

Full Length Research Paper

The exploration on network behaviors by using the models of Theory of planned behaviors (TPB), Technology acceptance model (TAM) and C-TAM-TPB

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This research mainly aims to explore the network behaviors of Web 2.0 users. The comparative analysis is also operated with the research models of Theory of planned behaviors (TPB), TAM and C-TAM-TPB. With network questionnaires, there are 638 valid replies received. The relations among different variables in this research are examined with the structural equation models. Additionally, it is found from research results, all hypotheses are established. Moreover, the explanatory power of planned behaviors is more acceptable than the technology acceptance model and C-TAM-TPB.

Key words: Theory of reasoned action (TRA), theory of innovation diffusion (TID), Theory of planned behaviors (TPB), TAM, C-TAM-TPB.

INTRODUCTION

The explanations on user behaviors to accept new technologies have been always a hot issue. The relevant researches on this issue are also widely known as one of the most mature research realms in the scientific lectures on modern information management. Therefore, from 1980 till now, by focusing on this issue, there are numerous models developed from information management science, sociology and psychology, inclusive of the theory of reasoned action (TRA), the theory of innovation diffusion (TID) (Rogers, 2003), the theory of planned behavior (TPB) (Ajzen, 1985), the technology acceptance model (TAM) (Davis, 1989), combined TAM and TPB, C-TAM-TPB (Taylor and Todd, 1995), etc. In view of the emphasis and prosperous development on the acceptance behavior theories for users to accept new technologies, the importance of researching technology acceptance behaviors for successful introduction can be clearly seen. However, among numerous theoretical models, there are different variables and causal relation-

ships included. Every theoretical model is vested with different influential variables and casual relationships due to different theoretical foundations and verification subjects. Therefore, in view of the applications for technology acceptance behaviors, there are many more empirical analysis required to discern various theoretical models and the applicability of variables to different industries.

It is found from past researches, TPB emphasizes behaviors (Timothy and Sulaiman, 2008), but TAM and C-TAM-TPB focus on the acceptance extents to new technology commodities (Marc and Christoph, 2008; Taylor and Todd, 1995). Based on the research results proposed by Davis (1989), as research results indicate, in view of the explanation on using information technologies, TAM shows stronger predicting power than that of TPB. However, as research results of Taylor and Todd (1995) indicated, TAM is added with social factors and control factors integrated into C-TAM-TPB with

stronger exploration power to information technologies. Additionally, in view of theoretical convenience, TAM is superior to C-TAM-TPB. Taylor and Todd (1995) also contend to maintain the convenience to an excellent extent, the explanatory power to behaviors must be sacrificed in TAM (with social variables and control variables omitted). Unlike TPB, TAM is designed with different contents according to various situations. Additionally, there is no social variable and control variable included in TAM, because Davis (1989) contends social variables and control variables show no remarkable associations with behaviors like the effect caused by usefulness. However, Taylor and Todd (1995) indicate social variables and control variables cause direct associations with behaviors. Therefore, both TAM and TPB are integrated to develop a C-TAM-TPB model.

To sum up above mentions, this research is operated with 3 models, namely TPB, TAM and C-TAM-TPB for empirical exploration on their fitness.

LITERATURE AND HYPOTHESIS

Web 2.0

Web 2.0 is a new network trend firstly proposed by the founder and CEO of O'Reilly Media, Mr. Tim O'Reilly (2005). Web 2.0 means the new business management of websites gradually surfacing from the network bubbles since 2000. Web 2.0 is not an unchanged fixed model, but it means a concept with continuous progress and improvement. Furthermore, the increasing network surfing populations and the changes happening to users' life habits are also the important factors to make Web 2.0 appear. Because Web 2.0 in itself emerges from the interaction and cohesion among people, the increasing network surfing populations is one of the critical factors to the formation of Web 2.0 (Gong, 2006). Till 2010 Q4, the number of frequent network surfing populations locally has reached 10,790,000. Compared with 600,000 network surfing users in 1996, the growth pace is very fast (III FIND, 2011). With such a great number of network surfing populations, the fever of Web 2.0 network applications is formed currently. Regarding the researches on Web 2.0, most are applied to education activities with the platforms available to improve learning efficiency and shorten the digital divide (Gabriela, 2009; Gabriela and Carmen, 2010; James, 2010; Koong and Wu, 2010).

