

A STRUCTURAL EQUATION MODELING OF INTERNET BANKING USAGE IN MALAYSIA

Ilham Sentosa,

Limkokwing University of Creative
Technology, Malaysia

Bambang Bemby Soebyakto,

Sriwijaya University,
Indonesia.

Chee Wei Ming,

Limkokwing University of Creative
Technology, Malaysia

Nik Kamariah Nik Mat,

Universiti Utara Malaysia
Malaysia.

ABSTRACT

Internet banking is a contemporary trend amongst financial services worldwide. However, the level of acceptance among consumers is unknown. This study intends to examine the determinants of internet usage intention in banks using Technology Acceptance Model (TAM) and exploring the mediating effect of perceived usefulness, perceived ease of use and perceived credibility on the relationship between self-efficacy and intention. The exogenous variable is self-efficacy and the mediators are perceived ease of use, perceived usefulness and perceived credibility while endogenous variables is intention of banking internet usage. Using structural equation modeling (SEM) analysis method, the results show that self-efficacy has significant and positive direct impact on perceived usefulness, perceived ease of use and perceived credibility while two variables perceived usefulness and perceived ease of use have direct significant positive influence on intention. Perceived credibility has a insignificant direct impact intention of internet banking usage. Perceived usefulness and perceived ease of use are partial mediators while perceived credibility is a full mediator. In general the use of TAM in internet banking usage intention is substantiated in this study.

Keywords: Internet Banking; Technology Acceptance Model, Structural Equation Modeling.

INTRODUCTION:

The growing phenomenon in financial services is the use of the internet banking as a new marketing channel for financial services. However, the level of acceptance of internet banking usage intention by the consumers in Malaysia is unknown. Consumer's use of internet banking requires acceptance of the technology, which can be complicated because it involves the changing of behavioral pattern. Moreover, internet technology could be difficult for some consumers to understand. Besides that the consumers also need to understand the complex nature of financial services. The combined effect of consumers' understanding of both the internet channel and financial services could contribute to the low acceptance level of the intention of internet banking usage.

Internet banking is relatively new especially in Malaysian banking environment. Previous studies dealt with conventional focus of internet banking research such as technological development, but this is now shifting to user-focused research. Further research is needed to understand the specific drive, motivation and needs and expectations of internet users to use the internet banking as a source of doing transactions compared to conventional banking. Many banks in Malaysia has their own internet banking system such as Maybank2u.com and PBeBank.com but unfortunately the rate of usage of the internet banking is rather low compared to the European countries and the United States of America.

Internet banking acceptance will be studied by examining the causes behind frequency of use of internet banking. This identifies the perceived usefulness, perceived ease of use of a technology and perceived credibility as determining user intention behaviors. This study also intends to investigate the mediating effect of these three factors on the relationship between self-efficacy and intention.

CONCEPTUAL DEVELOPMENT TO THE HYPOTHESIZED MODEL:

Technology acceptance model (Davies 1989) or TAM as it is commonly known, was adapted from the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and theory of planned behavior (Ajzen, 1985; Ajzen, 1991). TAM proposes specifically to explain the determinants of information technology end-user's behavior towards information technology (Saade, Nebebe & Tan, 2007). In TAM, Davis (1989) proposes that the influence of external variables on intention is mediated by perceived ease of use (PEU) and perceived usefulness (PU). TAM also suggests that intention is directly related to actual usage behavior (Davis, Bagozzi & Warshaw, 1989). Individual differences factors such as self-efficacy incorporated into the TAM was found to have significant effects on intention through PEU and PU and perceived credibility in internet banking usage (Wang, Wang, Lin & Tang, 2003). Trust and perceived risks have also been examined in TAM previous studies but have shown mixed findings (Kim et al. 2001; Liao et al, 1999; and Pavlou, 2001). Perceived credibility is the first dimension of trust and will be used interchangeably as defined by Lindsfold, (1978). Behavioral intentions may be defined as a measure of the strength of one's intention to perform a specific behavior such as the use of an information system (IS) (Fishbein & Ajzen, 1975). In general, prior research has suggested a positive impact/influence between experience with computing technology and a variety of outcomes such as an affect towards computers and computer usage (Levin and Gordon, 1989; Harrison and Rainer, 1992; Agarwal and Prasad, 1999).

COMPUTER SELF-EFFICACY AND INTENTION:

A related construct, called computer self-efficacy, has been examined in the IS literature (e.g. Compeau and Higgins, 1995; Compeau *et al.*, 1999; Hong *et al.*, 2001). Computer self-efficacy is defined as the judgment of one's ability to use a computer. More specifically, internet self-efficacy is the belief in one's capabilities to organize and execute courses of internet actions required to produce given attainments (Eastin & Larose, 2000). Continuing research efforts on computer self-efficacy can be observed in recent IS studies, which confirm the critical role that computer self-efficacy plays in understanding individual responses to information technology (Karahanna *et al.* 1999; Doll *et al.* 1998; Venkatesh and Davis, 2000; Gerrard and Cunningham, 2003).

