usage Statistics

Computer and high speed internet access

93.4% of the sample indicated that they have high speed internet access at home.

Internet telephony usage

81.5% use computer mediated internet telephony for international personal calls at least once a month, of which 59.9% in combination with traditional telephony.

TABLE 3: HOW DO YOU MAKE AN INTERNATIONAL CALL? (N=227)

	Frequency	Percent	Cumulative Percent
Traditional + Internet telephony	136	59.9	59.9
Internet telephony only	49	21.6	81.5
Traditional telephone only	42	18.5	100.0
Total	227	100.0	

21.6% responded indicating that they never used traditional telephony, i.e., they made exclusive use of internet telephony for international communication.

This is more than the number of respondents using only traditional telephony for international calls (18.5%).

Other usage types

Other usage types besides computer mediated internet telephony, amongst internet telephony users are: 18.4% uses or has used an IP phone, while 7.6% have experience with VoIP from a smartphone or pocket pc and an internet telephony gateway has only been used by 4.9% of the sample.

TABLE 4: OTHER INTERNET TELEPHONY METHODS USED? (N=185)

	Frequency	Percent	Cumulative Percent
No/Don't know	128	69.2	69.2
IP Phone	34	18.4	87.6
Internet Telephony Gateway	9	4.9	92.4
Internet Telephony software on a mobile phone	14	7.6	100.0
Total	185	100.0	

Paying versus non-paying users

28.6% of the respondents making internet calls make only free calls, while 62.8% declared paying for internet phone calls (51.4% in combination with free calls).

TABLE 5 :TYPE OF INTERNET CALLS (INTERNET TELEPHONY USERS N=185)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Computer to computer (free calls only)	53	28.6	31.4	31.4
	Computer to phone (paid calls only)	21	11.4	12.4	43.8
	Both	95	51.4	56.2	100.0
	Total	169	91.4	100.0	
Missing	System	16	8.6		
Total		185	100.0		

Reliability

Cronbach's Alpha was used to test the internal consistency of the sample, based on the average inter-item correlation of the independent variables. The score was .772 which is considered reliable.

Factor analysis

PCA factor analysis with promax rotation was used with a factor loadings cut off point set at 0.4 (Cavana, Delahaye and Sekaran, 2001).
Factor loadings with eigenvalues below .4 were discarded.
The three components loaded on their original constructs.
The result confirms the groupings in three components corresponding to the model.

TABLE 6; PATTERN MATRIX

Pattern Matrix			
	Component		
Variables	**1**	**2**	**3**
F7 - The reliability of internet telephony compared to traditional telephony	0.940		
F6 - The sound quality of internet telephony compared to traditional telephony	0.894		
F12 - How easy is it to use internet telephony compared to traditional telephony?	0.754		
F13 - How easy is it to install and set up everything so internet telephony can work?	0.532		
F4 - Internet telephony is much cheaper for international calls compared to traditional telephony		0.860	
F3 - Internet telephony is useful for making international calls		0.852	
F1 - Internet telephony improves contact with friends and family		0.803	
F5 - Using internet telephony is fun		0.631	
F9 - Using internet telephony increases the risk to become a victim of computer crime and computer viruses			0.833
F8 - Internet Telephony software causes the computer to crash or freeze			0.799
F11 - Trust the online payment system for internet telephony			0.526

Linear Regression

Multiple regression analysis was performed on the three components, with "intent to use" as the dependent variable.

TABLE 7: MODEL COMPONENTS

Component 1	Component 2	Component 3
Positive attitudinal beliefs	Negative attitudinal beliefs	Control beliefs
F1: Utilitarian Outcomes	F8 Anxiety	F6 Quality
F3: Utilitarian Outcomes	F9 Anxiety	F7 Quality
F4: Relative Advantages	F11 Anxiety	F12 Ease of Use
F5: Hedonic Outcomes		F13 Ease of Use

<u>Components</u>
Using the mean of the components with the dependent variable use_IT (use of internet telephony), component 1 had an acceptable sigma value of<5(0), and .287 coefficient. The predictor value of the first component "positive attitudinal beliefs" was found to be significant (Beta .616, Sigma <0) and indicates the largest impact in the explanation of behavioural intent (intent to adopt internet telephony).
The other two components "negative attitudinal beliefs" and "control beliefs " showed elevated sigma readings (.666 and .245) and can be regarded as having low significance.

The adjusted R of.415% suggests an appropriate level of explained variance (Dwivedi, Khoumbati, Williams, Lal, and Gharvi, 2007).

TABLE 8: COMPONENTS, MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.651[a]	.423	.415	.251

a. Predictors: (Constant), F8_9_11, F6_7_12_13, F1345

TABLE 9: COMPONENTS COEFFICIENTS

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.374	.124		3.006	.003
	F1345	.319	.031	.616	10.314	.000
	F6_7_12_13	.011	.025	.025	.432	.666
	F8_9_11	.026	.022	.063	1.166	.245

a. Dependent Variable: F15 - I intend to use or keep using Internet telephony in the future

<u>Multiple regression analysis on the Positive Attitudinal Belief Constructs</u>
The constructs of the first component F1235 "positive attitudinal beliefs" were selected for further regression analysis based on the outcome of this component. The constructs of the other two components (negative attitudinal beliefs F8_9_11 and control beliefs F5_7_12_13) were discarded due to high sigma readings and low predicting value.