The Theory of Planned Behaviors (TPB)

In 1985, 1988 and 1991, the theory of planned behaviors was proposed by Ajzen. Because the theory was developed from the theory of reasoned action (TRA), both theories suppose behavioral intentions to be the

important factors to usage behaviors. Moreover, for other factors to possibly cause indirect influence on behaviors through intentions, there are 3 major dimensions to influence intentions including the internal factors whether individuals showing their own preference, attitude towards the behaviors (AT), whether some import others giving the supports to a certain behavior, the "subjective norms (SN)" and the factors coordinated with both opportunities and time, also, the difficulty extents for individuals to control themselves with some behaviors achieved, "perceived behavioral control (PBC)". The formation of attitude and subjective norms is identical to that of TRA. If the higher positive attitude of individuals is posed against a certain behavior perceiving much more pressure from important others and surrounding societies, the substantial control extents to such a behavior is perceived stronger; if the behavior control is easier, individuals show stronger intentions to conduct such a behavior. Regarding TPB researches, there are some applied to knowledge share (Johnny and Bolloju, 2005), breastfeeding attitudes (Melanie et al., 2007), piracy behaviors (Timothy and Sulaiman, 2008) and daily life behaviors of network administrators (Alma et al., 2010), etc.

It is found from past researches on TPB, behavioral attitudes and perceived behaviors cause positive influence and high explanatory power to behavioral intentions. Behavioral intentions cause positive influence on substantial usage behaviors. Therefore, there are some hypotheses proposed by this research:

H1: More positive attitudes posed by users against Web 2.0 can bring with stronger "behavioral intentions".

H2: More positive "subjective norms" posed by users against Web 2.0 can bring with stronger "behavioral intentions".

H3: More positive "perceived behavior control" posed by users against Web 2.0 can bring with stronger "behavioral intentions".

H4: More positive "behavioral intentions" posed by users against Web 2.0 can bring with stronger "substantial usage behaviors".

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) was proposed by Davis in 1989. It is a model based on TRA especially focusing on the behaviors of using technologies. Till now, it is widely explained as the acceptance extents for users to accept new information technologies, namely, the associations formed by option faith and attitudes. It is meant to predict the acceptance extents of final users (Succi and Walter, 1999). Morris and Dillon (1997) contend no matter this system is actually applied, TAM provides researchers with a simpler and more cost-saving method to predict the extents of systematic

success.

In the perspective of technology acceptance, Davis (1989) proposes perceived usefulness (PU) and perceived ease of use (PEU) are two major determining factors for attitudes. Through empirical verification, two dimensions of both perceived usefulness (PU) and perceived ease of use (PEU) cause influence on the attitudes of using technologies to further impact behavioral intentions. Furthermore, behavioral intentions impact usage behaviors. Regarding TAM researches, they are applied to BBS or website communities (Mathieson et al., 2001; Kwon and Wen, 2010), on-line games (Hsu and Lu, 2004), Internet banking (Rigopoulos and Askounis, 2007) and on-line learning systems (Liu et al., 2010), etc.

In view of past researches on TAM, it is found perceived ease of use causes positive influence on perceived usefulness. Both perceived usefulness and perceived ease of use cause positive influence on attitudes. Attitudes cause positive influence on behavioral intentions. Behavioral intentions cause positive influence on usage behaviors. Therefore, there are some hypotheses proposed in this research:

H5: "Perceived ease of use" causes positive influence on "perceived usefulness".

H6: "Perceived usefulness" causes positive influence on "attitudes".

H7: "Perceived ease of use" causes positive influence on "attitudes".

H8: "Attitudes" cause positive influence on "behavioral intentions".

H9: "Behavioral intentions" cause positive influence on "substantial usage behaviors".

Combined Technology Acceptance Models and the Theory of Planned Behaviors (Combined TAM and TPB, C-TAM-TPB)

Taylor and Todd (1995) contend TAM is meant to predict the behavioral intentions for using technologies among users and the capabilities of substantial usage behaviors. Although, it has been widely supported by a great number of scientific researches, yet there is no social factor and control factor integrated into the research model. The said two factors have been clearly verified by numerous empirical researches with remarkable influence on users' substantial usage behaviors for using technologies. The said two factors are also the key variables in TPB. Therefore, Taylor and Todd (1995) integrate both TAM and TPB further added with two control variables, subjective norms and perceived behavior control, in to the TAM model. The combined TAM and TPB, C-TAM-TPB is proposed. According to the research conducted by Taylor and Todd (1995), from the empirical results with students using the facilities of computing center resources, it is found the C-TAM-TPB

integrated by both TAM and TPB comes with excellently high fitness to explain user behaviors for using new technologies.

It is found from past C-TAM-TPB researches, perceived ease of use causes positive influence on perceived usefulness. Both perceived usefulness and perceived ease of use cause positive influence on attitudes. Attitudes, subjective norms and perceived behavior control cause positive influence on usage behaviors. Therefore, there are some hypotheses proposed in this research:

H10: "Perceived ease of use" causes positive influence on "perceived usefulness".

H11: "Perceived usefulness" causes positive influence on "attitudes".

H12: "Perceived ease of use" causes positive influence on "attitudes".

H13: More positive "attitudes" posed by users against Web 2.0 can bring with stronger "behavioral intentions".

H14: More positive "subjective norms" posed by users against Web 2.0 can bring with stronger "behavioral intentions".