PERCEIVED USEFULNESS AND INTENTION:

Perceived usefulness is defined as the extent to which a person believes that using a particular system will enhance his or her job performance. The ultimate reason people exploit internet banking systems is that they find the systems useful to their banking transactions. There has been extensive research in the information systems (IS) community that provides evidence of the significant effect of perceived usefulness on usage intention (Petty, Cacioppo & Schumann, 1983; Taylor & Todd, 1995; Venkatesh & Davis, 2000). Davis's (1989) found that perceived usefulness has a stronger influence on usage. Davis's study shows that users are driven to adopt a technology primarily because of the functions it provides them, and secondarily because of the easiness

of benefiting from those functions. Customers are often willing to overlook some difficulties of usage if the service provides critically needed functions.

PERCEIVED EASE OF USE AND INTENTION:

Extensive research over the past decade provides evidence of the significant effect of perceived ease of use on usage intention, either directly or indirectly through its effect on perceived usefulness (Agarwal and Prasad, 1999; Davis et al., 1989; Hu et al., 1999; Jackson et al., 1997; Venkatesh, 1999, 2000; Venkatesh and Davis, 1996, 2000; Venkatesh and Morris, 2000). In order to prevent the “under-used” useful system problem, Internet banking systems need to be both easy to learn and easy to use. If the system was easy to use, it will be less threatening to the individual (Moon and Kim, 2001). This implies that perceived ease of use is expected to have a positive influence on users’ perception of credibility and intention of using internet banking systems.

PERCEIVED CREDIBILITY AND INTENTION:

Perceived credibility of the internet banking will also contribute to the increase in usage of internet banking. Perceived credibility is defined as to which one partner believes that the other partner has the required expertise to perform the job effectively and reliably (Ganesan, 1994). This is to say that trust based on a partner’s expertise and reliability focuses on the objective credibility of an exchange partner, i.e. expectancy that the word or written statement of the partner can be relied on (Lindsfold, 1978). According to Morgan and Hunt (1994), confidence stems in a part from the belief that the trustworthy party is reliable and has high integrity. An effective customer-company relationship requires trust (Morgan and Hunt, 1994), and for the company, such relationships are crucial to managing trust, because a customer typically must buy a service before experiencing it (Berry & Parasuraman, 1986). The importance of including trust has been pointed out by Polatoglu and Ekin (2001) in their qualitative study, and also by Kardaras and Papathanassiou (2001), who researched corporate customers. Perceived credibility also refers to two important dimensions which are security and privacy. Security is defined as the protection of information or systems from unsanctioned intrusions or outflows, while privacy is the protection of various types of data that are collected (with or without the knowledge of the users) during users’ interactions with the internet (Hoffman et al., 1999). The usage intention of internet banking could be affected by users’ perceptions of credibility regarding security and privacy issues. Daniel (1999) predicted security to be one of the determinants of customer acceptance of internet banking.

RESEARCH STRUCTURAL FRAMEWORK AND HYPOTHESES OF THE STUDY:

Following the structural model proposed by TAM (Davies et al., 1989) and Wang et al, (1995), the research structure model in Figure 1 consists of one exogenous variable (self-efficacy), three mediating variables (ease of use, perceived usefulness and perceived credibility), and one endogenous variable (intention). Self efficacy is hypothesized to have a direct impact on each of the mediating variables and subsequently each mediating variable has a direct impact on intention. It is also hypothesized that the relationship of self-efficacy and intention will be mediated by ease of use, perceived usefulness and perceived credibility. Thus, the generated hypotheses for this study are as follows:

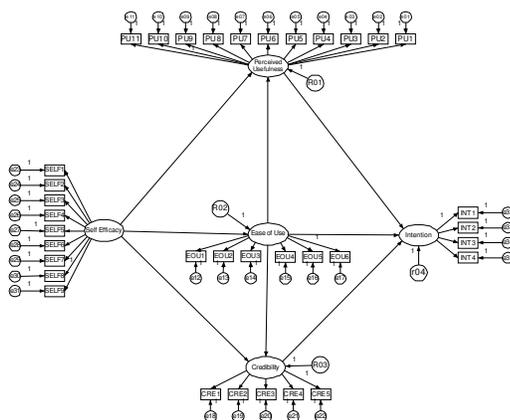
H1	Self-efficacy is significantly and positively related to perceived usefulness.
H2	Self-efficacy is significantly and positively related to perceived ease of use.
H3	Self-efficacy is significantly and positively related to perceived credibility.
H4	Perceived ease of use is significantly and positively related to perceived usefulness
H5	Perceived ease of use is significantly and positively related to perceived credibility
H6	Perceived usefulness is significantly and positively related to intention.
H7	Perceived ease of use is significantly and positively related to intention.
H8	Perceived credibility is significantly and positively related to intention.
H9	Perceived usefulness mediates the relationship between self-efficacy and intention.
H10	Perceived ease of use mediates the relationship between self-efficacy and intention.
H11	Perceived credibility mediates the relationship between self-efficacy and intention.

METHODOLOGY:

The unit of analysis in this research is the bank customers of five main commercial local banks in Malaysia namely Maybank Bhd, Public Bank Bhd, CIMB Bank Bhd, Ambank Bhd and RHB Bank Bhd. The respondents are the customers at the main office of each bank in the Kuala Lumpur region. The total respondents in this

research were 250 customers of the aforesaid banks that have the internet banking facility. To observe a certain degree of random sampling, each participating bank was allocated with 50 questionnaires whereby and the questionnaires will be given to the customers who visit the banks at 3 cluster times i.e. 9.30 am, 12.00 pm and 3.00 pm. An assigned counter staff requests the customer to response to the questionnaires and collects them immediately before the customers leave the bank after finishing their transactions. Using these procedures, 169 responses were collected back representing about 68 % response rate.

