Predicting Taxpayers' Acceptance of Online Taxation Use

Ching-Wen Chen Echo Huang
Department of Information Management
National Kaohsiung First University of Science and Technology
2 Juoyue Rd, Nantz District, Kaohsiung 811
Taiwan, R.O.C.

Abstract: This study proposes an extended model to predict users' acceptance of online taxation system for their personal income based on technology acceptance model (TAM) and diffusion of innovation (DOI). The results show that taxpayers' attitudes toward using online taxation are strongly and positively correlated with users' acceptance. The empirical results confirm that perceived ease of use (PEOU), perceived usefulness (PU), compatibility, and perceived readiness (PR) significantly impact taxpayers' attitudes toward using online taxation system (OTS), as well as confirming the significant effect of perceived ease of use of the OTS on perceived usefulness. The findings also show that compatibility, PU, PR and attitude toward using OTS influence taxpayers' intention to use online taxation system significantly. The implication of this study to both researchers and practitioners is discussed.

Keywords: technology acceptance model, diffusion of innovation, perceived readiness

1. Introduction

Recently the proliferation of business-to-consumer (B2C) e-commerce has resulted in organizations establishing their net presence through a website aggressively [8]. However, people know how easy it is to do business over the Internet and are demanding the same level of service from government as they receive in the private sector. Therefore, public sector is deterministically following the same path as the private sector did to establish websites providing self-services via Internet. Public sectors provide websites offering online services to increase productivity and efficiency [19], and the typical SST is online taxation system (OTS).

In recent years, individual innovation adoption behavior and the diffusion of innovations have turned the research agenda towards self-service technologies, particular online services, such as Internet [17, 23], e-commerce [14, 15], online banking [10], and e-government [15, 27]. E-taxation acceptance is an important index of e-government in many countries. The net presence and operation of e-taxation depend heavily on composition of information system (IS), such as Internet, WWW, and network. When taxpayers accept and use e-taxation systems, they accept and use technologies and innovations [8]. E-taxation is similar to doing transaction on the Internet, and online transaction is treated as a voluntary behavior, which is mainly depending on users' beliefs and corresponding evaluations of the outcome of this particular behavior. With this, evaluations of outcomes about e-taxation may influence users' intention to use. Based on previous studies, behavioral intention and behavior were reported a strong causal link [7]. Agarwal and Prasad [1] also suggested analyzing behavioral intention, which is more appropriate than actual usage.

Therefore, this study integrated constructs from well-established information system acceptance models based on the Technology Acceptance Model [11], Diffusion of Innovation [28], and perceived readiness [19] into a parsimonious model to explain the impact of perceived readiness on customer's attitude towards using SSTs over the Internet and acceptance of SSTs over the Internet. The empirical context of this study is taxpayer's intention to use OTS for personal annual income in Taiwan.

2. Theoretical model

2.1 Technology acceptance model (TAM)

A main stream of social psychology suggests that a person's behavioral intention toward a specific behavior is the major factor in whether or not the individual will carry out [3]. In theory of reasoned action (TRA), the adoption of a particular behavior is based on the individual's evaluation of the potential to perform a specific task and is subject to contextual factors [12]. Behavioral intention, in turn, was predicted by the individual's attitude toward the behavior and subjective norm. Derived from TRA, technology acceptance model proposed that beliefs influence attitudes about information technology, which lead to intentions and subsequently behaviors of actual technology usage. TAM asserted that

perceived usefulness, and perceived ease of use of the technology characterized the beliefs that lead to system usage.

TAM is criticized for low explanatory power, some empirical studies have suggested that TAM be integrated with other acceptance theories to improve its predictive power [16, 18]. Though each study has contributed to our understanding of technology acceptance, they also illustrate the complexity of the issue. Liljander *et al.* [19] proposed technology readiness (TR) as a factor that fosters or hinders the adoption of new technologies. Based on their findings, we proposed a new factor called perceived readiness (PR), which is defined as 'mental enablers and inhibitors that collectively determine a person's predisposition to use new technologies.' Meuter *et al.* [22] argued that technologies could evoke feelings of anxiety or fun [1], which affect individuals' beliefs of and behavior toward technologies. This study integrates PR with TAM to investigate its ability to perform as a predictor of individual adoption and evaluation of SSTs. What extent PR can explain the variance in individual's attitude towards SSTs is also the major concern in this study.

2.2 Diffusion of innovation (DOI)

In the DOI theory, the adoption of innovation is modeled as a process of information gathering and uncertainty reduction with a view to evaluate the technology [28]. The individual's decision on whether to use the technology is based on perceptions of the technology such as relative advantage, compatibility, complexity, trialability, and observability. These identified antecedents of technology usage may be different for an individual adopting technology to receive a service and an employee who is using the technology to perform their work. In recent years, individual innovation adoption behavior and the diffusion of innovations have turned towards self-service technologies, particular online services, such as Internet [17, 23], e-commerce [14], and online banking [10].