H15: More positive "perceived behavior control" posed by users against Web 2.0 can bring with stronger "behavioral intentions".

H16: More positive "behavioral intentions" posed by users against Web 2.0 can bring with stronger "substantial usage behaviors".

RESEARCH METHODS

Measurements

Attitude: It means the intentional evaluation for individuals to use Web 2.0 websites. There are 7 questions totally with the question items proposed by Ajzen (1985), Johnny and Bolloju (2005).

Subjective norm: It means the Web 2.0 usage extents of important relevant persons perceived by users. There are totally 3 questions adopted from Ajzen (1985), Johnny and Bolloju (2005).

Perceived behavior control: It means the support extents provided by relevant infrastructures to use Web 2.0 websites perceived by users. There are totally 5 questions adopted from Ajzen (1985), Johnny and Bolloju (2005).

Perceived usefulness: It means the fruitful assistance to use Web 2.0 websites for more efficient communications and satisfaction perceived by users. There are totally 5 questions adopted from Davis (1989), Mathieson et al. (2001).

Perceived ease of use: It means the achieved intentions, effort spending and realizing functions to use Web 2.0 websites perceived by users. There are totally 6 questions adopted from Davis (1989), Mathieson et al. (2001).

Behavioral intention: It means the future intentions to use, recommend others to use and actively plans to use Web 2.0 websites perceived by users. There are totally 3 questions adopted from Ajzen (1985), Johnny and Bolloju (2005).

Substantial usage behavior: It means usage frequencies and durations of using Web 2.0 websites perceived by users. There are totally 3 questions adopted from Ajzen (1985), Johnny and Bolloju (2005).

The aforesaid scales are all designed with Likert 5-point scales. Respondents pose different extents of approvals (1: total

disapproval, 5: total approval).

Demographic variable: There are totally 6 items, genders, marital status, education levels, durations to touch Internet, weekly average frequencies on internet surfing.

Subjects and sampling

This research is operated with internet questionnaires. It is because higher reliable questionnaire replies can be achieved by respondents through internet surfing environment (Hoffman and Novak, 1996). However, the most unconvincing factor of internet surveys is mainly because internet users are vested without population representativeness among samples. Such a situation is mainly because not every individual has internet facilities in hand (Couper, 2000). However, with the remarkably growing internet prevalence, convenience and usability recently, some researches reveal the compositions of internet surfers come with increasingly high heterogeneous users. Their difference to non-internet surfers is also dwindling gradually (Smith and Leigh, 1997; Hewson et al., 2003). Compared with traditional questionnaires, internet questionnaire surveys are merited with low cost and immediate response feedback. They can breakthrough the restrictions of time and space. They are featured with good anonymity and excellently independent replies to avoid the interference from others (Couper, 2000). Ilieva et al. (2002) contend the durations for internet surveys should last for 1 week at least. It is highly recommended the survey durations should last for 2 weeks roughly with sufficient time available for the survey involvement of respondents. Additionally, the number of samples should be larger than 150 just available for SEM analysis (Cheng et al., 2005).

The pre-tests are conducted on the student subjects from graduate schools and universities for questionnaire surveys. There are totally 67 valid replies received to evaluate the length and linguistic clearness of questionnaire contents. By using item analysis techniques, the questions with weaker influence can be realized for further deletion or correction to improve questionnaire quality. Finally, through the questionnaire surveys posted on the MY3Q website and various forums, respondents can directly reply questionnaires through the internet browser. The duration of questionnaire surveys is 3 months. There are totally 698 replies received with 60 invalid replies deleted. Therefore, there are totally 638 valid replies received.

Sample receipt and distribution

In view of gender distribution, males occupy 47.3% and females occupy 52.7%. Regarding the distribution of marital status, the unmarried samples occupy 64.8%. About gender distribution, most samples are young students aging from 20 to 30, occupying 41.7%. Regarding the distribution of education levels, most are university and college students, occupying 57.9%. In view of the durations of internet surfing, samples with 6 years of internet surfing experience occupy 54.3%. For average weekly internet surfing durations, samples with 30 more hours of internet surfing durations a week is the largest proportion occupying 22.2%.

RESULTS

Reliability analysis and correlation analysis

From reliability analysis, it is found every dimensional Cronbach's α coefficient are rated above 0.7. Additionally, for TAM, TPB and C-TAM-TPB, the integral

Cronbach's α coefficients are separately rated at 0.84, 0.83 and 0.88. According to the suggestions from Guelford (1965), if Cronbach's α coefficients are rated above 0.70, it means high reliability. On the whole, the reliability levels of every variable are all rated above 0.7. It means this research is vested with very high reliability. The averages, standard deviations, correlation analysis and reliability analysis for every variable are shown as Table 1.