FIGURE 1: HYPOTHESIZED MODEL



This research is conducted through self administered questionnaires whereby the questionnaires is subdivided into two categories. The target questions focus on the independent variables such as perceived usefulness (11 items), perceived ease of use (6 items), perceived credibility (5 items), computer self-efficacy (9 items) and purchase intention (4 items). The scaling used in this research is the 7-point Likert scale of 1-strongly disagree, 2-disagree, 3-slightly disagree, 4-neutral, 5- slightly agree, 6-agree and 7-strongly agree. All measures were adapted and modified from Wang et al., (2003). The demographic variables asked are gender, race, age, education and monthly income of the respondent. The data were input into SPSS version 20 software program and analyzed using AMOS version 20. Several statistical validity tests and analysis were conducted such as reliability test and composite reliability tests, validity tests using confirmatory factor analysis (CFA) for construct validity, discriminant validity for multicollinearity treatment, descriptive analysis, correlation and structural equation modeling analysis using AMOS 7.0.

FINDINGS:

From Table 1, we can observed that the majority of the sample is male (60.4%) compared to female (39.6%). In term of races, 49.7% is Malay, Chinese is 21.9% and Indian is 22.5%. It can also be observed that the majority of the sample is holding diploma qualification (42.6%), followed by first degree holders (32%), and secondary schools (14.2%). From the monthly income statistics, we can observed that the majority of respondents are earning monthly income of below RM3,000 (37.9%), followed by income between RM3,000-00 to RM3,999-00 (36.7.2%) and salary of RM4,000-00 to RM4,999-00 (14.2%). The top range income of above RM5000 is about 8%. Over 90% of respondents are below the age of 36 years. We believe that the above sample in term of gender, race and income produces moderately homogenous sample pool for this research.

TABLE 1: THE PROFILE OF RESPONDENTS (N=169)

Demographics	Frequency	Valid Percent
Gender		
Male	102	60.4
Female	67	39.6
Race		
Malay	84	49.7
Chinese	37	21.9
Indian	38	22.5
Others	10	5.9

Education		
Primary School	2	1.2
Secondary School/SPM/STPM	24	14.2
Diploma	72	42.6
First degree	54	32
Master degree	17	10.1
Age		
Below 24	6	3.6
25-30	80	47.3
31-36	67	39.6
37-42	6	3.6
43 and above	10	5.9
Monthly income		
Less RM1,000-00	5	3.0
RM1,000-00 to RM2,999-00	64	37.9
RM3,000-00 to RM3,999-00	62	36.7
RM4,000-00 to RM4,999-00	24	14.2
RM5,000-00 to RM5,999-00	5	3.0
RM6,000-00 and above	9	5.3

DESCRIPTIVE ANALYSIS OF VARIABLES:

From Table 2, we observed that the Cronbach’s alpha before the confirmatory factor analysis was conducted is between 0.82 to 0.93. This indicates that the items in each construct collapse as a set in measuring the concept therefore the reliability of the measures used in this study can be considered as internally consistent (Sekaran, 2003).

TABLE 2: DESCRIPTIVE STATISTICS OF VARIABLES:

	Variable Name	No of Items	Mean (Std. Dev)	Cronbach’s Alpha
Y1	Intention	4	3.894 (0.711)	0.925
X1	Self-Efficacy	9	3.918 (0.745)	0.931
X2	Perceived Usefulness	11	3.774 (0.735)	0.907
X3	Ease of Use	6	3.956 (0.766)	0.823
X4	Credibility	5	3.858 (0.763)	0.888
Total		35		

CONFIRMATORY FACTOR ANALYSIS RESULTS:

From the confirmatory factor analysis result in Table 3, we observed that the factor loadings of all observed variables or items are high ranging from 0.610 to 0.938. This indicates that all the constructs conform with the construct validity test.

TABLE 3: FINAL CONFIRMATORY FACTOR ANALYSIS RESULTS OF CONSTRUCT VARIABLES

Variable	Code	Attributes	Factor Loadings
Factor 1: Perceived Usefulness (5 items)	PU2	Using the internet banking improves my task	0.703
	PU3	Using the internet banking increases my productivity	0.665
	PU6	I find the internet banking to be useful	0.781
	PU8	Using the internet banking enhances my effectiveness in my task	0.751
	PU9	Using the internet banking improves my performance in my task.	0.639
Factor 2: Ease of Use (4 items)	EOU2	Internet banking makes the services effective way making.	0.610
	EOU4	Internet banking makes the banking transactions faster	0.705
	EOU5	Getting information from the internet banking is easy	0.688
	EOU6	Internet banking is easy to use	0.677
Factor 3: Credibility (4 items)	CRE1	Internet banking has privacy	0.812
	CRE3	I feel safe in your transactions with internet banking	0.808
	CRE4	One can trust the internet banking system	0.858