2.3 Research model

DOI involves the formation of a positive or negative attitude toward an innovation. It lacks of further evidence to explain how attitude evolves into decision of accept or reject. Many TAM extension studies [18] suggest further acceptance research should integrate with other theories to improve the explanations or predictions of behaviors. Neither TAM nor DOI have been found to provide consistently superior predictions of behaviors independently. Therefore, many studies integrated TAM and DOI to construct new model to explore the relation between attitude and acceptance [8]. This study follows this trend focusing on integrating both TAM and DOI to predict intention to use from different points of view.

Moore and Benbasat [24] argued that the relative advantage construct in DOI is very similar with perceived usefulness in TAM, and the complexity construct in DOI is extremely similar to the perceived ease of use in TAM. Chen *et al.* [8] argued TAM and DOI reconfirm each other findings. Therefore, in our model, we first exclude relative advantage and complexity. Tornatzky and Klein [30] review the past DOI research, found that only relative advantage, compatibility, and complexity were consistently related to innovation adoption. Thus, we further excluded trialability and observability from the proposed model because they have not been found to be consistently related to the rate of adoption in previous research. Fishbein and Ajzen [12] suggested external variables should also be excluded because these variables don't have consistent findings and change over time [8]. Using TAM as the basic structure, the research model contains four predictors of attitude towards using e-taxation system, which are perceived usefulness, perceived ease of use, compatibility, and perceived readiness. Compatibility and perceived readiness were included as additional predictor of intention to use for voluntary setting.

Meanwhile, corresponding hypothesis of the proposed model are as follows.

H1: Attitude toward SSTs will positively influence behavioral intention to use OTS by taxpayer.
H2: Taxpayer's perceived usefulness will positively influence behavioral intention to use OTS.
H3: Taxpayer's perceived ease of use will positively influence behavioral intention to use OTS.
H4: Taxpayer's perceived readiness will positively influence behavioral intention to use OTS.
H5: Taxpayer's perceived compatibility will positively influence attitude toward using OTS.
H6: Taxpayer's perceived usefulness will positively influence attitude toward using OTS.
H7: Taxpayer's perceived ease of use will positively influence attitude toward using OTS.
H8: Taxpayer's perceived readiness will positively influence attitude toward using OTS.
H9: Taxpayer's perceived ease of use will positively influence perception of usefulness.

3. Research methodology

3.1 Measurement

The questionnaire was based as much as possible on measures reported in the literature, the questions being translated into Chinese (Mandarin). Multiple-item measures were used to assess the research constructs. All questions were measured using a 7-point scale.

A literature review and a pretest were conducted to ensure the face validity of our questionnaire[31]. The subjects of the pretest are graduate students in the master-work-experience's program and have at least five-years of either theoretical or practical experiences in related-working fields. These sample students in our pretest tend to be older, have families, regular jobs, and higher incomes that are reflective of society at large. Thus, these pretest sample subjects have the experience in either manual or electronic filing their personal income taxes in the past five years.

3.2 Data collection

Empirical data for this study was collected via a cross-sectional field survey of personal income taxpayers. There are two stages in the phase of data collection. In the first stage, a sample of sized 50 were randomly chosen from graduate students with five-years working experience in the master-work-experience's program of a national university. After a brief explanation concerning the investigation of the questionnaire to these chosen sample graduates, each one of them then were asked to bring 5~10 questionnaires (with stamped envelops) back to their living environment and distributed randomly to their colleagues, co-workers, relatives, or friend who were eligible for filing personal income taxes and willing to participate the investigation. The process of data collection lasted for four weeks in the income tax-filing season of May, and a total of 370 questionnaires were collected. The random sample covered one metropolitan and three counties with total population of 4.5 millions. Three hundred and fifty-nine questionnaires were used in the analysis after excluding those with missing values or inconsistent responses.

The age of the samples ranged from 20 to over 60 years old and the mean age was 34.6 years old. The age of over 75% of the sample was between 20 to 40 years old. The gender ratio was 52.1:47.9 (male : female). Of the sample, 85% hold bachelors or higher degrees in education, and half sample had annual incomes between new Taiwan dollars (NT$) of 370,000 to 990,000. Over two-third of the sample (246/359) filed their income taxes on Web-based tax system provided by tax authority of Taiwan in this personal income tax season of 2006.