The analysis of structural equation modeling (SEM)

This research is operated with generally weighted least squares (WLS) as a method to examine parameter estimation and modal fitness. For the examination of modal fitness, this research refers to the opinions proposed by Bagozzi and Yi (1988). In 3 perspectives of preliminary fitness, overall modal fitness and internal structural fitness, the fitness for theoretical models and observed data is evaluated.

In view of preliminary fitness, in TPB, the measurement errors of Y variables (namely, $\varepsilon_1, \varepsilon_2 \sim \varepsilon_6$) and X variables ($\delta_1, \delta_2, \delta_3 \dots \delta_{15}$), along with the residual errors of potential dependent variables ($\zeta_1 \dots \zeta_2$) are all ranged between 0.17 and 0.4. There is no negative error found. Furthermore, all are rated above .05 to reach their significance levels. Factor loadings are ranged between 0.59 and 0.85. The standard errors of estimated parameters are ranged between 0.01 and 0.12 and there is no remarkable standard error found. To sum up above mentions, in view of preliminary fitness in models, TPB perfectly complies with the fitness criteria proposed by Bagozzi and Yi (1988). TPB paths established by this research show no specification error. Identically, TAM and C-TAM-TPB also satisfy this standard.

In view of overall fitness, in TPB, χ^2/DF is rated at 5 within the acceptable range. RMSEA is rated at 0.07. Although, the value is rated above the severe standard 0.05, P value is significant. It means theoretical models and observed data come with good fitness. Both GFI and AGFI indices are rated above 0.9 and 0.87. It reveals the theoretical models in this research are vested with excellently high explanatory power to variability and co-variables. NFI, CFI, IFI and RFI are orderly rated at 0.89, 0.91, 0.91 and 0.88. All of them are rated above or approached to the severe standard 0.90. It reveals the overall fitness for TPB established by this research and observed data can reach the ideal standard. PNFI and PGFI are orderly rated at 0.77 and 0.79 and both are rated above the standard .50. The AIC index achieved by this research is rated at 462.000 smaller than 1136.674 of the saturation model and 9238.336 of the independent model. It complies with the theoretical model requirement AIC shall be rated below the AIC standards of both the saturation model and the independent model. It reveals TPB established by this research is a streamlined model.

Table 1. Results of mean, sd, correlation and reliability analysis

	mean	sd	1	2	3	4	5	6	7
1 AT	3.78	.582	(0.92)						
2 SN	3.44	.713	0.5***	(0.81)					
3 PBC	3.61	.600	0.65***	0.62***	(0.78)				
4 BI	5.23	.694	0.42***	0.44***	0.5***	(0.81)			
5 B	3.54	.772	0.52***	0.45***	0.51***	0.45***	(0.91)		
6 PEU	3.54	.609	0.54***	0.55***	0.65***	0.52***	0.45***	(0.91)	
7 PU	3.60	.587	0.55***	0.55***	0.58***	0.57***	0.55***	0.65***	(0.82)

Note : *P<0.05 , **P<0.01 , ***P<0.000

Note : () indicate reliability

Table 2. Results of three models

	TPB	TAM	C-TAM-TPB
Absolute fit measures			
Degrees of Freedom	183	246	457
Minimum Fit Function Chi-Square	1040.674(P=0.0)	1455.202(P=0.0)	2943.746(P=0.0)
Root Mean Square Error of Approximation(RMSEA)	0.07	0.07	0.08
P-Value for Test of Close Fit (RMSEA<0.05)	0.000	0.000	0.000
Goodness of Fit Index (GFI)	0.9	0.88	0.81
Adjusted Goodness of Fit Index (AGFI)	0.87	0.84	0.79
Incremental fit measures			
Normed Fit Index (NFI)	0.89	0.89	0.81
Comparative Fit Index (CFI)	0.91	0.9	0.83
Relative Fit Index (RFI)	0.88	0.88	0.79
Incremental Fit Index (IFI)	0.91	0.9	0.83
Parsimonious fit measures			
Independence AIC	9238.336	10976.634	3085.746
Model AIC	462.000	600.000	1056
Saturated AIC	1136.674	1563.202	14913.448
Parsimony Normed Fit Index (PNFI)	0.77	0.77	0.74
Parsimony Goodness of Fit Index (PGFI)	0.79	0.79	0.76

Identically, TAM and C-TAM-TPB also comply with this standard (Table 2).

In view of internal structural fitness, in TPB, all estimated factor loadings (λ values) reach their significant levels with $t=2.41\sim 27.20$ and $p<.05$. It complies with the evaluation standard that factor loadings shall reach their significant levels (Bagozzi and Yi, 1988) . Secondly, the individual item reliability of 21 measurement indicators in TPB paths (Range values of X and Y measurement indicators predicted by potential variables) is ranged between 0.45 and 0.73. All values are rated above the standard .45, namely the ideally acceptable results. Thirdly, the 5 composite reliabilities of

potential variables in theoretical models are orderly rated at 0.89, 0.81, 0.84, 0.79 and 0.86. All values are rated above the evaluation standard .60. Fourthly, in view of extracted variances, the extracted variances of 5 potential variables in theoretical models (average extracted variances) are separately rated at 0.55, 0.57, 0.51, 0.57 and 0.68. All values are rated above the evaluation standard .50. Identically, TAM and C-TAM-TPB also satisfy the standard.