	CRE5	Internet banking has a good security system	0.662
Factor 4: Self-Efficacy (2 items)	SELF5	I feel confident about learning a new e-mail program if I am neither aided by a competent person	0.809
	SELF7	I feel confident about learning a new text-processing program if I am not aided.	0.719
Factor 5: Intention (4 items)	INT1	Given that I had access to the internet banking, I predict that I would use it	0.938
	INT2	I intend to use the internet banking in the future	0.793
	INT3	I intend to use the internet banking as much as possible	0.791
	INT4	I intend to use the internet banking	0.914
TOTAL		19 Items	

COMPOSITE RELIABILITY AND DISCRIMINANT VALIDITY OF THE CONSTRUCTS:

Table 4a and 4b shows the result of the calculated composite reliability and variance extracted to support composite reliability of each construct (with error consideration) and discriminant validity of constructs respectively (Nejatian, et, all., 2011; Ali and Sentosa, 2008). According to Fornell & Larcker (1981), average variance extracted (AVE) should be more than the correlation squared of the two constructs to support discriminant validity (compare table 5 and table 6). Each AVE value is more than correlation squared, thus discriminant validity is supported or multicollinearity is absent.

TABLE 4A: COMPOSITE RELIABILITY AND VARIANCE EXTRACTED OF VARIABLES

Observed variable	Factor loadings	Squared multiple correlations	Error variance	Composite reliability	Variance Extracted
Intention					
INT1	0.938	0.880	0.046	0.982	0.975
INT2	0.793	0.630	0.063		
INT3	0.791	0.626	0.063		
INT4	0.914	0.836	0.050		
Self-Efficacy					
SELF5	0.809	0.655	0.120	0.914	0.862
SELF7	0.719	0.517	0.100		

TABLE 4B: COMPOSITE RELIABILITY AND VARIANCE EXTRACTED OF VARIABLES

Observed variable	Factor loadings	Squared multiple correlations	Error variance	Composite reliability	Variance Extracted
Ease of Use					
EOU2	0.610	0.372	0.128	0.928	0.853
EOU4	0.705	0.497	0.125		
EOU5	0.688	0.473	0.130		
EOU6	0.677	0.458	0.174		
Credibility					
CRE1	0.812	0.660	0.134	0.961	0.939
CRE3	0.808	0.653	0.088		
CRE4	0.858	0.737	0.089		
CRE5	0.662	0.438	0.093		
Perceived Usefulness					
PU2	0.703	0.495	0.151	0.946	0.900
PU3	0.665	0.442	0.147		
PU6	0.781	0.610	0.151		
PU9	0.751	0.565	0.144		
PU10	0.639	0.408	0.115		

TABLE 5: AVERAGE VARIANCE EXTRACTED (AVE) MATRIX OF VARIABLES

Variable Name	1	2	3	4	5
Intention (1)	1.00				
Self-Efficacy (2)	0.918	1.00			
Perceived Usefulness (3)	0.937	0.880	1.00		
Ease of Use (4)	0.914	0.857	0.876	1.00	
Credibility (5)	0.957	0.900	0.919	0.896	1.00

TABLE 6: CORRELATION & CORRELATION SQUARED MATRIX

Variable Name	1	2	3	4	5
Intention (1)	1.00				
Self-Efficacy (2)	0.760** (0.578)	1.00			
Perceived Usefulness (3)	0.753** (0.567)	0.695** (0.483)	1.00		
Ease of Use (4)	0.655** (0.429)	0.566** (0.320)	0.609** (0.370)	1.00	
Credibility (5)	0.611** (0.373)	0.592** (0.350)	0.584** (0.341)	0.477** (0.227)	1.00

** Correlation is significant at 0.01 level (2-tailed), values in brackets indicate correlation squared.

GOODNESS OF FIT INDICES:

Confirmatory factor analysis was conducted on every construct and measurement models (see Table 7). All CFAs produced a relatively good fit as indicated by the goodness of fit indices such as CMIN/df ratio (<2); p-value (>0.05); Goodness of Fit Index (GFI) of >.95; and root mean square error of approximation (RMSEA) of values less than .08 (<.08). The measurement model has a good fit with the data based on assessment criteria such as GFI, CFI, TLI, RMSEA (Nejatian, et, all., 2011; Bagozzi & Yi, 1988). Table 8 shows that the goodness of fit of generated or revised model is better compared to the hypothesized model. A new path is also generated from self-efficacy directly to behavior.

TABLE 7: GOODNESS OF FIT ANALYSIS-CONFIRMATORY FACTOR ANALYSIS (CFA) OF MEASUREMENT MODELS (N=169)

Finals Models	Intention	Self-Efficacy	Perceived Usefulness	Ease of Use	Credibility
Items remain	4	4	5	4	4
CMIN	3.731	3.541	15.624	2.132	3.042
df	2	2	9	2	2
CMIN /df	1.865	1.771	1.736	1.066	1.521
p-value	0.155	0.170	0.075	0.344	0.218
GFI	0.989	0.990	0.971	0.993	0.991
CFI	0.995	0.986	0.988	0.999	0.996
TLI	0.984	0.958	0.979	0.998	0.987
RMSEA	0.072	0.608	0.066	0.020	0.056

TABLE 8: GOODNESS OF FIT ANALYSIS-COMPARISON BETWEEN HYPOTHESIZED AND RE-SPECIFIED (N=169)