TABLE 10: POSITIVE ATTITUDINAL CONSTRUCTS

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.655[a]	.430	.422	.253

a. Predictors: (Constant), HE_RQ3, RA_RQ2, UTIL_RQ1

TABLE 11: POSITIVE ATTITUDINAL CONSTRUCTS :COEFFICIENTS –

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.338	.127		2.660	.008
	UTIL_RQ1[17]	.207	.034	.426	6.157	.000
	RA_RQ2[18]	.092	.031	.189	2.924	.004
	HE_RQ3[19]	.050	.018	.162	2.777	.006

a. Dependent Variable: F15 - I intend to use or keep using Internet telephony in the future

UTIL_RQ1 stands for constructs grouping *utilitarian outcomes* (usefulness)
RA_RQ2 stands for constructs grouping the *relative advantage* (such as cost savings)
HE_RQ3 stands for constructs grouping the *hedonic outcomes* (such as enjoyment)

The constructs regarding utilitarian outcomes showed the highest standardized coefficient (.426) and suggests significant predictive power on the adoption of the technology (dependant variable). Relative advantage and Hedonic outcomes showed significant standardized coefficients with acceptable sigma readings in the multiple regression analysis.

Correlations between questions and dependent variables

Four variables showed correlations coefficients larger than .4 with a sigma coefficient lower than 0.05, suggesting significant correlation to the dependent variable (intent to adopt). A cut off Pearson's correlation coefficient value of 0.4 or higher with a sigma value of <5 was applied to classify correlation as 'significant' (Cavana, Delahaye and Sekaran, 2001).

The highest correlations were calculated for F3 (internet telephony is useful), F1 (internet telephony improves contact) and F4 (internet telephony is much cheaper).
So F1, F3, F4, and F5 correlate with the dependent variable 'intent to use'.
All of these items belong to the same component 'positive attitudinal beliefs'.

TABLE 12: CORRELATIONS OVERVIEW

Correlations					
	F15 - Intent	sigma	use_Int _tel	sigma	N
F1 -Internet telephony improves contact with friends and family	0.517	0	0.502	0	226
F3 -Internet telephony is useful to make international calls	0.609	0	0.527	0	226
F4 -Internet telephony is much cheaper for international calls compared to traditional telephony	0.508	0	0.472	0	226
F5 -Using internet telephony is fun	0.432	0	0.396	0	223
F8 -Internet Telephony software causes the computer to crash or freeze	0.161	0.016	0.165	0.014	222
F9 -Using internet telephony increases the risk to become a victim of computer crime and computer viruses	0.145	0.032	0.168	0.012	221
F11 -Trust the online payment system for internet telephony	0.283	0	0.271	0	221
F6 -The sound quality of internet telephony compared to traditional telephony	0.247	0	0.262	0	219
F7 -The reliability of internet telephony compared to traditional telephony	0.141	0.037	0.16	0	219
F12 -How easy is it to use internet telephony compared to traditional telephony?	0.263	0	0.329	0	220
F13 -How easy is it to install and set up everything so internet telephony can work?	0.375	0	0.401	0	219

Correlations between constructs and dependent variables (figure 2, 3 and 4)
Three constructs show significant correlation: Utilitarian Outcomes (.620), Relative Advantage (.508), and Hedonic Outcomes (.432).
These constructs all are part of the same component, "positive attitudinal beliefs".
Correlations between dependent variables
This high value confirms the correlation between the 'intent to use' and actual usage. (Sigma <5, correlation coefficient .769).

Correlation between components and dependent variables (figure 2, 3 and 4)
The mean values of each component were calculated, and investigated for correlation to the dependent variables. Component 1 shows significant correlation to the 'intent to use' (.642), while components 2 and 3 demonstrate low values (negative attitudinal beliefs 0.259, control beliefs 0.322).

This confirms the findings that items of the 'positive attitudinal belief' component show significant correlation to the dependent variable 'intent to use'.

Hypotheses
H1-H0
The regression as well as the correlation analysis of the components shows a significant relationship between component 'positive attitudinal beliefs' and the behavioural intention to adopt internet telephony. This confirms hypothesis H1.