Additionally, in TPB, in the part of residual variances of internal potential variables (η), the residual variances (ξ_1) of behavioral intentions are rated at 0.33; behavioral intentions are explained as 67% of the total variances of attitudes, subjective norms and perceived behavior

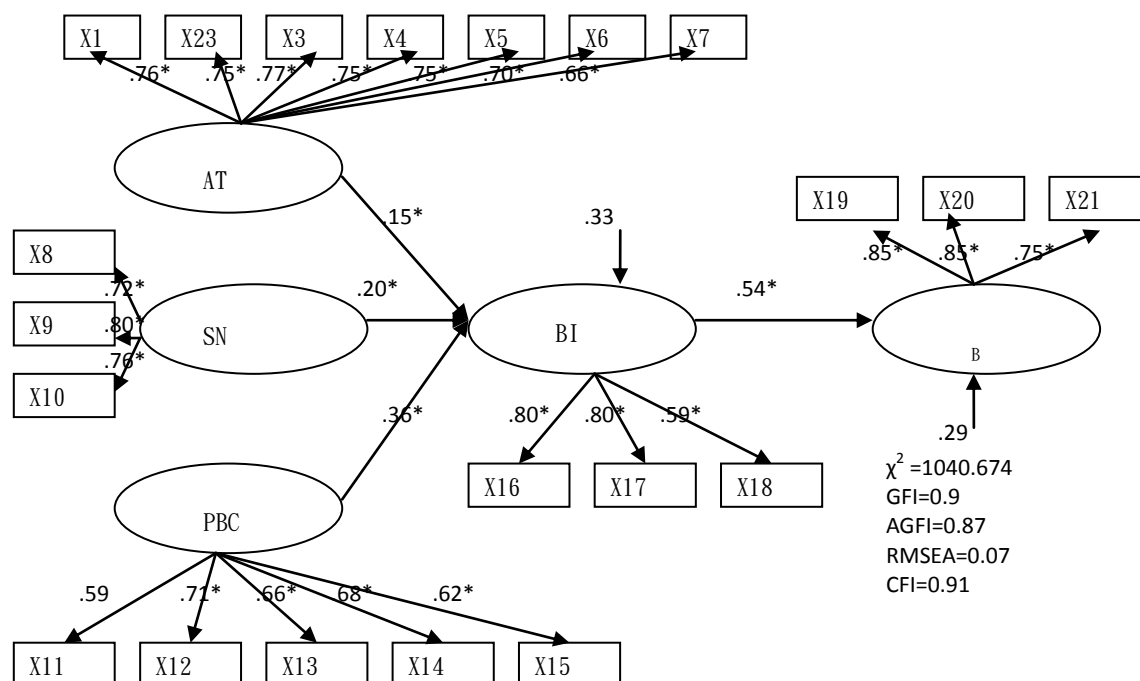


Figure 1. Model of TPB

control. The residual variance (ξ_4) of substantial usage behaviors is rated at 0.29. The variance of substantial usage behaviors is explained as 71% of total variance by behavioral intentions (Figure 1).

TAM, for the part of residual variance from internal potential variables (η), the residual variance (ξ_1) of perceived usefulness is rated at 0.54. Perceived usefulness is explained as 46% of total variance by perceived ease of use, the residual variance (ξ_2) is 0.46, and attitudes are explained as 54% of total variance by both perceived usefulness and perceived ease of use. The residual variance (ξ_3) of behavioral intentions is 0.31 behavioral intentions are explained as 69% of total variance by attitudes. The residual variance (ξ_4) of substantial usage behaviors is 0.29 and substantial usage behaviors are explained as 71% of total variance by behavioral intentions (Figure 2).

In the C-TAM-TPB model, for the part of residual variance (η) of internal potential variables, the residual variance (ξ_1) of perceived usefulness is 0.54; perceived usefulness is explained as 46% of total variance by perceived ease of use. The residual variance (ξ_2) of attitudes is 0.43; attitudes are explained as 57% of total variance by both perceived usefulness and perceived ease of use. The residual variance (ξ_3) of behavioral intentions is 0.53; behavioral intentions are explained as 47% of total variance by attitudes, subjective norms and perceived behavior control. The residual variance (ξ_4) of substantial usage behaviors is 0.31 and substantial usage behaviors are explained as 69% of total variance by behavioral intentions (Figure 3).

Finally, in the analysis on model fitness and simplicity, in TPB, both GFI and AGFI values are rated at 0.9 and 0.87. In TAM, both GFI and AGFI values are rated at 0.88 and 0.84. In C-TAM-TPB, both GFI and AGFI values are rated at 0.81 and 0.79. To sum up above mentions, TPB values are superior to those of other models.