Finals Models	Hypothesized Model	Re-Specified Model
Items remain	19	19
CMIN	163.203	157.756
Df	144	143
CMIN/df	1.133	1.103
p-value	0.131	0.189
GFI	0.911	0.914
CFI	0.989	0.992
TLI	0.987	0.990
RMSEA	0.028	0.025

HYPOTHESES RESULTS:

Table 9 and Figure 2 show that self-efficacy has a direct positive and significant influence not only on: (1) perceived usefulness ($\beta=.62$; $CR=4.07$; $p<.001$); (2) perceived ease of use ($\beta=.77$; $CR=5.83$, $p<.001$); and (3) perceived credibility ($\beta=.64$; $CR=4.11$; $p<.001$), but also on intention ($\beta=.38$; $CR=2.19$, $p<.05$) a newly found path of this research. Thus, H1, H2, H3 are asserted and a new hypotheses is generated for the relationship between self-efficacy and intention. Perceived ease of use has a significant and positive link with perceived usefulness ($\beta=.26$; $CR=2.62$; $p<.05$), thus, H4 asserted. However, perceived ease of use is found to be insignificantly related to perceived credibility ($\beta=.21$; $CR=1.56$; $p>0.1$). Thus, H5 is rejected. Additionally, perceived usefulness ($\beta=.39$; $CR=3.05$; $p<.001$) and perceived ease of use ($\beta=.30$; $CR=2.92$; $p<.001$) has a direct positive and significant influence on intention. Hence H6 and H7 are asserted. However, H8 is rejected when perceived credibility ($\beta=.07$; $CR=.713$; $p>.05$) has an insignificant impact on intention.

TABLE 9: DIRECT IMPACT OF REVISED MODEL: STANDARDIZED REGRESSION WEIGHTS

H	Relationships between Exogenous and Endogenous		Standardized Estimate	S.E.	C.R.	P-value	
New	Intention	<---	Self-Efficacy	0.314	0.171	2.186	0.029
H1	Perceived Usefulness	<---	Self-Efficacy	0.588	0.152	4.071	0.000
H2	Perceived Ease of Use	<---	Self-Efficacy	0.693	0.131	5.832	0.000
H3	Perceived Credibility	<---	Self-Efficacy	0.574	0.155	4.116	0.000
H4	Perceived Usefulness	<---	Perceived Ease of Use	0.269	0.124	2.062	0.039
H5	Perceived Credibility	<---	Perceived Ease of Use	0.203	0.132	1.555	0.120
H6	Intention	<---	Perceived Usefulness	0.339	0.126	3.050	0.002
H7	Intention	<---	Perceived Ease of Use	0.281	0.104	2.917	0.004
H8	Intention	<---	Perceived Credibility	0.061	0.092	0.713	0.476

VARIANCE EXPLAINED (SQUARED MULTIPLE CORRELATION-SMC):

From Table 10, it could be deducted that self-efficacy explains 48 % of the variance in ease of use, 53.2 % variance in credibility, and 63.6 % variance in perceived usefulness. All mediating variables (ease of use, perceived credibility and perceived usefulness explains 78.4 % variance in intention.

TABLE 10: SQUARED MULTIPLE CORRELATION RESULTS

Endogenous Variable	Squared multiple correlation (SMC) = R^2
Perceived Ease of Use	0.480
Perceived Credibility	0.532
Perceived Usefulness	0.636
Intention	0.784

RE-SPECIFIED MODEL:

Figure 2 depicts the structural path readings derived from the Structural Equation Modeling (SEM) analysis. The Goodness of Fit (GOF) of the structural model shows support according to the standard norms in structural equation GOF indices as presented in Table 8.

DIRECT AND INDIRECT IMPACT (THE MEDIATING EFFECT):

Table 11a, 11b and 11c present the findings for direct and indirect effects of self-efficacy to intention through the mediating variables of perceived ease of use, perceived usefulness and perceived credibility. Hair et al., (2006), Ali and Sentosa (2008) suggest that if all direct effects between the three latent variables are significant then, mediating effects are justified (see table 6). Since table 11a shows the direct impact of all hypothesized links, so the explanation for table 11a is similar to table 9 which has been explained above.

FIGURE 2: RE-SPECIFIED MODEL

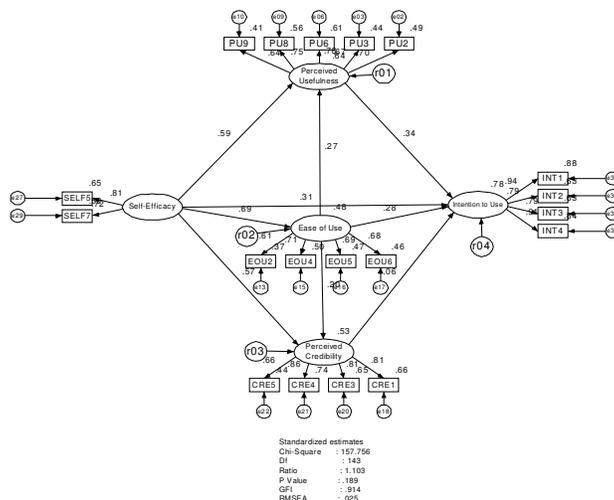


Table 11b shows the calculation of indirect effect of the structure path. The indirect estimates are calculated by multiplying each direct impact (eg. [Self-efficacy → perceived usefulness] X [Perceived usefulness → intention]). The results show that perceived usefulness and perceived ease of use partially mediate the link between self-efficacy and intention because the indirect impacts reduced but remain significant. The same goes to the mediating effect of perceived ease of use (partial mediator). Conversely, perceived credibility do not mediates the relationship between self-efficacy and intention due to the insignificant indirect impact generated. This means that the direct effect is strongest (Hair et al., 2006). Therefore, H9 & H10 are partially asserted while H11 is rejected. Table 11b summarizes the mediating effects of perceived usefulness, perceived ease of use and perceived credibility. Table 11c presents the results of total effects between the mediators and direct relationship. It is calculated by summing indirect effects and direct effects.