FIGURE 2: POSITIVE ATTITUDINAL BELIEFS
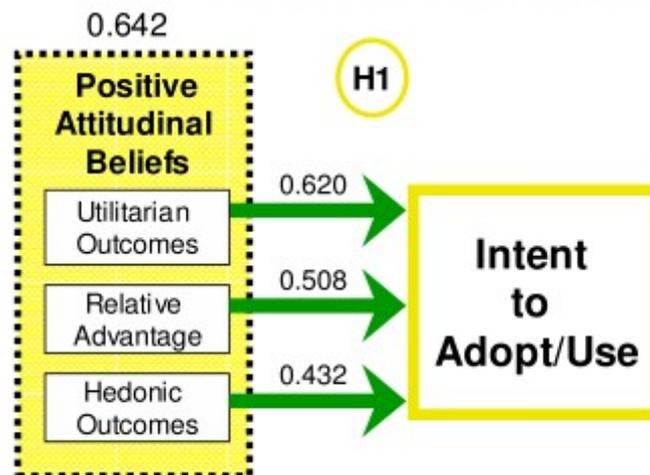
H1 confirmed: Positive attitudinal beliefs positively influence the intent to use internet telephony.
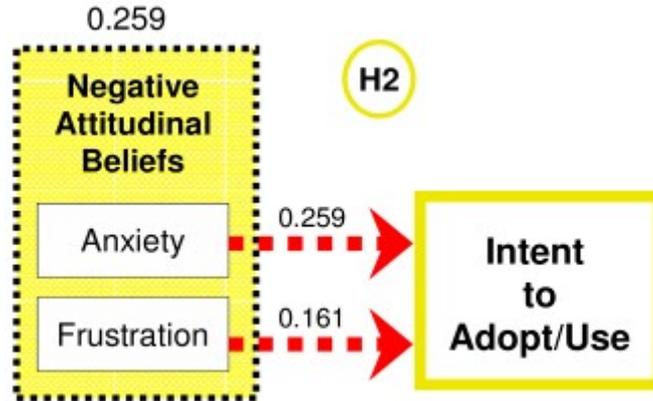Therefore, the null hypothesis is rejected.

H0 rejected: "Positive attitudinal beliefs", "Negative attitudinal beliefs" and
 "Control beliefs" do not influence the intent to use internet telephony.

H2-H3

The components "negative attitudinal beliefs" and "control beliefs" do not show reliable results from the linear regression, nor correlation with the independent variable. Therefore, these hypotheses are rejected.

FIGURE 3 : NEGATIVE ADDITIONAL BELIEFS

H2 rejected: Negative attitudinal beliefs negatively influence the intent to use internet telephony.

FIGURE 4: CONTROL BELIEFS
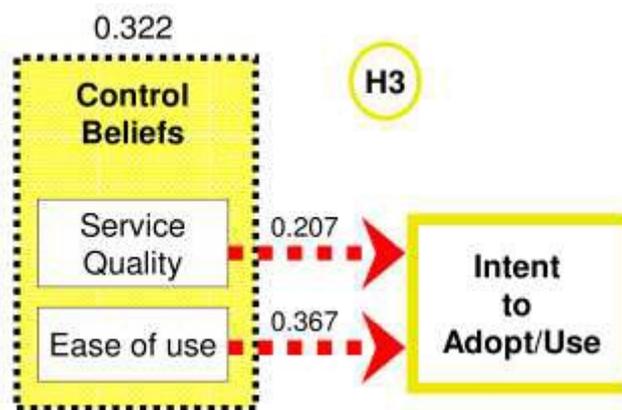
H3 rejected: Control beliefs positively influence the intent to use internet telephony.

DISCUSSION AND CONCLUSIONS

The research shows a high adoption and use of internet telephony in the sample.
On the other hand, it also shows the inability of internet telephony to replace normal telephones (PSTN, Public Switched Network) at this stage in Thailand for international calls, with most internet telephony users still relying on the PSTN for part of their communications overseas.

Existing consumer information technology adoption models with the instruments used in this research were partially able to predict the intentional behaviour to adopt internet telephony.

The perceived usefulness, the ability of internet telephony to improve social contact, cost savings and enjoyment were found to be the strongest predictors for the intent to use internet telephony.
Negative attitudinal concepts such as security concerns and frustration with the technology did not show significant influence.
Neither did quality concerns and ease of use influence the behavioural intent to use internet telephony.

IMPLICATIONS

Impact on the market

The study indicated that internet telephony in Thailand is real, given the high adoption and use in the sample (over 80%). Amongst internet telephony users, a significant group (62.8%) pays for internet telephony communication, while 28.6% makes use of free calls only. This indicates that internet telephony is creating significant volumes of calls that are bypassing the traditional Thai telecommunications networks. Lagging legislation and slow liberalization of the Thai telecommunication market has created a large 'grey' market of international communication, in which many international calls from Thailand are now not being made through the traditional PSTN channel but through internet telephony systems without any license being obtained from the National Telecommunications Authority.
As indicated earlier, it would appear that very few studies have been undertaken in respect of consumer as opposed to business usage of internet telephony (in Thailand or elsewhere).

From a marketing perspective the results suggest that emphasizing the positive attitudinal beliefs e.g. the usefulness (improving social contact), the advantages (such as cost saving) and the 'fun factor'(hedonic outcomes) would be the most effective. Messages surrounding security ease of use and quality would have less impact on the adoption and use of the technology.

It is hoped that this study will generate further interest in this important area.

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