DISCUSSION AND CONCLUSION

Based on analysis results, all path coefficients reach their significant levels with all hypotheses well established. For the part of TPB (H1-H4), results reveal the attitudes, subjective norms and perceived behavior control of users can actually affect behavioral intentions. Also, behavioral intentions affect substantial usage behaviors. Additionally, it is found the attitudes toward Web 2.0 websites (3.78) show higher approval extents than those of behavior control to Web 2.0 websites (3.61) and subjective norms to websites (3.44). It reveals most users agree using Web 2.0 websites can save time. They are also functioned with much more resource to solve problems or give aids. Therefore, the upcoming usage intentions of users against Web 2.0 internet are enhanced.

For the part of TAM (H5-H9), results reveal perceived usefulness and perceived ease of use among users can affect the attitudes posed by users with subsequent influence on behavioral intentions and substantial behaviors. Among them, the approval extents of perceived usefulness (3.6) are higher than that of

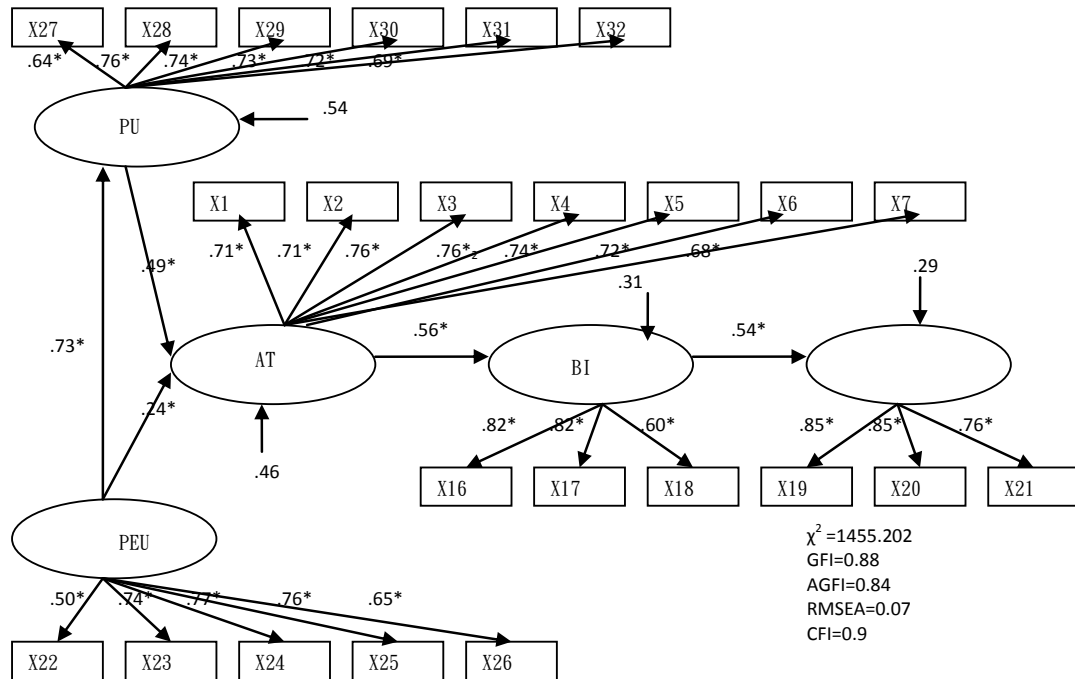


Figure 2. Model of TAM

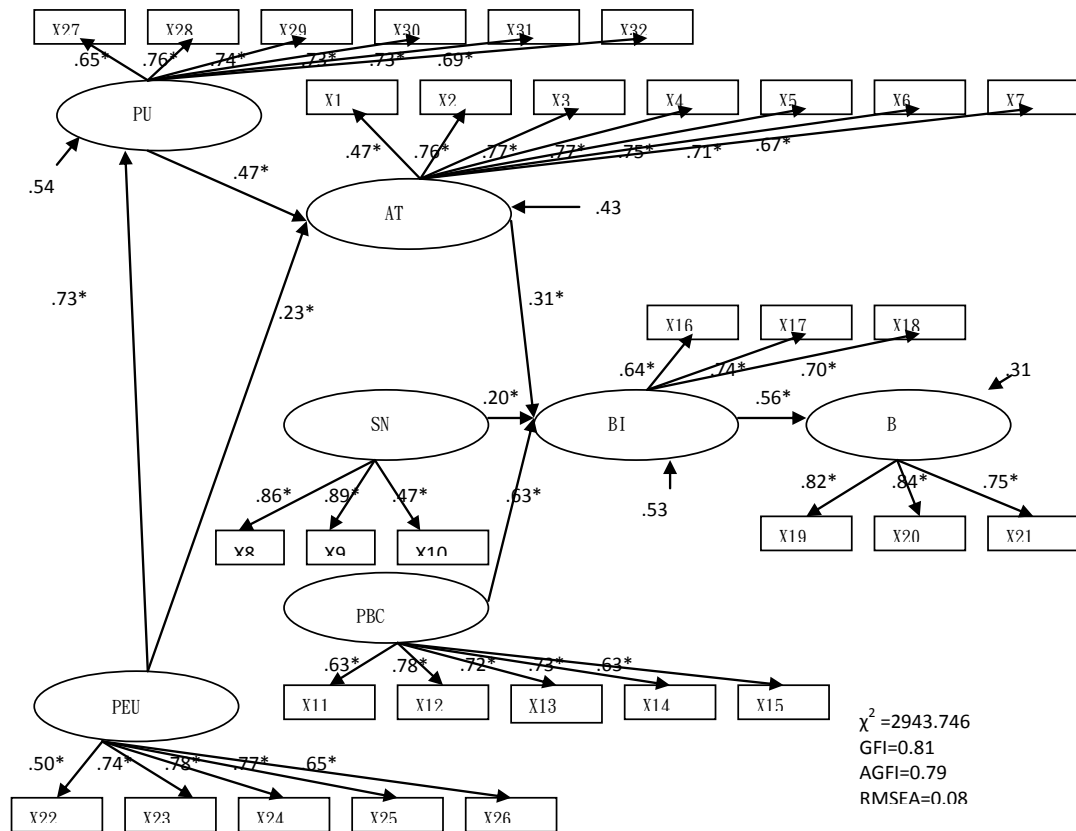


Figure 3. Model of C-TAM-TPB

perceived ease of use (3.54). It reveals most users agree that using Web 2.0 websites can enhance the convenience of daily life to satisfy information demands with pleasant emotion reachable.

For the part of C-TAM-TPB (H10-H16), results are identical to those of TPB and TAM. Among them, attitudes (3.78) show higher approval extents to perceived behavior control (3.61), subjective norms (3.44), perceived usefulness (3.6) and perceived ease of use (3.54). It reveals for users' behaviors, attitudes mean a very important influential factor.

Among the 3 modal comparison analysis mentioned in this research, for the overall modal fitness analysis among TPB, TAM and C-TAM-TPB, in TPB, both GFI and AGFI values are rated at 0.9 and 0.87; CFI and IFI values are 0.91 and 0.91 separately. It is better below two models. In TAM, both GFI and AGFI values are rated at 0.88 and 0.84; both CFI and IFI values are 0.9 and 