TABLE 11A: DIRECT EFFECT OF VARIABLES INTERACTION

Exogenous	Endogenous	Path	Standardize d Estimate	P	Relationship
Self-efficacy	Perceived Usefulness	Self-efficacy → Usefulness	0.588	0.000	Sig
Self-efficacy	Perceived Ease of Use	Self-efficacy → Ease of Use	0.693	0.000	Sig
Self-efficacy	Perceived Credibility	Self -efficacy → Credibility	0.574	0.000	Sig
Perceived Usefulness	Perceived Intention	Usefulness → Intention	0.339	0.002	Sig
Perceived Ease of Use	Perceived Intention	Ease of Use → Intention	0.281	0.004	Sig
Perceived Credibility	Perceived Intention	Credibility → Intention	0.061	0.476	Insig
Perceived Self-efficacy	Perceived Intention	Self-efficacy → Intention	0.314	0.029	Sig

TABLE 11B: INDIRECT EFFECT OF VARIABLES INTERACTION

Exogenous	Mediated	Endogenous	Path	Indirect Effect Estimate	Mediating Hypothesis
Self-efficacy	Perceived Usefulness	Intention	Self→Useful→Intention (0.588 * 0.339)	0.199	Partial Mediating
Self-efficacy	Perceived Ease of Use	Intention	Self → Ease of Use → Intention(0.693 * 0.281)	0.194	Partial Mediating
Self-efficacy	Perceived Credibility	Intention	Self→Credibility→ Intention (0.574 * 0.061)	0.035	NOT Mediating

TABLE 11C: TOTAL EFFECT OF MEDIATING VARIABLE

Exogenous	Mediated	Endogenous	Path	Total Effect
Self-efficacy	Perceived Usefulness	Intention	Self→Useful→Intention (0.314 + 0.199)	0.513
Self-efficacy	Perceived Ease of Use	Intention	Self→EOU→Intention (0.314 + 0.194)	0.508
Self-efficacy	Perceived Credibility	Intention	Self→Credibility→ Intention (0.314 + 0.035)	0.349

Note: Standardized path estimates are reported

DISCUSSION:

Our main concern in this study is to substantiate the applicability of TAM in internet banking usage intention. Consequently, we found that computer self-efficacy plays a critical role in confirming the intention of internet banking usage. Our findings are similar with many past findings (Eastin and Larose, 2000; Compeau and Higgins, 1995; Compeau *et al.*, 1999; Hong *et al.*, 2001). Our study also found significant assertions for direct paths from self-efficacy to: (1) perceived usefulness, (2) ease of use of using the technology and (3) perceived credibility. While our results indicate positive significant impacts between all the three links, Wang *et al.*, (2003) found a negative significant result between self-efficacy and perceived credibility. Hence, these findings substantiate the appropriateness of incorporating self efficacy in the TAM. Possibly, some banks should step up the education programs on information technology and their financial services offered to their customers. Accordingly, it will increase the customers’ self efficacy in computer technology. By improving their computer self efficacy, it could enhances their perceived usefulness, ease of use of using the technology and increased perceived credibility.

The next objective is to observe the direct causal links between perceived usefulness, perceived ease of use and perceived credibility to internet banking usage intention. Unlike Wang *et al.*’s., (2003) findings, our result support only two causal links i.e. perceived usefulness and perceived ease of use to intention, while links between perceived credibility and intention was not asserted. Wang *et al.*, (2003) found all three links to be significant. Thus, perceived usefulness is directly related to usage intention of internet banking. These findings are supported by Davis’s (1989) & Wang *et al.*, (2003). Perceived ease of use has direct impact on intention of internet banking usage. Similar finding has been found in previous studies (Wang *et al.*, 2003; Venkatesh and Morris, 2000). Although perceived credibility of the internet banking could also contribute to the increased in internet banking intention (Wang *et al.*, 2003; Morgan & Hunt, 1994; Daniel, 1999), our findings do not support this relationship. The probable reason for this conflicting result could be due to the lack of trust on on-line banking as well as the concern for privacy and security issues have been escalating in Malaysia (Ahmad Nasir Mohd Zin & Zahri Yunos, 2005).

Subsequently, our findings have found some promising partial mediating effects of the perceived usefulness and perceived ease of use on the relationship between self efficacy and intention. It was found that perceived usefulness and perceived ease of use partially mediated the link between self-efficacy and intention while perceived credibility do not support mediation (direct effect is supported). This finding has given special evidence of support to the original TAM (without perceived credibility) in Asian setting. This increases the appropriateness of using original TAM specifically in internet banking setting. The adoption in a special setting: internet banking in Malaysia and the TAM has put a challenge to test in this unique environment, resulting in a model fit which gives original TAM a thumb’s up.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH:

Model of technology acceptance is also valid for internet banking in Malaysia. We also suggest that models of technology acceptance should be re-formulated to focus more on the key role of the perceived usefulness of the service embedded in the technology (Abdullah & Sentosa, 2011). Implications for banks are that they need to put much effort not only into making a user-friendly internet bank, but also into explaining to their customers how the internet bank is useful to them (Kent *et al.*, 2005). This research has found significant direct and indirect effects of three mediating variables namely perceived usefulness, perceived ease of use, perceived credibility on the relationships between computer self-efficacy and the intention to use internet banking. The construct has been tailored according to the Malaysian context. We believe that the model we have suggested could be useful for managerial research and practice of electronic commerce especially in the banking industry for the improvement of strategic marketing planning in Malaysia.

REFERENCES:

- [1] Abdullah, A. H., Sentosa, I. (2011). Human Resource Competencies Perceived by Malaysian Human Resource Practitioners and Consultants. *International Journal of Current Research*, Vol.3, Issue.10,PP.099-106, September 2011.
- [2] Ahmad Nasir Mohd Zin & Zahri Yunos (2005). How to make online banking secure. Techcentral .com.
- [3] Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- [4] Ajzen, I. (1985), "From intentions to actions: a theory of planned behavior", in Kuhl, J., Beckmann, J. (Eds),*Action Control: From Cognition to Behavior*, Springer-Verlag, New York, NY, pp.11-39.
- [5] Agarwal, R. & Prasad, J. (1999), "Are individual differences germane to the acceptance of new information technologies?", *Decision Sciences*, Vol. 30 No. 2, pp. 361-91.
- [6] Bandura, A. (1977). Self-efficacy:Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- [7] Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York:W.H. Freeman.
- [8] Bandura, A. (1982). Self-efficacy mechanisms in human agency.*American Psychologist*, 37, 122-147
- [9] Bagozzi, R.P. and Y. Yi. 1988. "On the evaluation of structural equation models." *Journal of the Academy of Marketing Science* 16 74-94
- [10] Bradley L and Stewart K (2003), "A delphi study of internet banking", *Journal of Marketing Intelligence & Planning* 21.5. 272-281.
- [11] Compeau, D., & Higgins, C. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19, 189-211.
- [12] Compeau, D., & Higgins, C. (1999). Social Cognitive Theory and individual reactions to computing technology: A longitudinal study. *MIS Quarterly*, 23, 145-158.
- [13] Compeau, D. R., & Higgins, C. A. 1995. "Application of social cognitive theory to training for computer skills". *Information Systems Research*, 6(2): 118-143.
- [14] Davis, L. D., & Davis, D. F. (1990). "The effect of training techniques and personal characteristics on training end-users of information systems". *Journal of Management Information Systems*, 7(2), 93-110.
- [15] Davis, S. A., & Bostrom, R. P. (1993). Training end users: An experimental investigation of the roles of the computer interface and training methods. *MIS Quarterly*, 17(1), 61-85.
- [16] Davis, F.D. (1989) "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS quarterly*, Vol. 13 No 3, pp 318-39.
- [17] Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- [18] Doll, W.J., Hendrickson, A. and Deng, X. (1998), "Using Davis's perceived usefulness and ease-of-use instruments for decision making: a confirmatory and multi-group invariance analysis", *Decision Science*, Vol. 29 No. 4, pp. 839-69.
- [19] Enders A, Konig A, Jelassi T and Hungenberg (2006), *The Relativity of Disruption: E-Banking As A Sustaining Innovation in The Banking Industry*, *Journal of Electronic Commerce Research* 7,2. 67-78
- [20] Eriksson K, Kerem K and Nilsson D (2005), "Customer Acceptance of Internet Banking in Estonia", *International Journal of Bank Marketing* 23,2. 200-216.
- [21] Fishbein, M., Ajzen, I. (1975), *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Addison-Wesley, Reading, MA, .
- [22] Flavian C, Guinnaliu M and Torres E (2005), *The Influence of Corporate Image on Consumer Trust: A Comparative Analysis in Traditional Versus Internet Banking*, *Internet Research Bradford* 15,4. 447-451.
- [23] Fornell & Larcker (1981), *Evaluating structural equation models with unobservable variables and measurement error*. *Journal of Marketing Research*, 48, 39–50.
- [24] Ganesan, S. (1994), "Determinants of long-term orientation in buyer-seller relationships", *Journal of Marketing*, Vol. 58 No. 2, pp. 1-19.
- [25] Gefen, D., Karahanna, E. and Straub, D.W. (2003), "Trust and TAM in online shopping: an integrated model", *MIS Quarterly*, Vol. 27 No. 1, pp. 51-90
- [26] Harrison, A.W., Rainer, R.K. Jr (1992), "The influence of individual differences on skill in end-user computing", *Journal of Management Information Systems*, Vol. 9 No.1, pp.93-111
- [27] Hoffman, D.L., Novak, T.P. and Peralta, M. (1999), "Building consumer trust online", *Communications of the ACM*, Vol. 42 No. 4, pp. 80-5.
- [28] Hong, W., Thong, J.Y.L., Wong, W.M., Tam, K.Y. (2001), "Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics", *Journal of Management Information Systems*, Vol. 18 No.3, pp.97-124