0.9. In C-TAM-TPB, both GFI and AGFI are rated at 0.81 and 0.79; CFI and IFI are separately 0.83 and 0.83. For the part of path analysis, all the paths in TPB, TAM and C-TAM-TPB have been clearly examined in this research. For the part of explanatory power to variables, the explanatory powers of 3 models are all rated above the standard. For the part of substantial usage behaviors, the explanatory powers of both TPB and TAM (71%) are better than that of C-TAM-TPB (69%). To summarize above mentions, TPB shows its excellent fitness from the empirical analysis on user behaviors when they are using Web 2.0 websites.

It is known from the results in this research, 3 models are applicable to Web 2.0 websites. However, TPB shows higher applicability than those of TAM and C-TAM-TPB in this research. In this research, it is contended with the increasing prevalence of modern computer and information technologies, technological usefulness and ease of use have become one of the basic conditions. Also, accompanied with higher consumption power available, there is no obstacle for users to use technologies. Therefore, past research results are probably unsuitable for current researches on Web 2.0 websites. For past TPB researches, they emphasized usage behaviors (Timothy and Sulaiman, 2008). For TAM and C-TAM-TPB research models, they focused on the acceptance extents to new technology commodities (Marc and Christoph, 2008; Taylor and Todd, 1995). The results in this research are different from those of past researches. It is found research results users are deeper affected by external factors than internal factors to aggressively operate websites and users show higher operation frequencies of websites due to the factors from surrounding friends, relatives and individual facilities.

RESEARCH LIMITATION

In this research, the questionnaire messages are separately posted on internet relevant communities and

forums, such as PTT and discussion forums, etc. With the aggressive propagation made by internet questionnaire respondents, samples are collected in a snowball way. Snowball sampling probably causes the issues of high homogeneity and restriction.

REFERENCES

- Ajzen I (1985). From Intentions to Actions: a Theory of Planned Behavior. In J. Kuhl and J. Beckmann (eds.), *Action Control: From Cognition to Behavior*. New York: Springer Verlag, 11-39.
- Alma M, Colette D, Geraldine G (2010). Work-life Balance Policy and Practice: Understanding Line Manager Attitudes and Behaviors, *Hum. Resour. Manage. rev.*, 20(2): 158 - 167.
- Bagozzi RP, Yi Y (1988). On the Evaluation of Structure Equation Models. *Acad. Mark. Sci.*, 16(1): 74 - 94.
- Cheng ZC, Cheng BL, Cheng XF, Liu ZJ (2005). *The Statistical Software Applications for Multivariate Analysis*, Taipei: The Wunang Publisher.
- Couper MP (2000). Web Surveys: A Review of Issues and Approaches. *Public Opin Q.* 64(4): 464 - 495.
- Davis FD (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Q.* 13(3):319 - 340.
- Gabriela G (2009). To Use or Not to Use Web 2.0 in Higher Education? *Soc Behav Sci.* 1(1): 478 - 482
- Gabriela G, Carmen H (2010). Microblogging Multimedia-Based Teaching Methods Best Practices with Crip.eu. *Social and Behavioral Sciences*, 2(2): 2151 - 2155
- Gong WR (2006). *Earning Money and Creativities on Web 2.0*, Institute for Information Industry, III.
- Guilford JP (1965). *Fundamental Statistics in Psychology and Education*, 4th ed., New York: McGraw-Hill.
- Hewson C, Yule P, Laurent D, Vogel C (2003). *Internet Research Methods: A Practical Guide for the Social and Behavioral Sciences*, Sage, London, UK.
- Hoffman DL, Novak TP (1996). Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations. *J. Mark.*, 60(3):50 - 69.
- Hsu CL, Lu HP (2004). Why Do People Play On-Line Games? an Extended TAM with Social Influences and Flow Experience. *Inf. Manage.*, 41(7):853 - 868
- III FIND (2011, March 16). Local Internet Surfing Population in Taiwan till December 2010, Retrieved May 26, 2011, from <http://www.find.org.tw/find/home.aspx?page=many&id=282>
- Ilieva J, Baron S, Healy NM (2002). Online Surveys in Marketing Research: Pros and Cons. *Int. J. Mark. Res.*, 44(3): 361 - 376
- James PP (2010). The Changing Space of Research: Web 2.0 and the Integration of Research and Writing Environments. *comput. compos.*, 27(1):48 - 58
- Johnny CFS, Bolloju N (2005). Explaining the Intentions to Share and Reuse Knowledge in the Context of IT Service Operations. *J. Knowl. Manage.*, 9(6):30 - 42
- Koong CS, Wu CY (2010). An Interactive Item Sharing Website for Creating and Conducting On-Line Testing. *Comput. Educ.*, 55(1):131 - 144
- Kwon O, Wen Y (2010). An Empirical Study of the Factors Affecting Social Network Service Use. *Comput. Human. Behav.* 26(2):254 - 263
- Liu IF, Chen MC, Sun YS, Wible D, Kuo CH (2010). Extending the TAM Model to Explore the Factors that Affect Intention to Use an Online Learning Community. *Comput. Educ.*, 54(2):600 - 610
- Marc F, Christoph L (2008). User Acceptance of Virtual Worlds. *J. electron. commer. Res.*, 9(3): 231 - 242
- Mathieson K, Peacock E, Chin WW (2001). Extending the Technology Acceptance Model: The Influence of Perceived User Resources. *Database adv. inf. syst.*, 32(3):86 - 113
- Melanie G, Samantha C, Carol M, John M, Barbara SK, Marion W (2007). Measuring Young People's Attitudes to Breastfeeding Using the Theory of Planned Behaviour. *J. Public Health.*, 29(1): 17 - 26
- Morris MG, Dillon A (1997). How User Perceptions Influence Software Use. *IEEE Softw.*, 14(4): 58 - 65.

- Rigopoulos G, Askounis D (2007). A TAM Framework to Evaluate Users' Perception towards Online Electronic Payments. *J. Internet Banking commer.*, 12(3): 1 - 6
- Rogers EM (2003). *Diffusion of Innovations*, 5th ed., New York : Free Press.
- Smith MA, Leigh B (1997). Virtual Subjects: Using the Internet as an Alternative Source of Subjects and Research Environment. *behav. res. Methods.*, 29(4): 496 - 505.
- Succi MJ, Walter ZD (1999). Theory of User Acceptance of Information Technologies: An Examination of Health Care Professionals, *Systems sciences, HICSS-32, Proceedings of the 32nd Annual Hawaii International Conference*, 1-6
- Taylor S, Todd PA (1995). Understanding Information Technology Usage: a Test of Competing Models. *inf. syst. Res.*, 6 (2):144 – 176.
- Tim O'Reilly (2005, September 30). What-is-web-20: Design Patterns and Business Models for the Next Generation of Software, Retrieved May 25, 2011, from <http://tim.oreilly.com/news/2005/09/30/what-is-web-20.html>
- Timothy PC, Sulaiman AR (2008). Factors that Influence the Intention to Pirate Software and Media. *J. Bus. Ethics.*, 78(4): 527 – 545.