- [29] Hutchinson D and Warren M (2003), "Security for internet banking: a framework", *Journal of Logistic Information Management* 16,1. 64-73.
- [30] Jackson, C.M., Chow, S., Leitch, R.A. (1997), "Toward an understanding of the behavioral intention to use an information system", *Decision Sciences*, Vol. 28 No.2, pp.357-89.
- [31] Karahanna, E. and Straub, D.W. (1999), "The psychological origins of perceived usefulness and perceived ease-of-use", *Information & Management*, Vol. 35 No. 4, pp. 237-50.
- [32] Kim, K.K, Prabhakar, B., Kim, B.H (2001),"Initial Trust as a Determinant of the Adoption of Internet Banking", available at: <http://mri.inha.ac.kr/article/8-1/banking%5D.PDF>.,
- [33] Levin, T. and Gordon, C. (1989), "Effect of gender and computer experience on attitudes towards computers", *Journal of Educational Computing Research*, Vol. 5 No. 1, pp. 69-88.
- [34] Liao, S., Shao, Y.P., Wang, H., Chen, A. (1999), "The adoption of virtual banking: an empirical study", *International Journal of Information Management*, Vol. 19 No.1, pp.63-74
- [35] Lindsfold, S. (1978), "Trust development, the GRIT proposal and the effects of conciliatory acts on conflict and cooperation", *Psychological Bulletin*, Vol. 85 No.4, pp.772-93.
- [36] Morgan, R.M. Hunt, S.D (1994)."The commitment-trust theory of relationship marketing", *Journal of marketing*, 58, 20-38.
- [37] Mathieson, K. (1991), "Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior", *Information Systems Research*, Vol. 2 No.3, pp.173-91.
- [38] Milind S, (1999), "Adoption of internet banking by Australian consumers: an empirical investigation, *International Journal of Bank Marketing* 17.5, 324-334.
- [39] Moore, G.C., Benbasat, I. (1991), "Development of instrument to measure the perceptions of adopting an information technology innovation", *Information Systems Research*, Vol. 2 No.3, pp.192-222.
- [40] Nahl, D. (1996). "Affective monitoring of Internet learners: Perceived self-efficacy and success". *Journal of American Society for Information Sciences*, 33, 100-109.
- [41] Nahl, D. (1997). User-centered assessment of two Web browsers: Errors, perceived self-efficacy, and success. *Journal of American Society for Information Sciences*, 34, 89-97
- [42] Niels P.M (2000), "The Internet and Service Marketing – the Case of Danish Retail Banking, *Internet Research: Electronic Networking Application and Policy* 10,1. 7-18.
- [43] Nejatian, H., Piaralal, S. K., Sentosa, I., Bohari, A. M., (2011). The Influence of Customer Knowledge on CRM Performance of Malaysian ICT Companies: A Structural Equation Modelng Approach, *International Journal of Business and Management*, Vol.6, No.7;July2011, ISSN 1833-3850 (Print) ISSN 1833-8119 (Online), Canadian Center of Science and Education (CCSE),www.ccsenet.org/ijbm, doi:10.5539/ijbm.v6n7p181.
- [44] Nelson O.N and Queenie S (2006), "Customer attitudes, systems characteristics and internet adoption in Malaysia", *Management Research News* 29, 1/2. 16-27.
- [45] Pavlou, P.A. (2001), "Consumer Intention to adopt electronic commerce – Incorporating Trust and Risk in the Technology Acceptance Model", in *Proceedings of the Diffusion Interest Group in Information Technology Conference (DIGIT2001)*, Sunday 16 December, New Orleans, LA.
- [46] Petty, R. E., Cacioppo, J. T., & Schumann, D. (1983). "Central & Peripheral Routes to Advertising Effectiveness: The Moderating Role of Involvement". *Journal of Consumer Research*, 10 (2), 135-146
- [47] Saade R.G, Nabebe F and Tan W (2007), "Viability of the technology acceptance model in multimedia learning environments: A Comparative Study", *International Journal of Knowledge and Learning Objects*, 3, 175-184.
- [48] Sekaran, U (2003), "Research Methods for Business", New York, Wiley & Sons, Inc
- [49] Siriluck R and Marck S (2003), "Barriers to internet banking adoption: a Qualitative Study Among Corporate Customer in Thailand", *International Journal of Bank Marketing* 21,6/7, 312-323.
- [50] Taylor, S., Todd, P.A. (1995), "Understanding information technology usage: a test of competing models", *Information Systems Research*, Vol. 6 No.2, pp.144-76.
- [51] Venkatesh, V. (1999), "Creation of favorable user perceptions: exploring the role of intrinsic motivation", *MIS Quarterly*, Vol. 23 No.2, pp. 239-60.
- [52] Venkatesh, V (2000)," Determinants of perceived ease of use: integrating control, motivation and emotion into the technology acceptance model". *Information Systems Research*, Vol. 11 No. 4, pp. 342-65.
- [53] Wang Y.S, Wang Y.M, Lin H.H and Tang T.I (2003), "Determinants of user acceptance of Internet banking: An empirical study", *International Journal of Service Industry Management* 14,5. 501-519.