3.3 Scale validation

Construct validity for the six measurement scales (behavioral intention to use, attitude toward using, perceived usefulness, perceived ease of use, compatibility, perceived readiness) was assessed via confirmatory factor analysis (CFA) using LISREL program. Each scale item can be modeled as a reflective indicator of it corresponding hypothesized (latent) construct. Tables 1 presented the results of the CFA analysis. To examine the goodness-of-good-fit of the overall CFA model, Bentler [5] suggested that chi-square normalized by degrees of freedom (χ^2/df) should not exceed 5. Other indexes of fit, Bentler-Bonett Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI), should both exceed 0.9. Although NNFI is sensitive to sample size and may indicate poor fit with small samples, it does not cause trouble in indicating model fit since the sample size of the study is 359. For the current CFA analysis, χ^2/df was 1.53 ($\chi^2 = 114.68$ and $df = 75$), NNFI was 0.99, and CFI was 0.99, suggesting adequate model fit.

Table 1: Measurement model

Item	Item Loading (λ)	Error Loading	*t*-Value for λ
BI1	0.75	0.44	11.09
BI2	0.80	0.36	10.12
BI3	0.79	0.38	10.32
ATU1	0.83	0.31	8.72
ATU2	0.86	0.26	7.53
PU1	0.84	0.30	9.24
PU2	0.84	0.30	9.15
PU3	0.84	0.29	9.03
EOU1	0.82	0.33	7.35
EOU2	0.81	0.34	7.56
PR1	0.73	0.47	9.27
PR2	0.77	0.41	8.15
C1	0.71	0.50	8.92
C2	0.71	0.55	9.82
C3	0.72	0.56	9.98

Convergent validity refers to the confirmation of the existence of a construct determined by the correlations exhibited by independent measures of the construct. Evidence of convergent validity is thus reflected in the strength of factor loadings and

their associated significant *t*-values along with estimates of the average variance explained (AVE). Fornell and Larcker [13] suggested that factor loadings should exceed .707 for each item. Anderson and Gerbing [4] also noted that convergent validity is demonstrated with all factor loadings being sufficiently large and each *t*-value being twice the standard error of the loading. Meanwhile, AVE estimates for each latent factor provide an estimate of the variance captured by the construct in relation to the amount of variance due to measurement error. Fornell and Larcker [13] further suggested a construct to display convergent validity if AVE is at least .50 (that is, when variance explained by the construct is greater than measurement error). Based on the discussion above, we found that all loading values in the CFA model exceeded 0.7 (see Table 1) and were significant at *p*-value of 0.001. AVE ranged from 0.51 to 0.71 greater than variance due to measurement errors (AVE > 0.5). Hence, the variable in the CFA model demonstrated adequate internal consistency and convergent validity.

The AVE could also be used to evaluate discriminant validity [13]. To fully satisfy the requirements for discriminant validity, the square root of AVE for each construct should be greater than the squared correlations between the constructs and all the other constructs. These results were presented in Table 2. The bold number on the diagonal was the square root of the AVE. The data clearly shows the squared correlations between the constructs to be less than the square root of average variance extracted of their respective constructs. Actually, the largest squared correlation between any pair of constructs was 0.67 (behavioral intention to use and attitude toward using), while the smallest AVE was 0.71. Hence, the test of discriminate validity was also met.

Table 2: The squared correlation matrix

Construct	Squared correlations between the constructs					
	BIU	ATU	PU	PEOU	PR	C
BIU	**0.78**					
ATU	0.67	**0.84**				
PU	0.49	0.42	**0.84**			
PEOU	0.58	0.48	0.27	**0.81**		
PR	0.62	0.50	0.35	0.41	**0.75**	
C	0.30	0.40	0.19	0.21	0.32	**0.71**

4. Results

4.1 Hypotheses testing and assessment of model fit

The nine hypotheses listed above were tested collectively using the structural equation modeling (SEM). Browne and Cudeck [6] suggested that a model whose root mean square error approximation (RMSEA) is less than 0.05 has a close fit and a RMSEA of less than 0.08 has a good fit also. Chin and Todd [9] suggested that the goodness of fit index (GFI) and normed fit index (NFI) should be above 0.90 and the adjusted goodness of fit index (AGFI) above 0.80 for a good fit. Bentler [5] and McKnight *et al.* [21] had similar suggestions. Similar to the assessment of the CFA model above, the structure model χ^2/df was 1.58 ($\chi^2 = 123.41$ and $df = 78$), RMSEA was 0.04, GFI was 0.96, NFI was 0.98, AGFI was 0.93, NNFI was 0.99, and CFI was 0.99. The LISREL models used a covariance matrix as input. The path analysis is used to examine the significance and strength of hypothesized effects in the research model.

Structural equation modeling permits the direct and indirect effects of each construct from the perspective of the entire model to be found. In this research model, the entire path coefficient-related hypotheses were significant at $p < 0.001$, except Hypothesis 8 was supported at $p < 0.01$. Behavioral intention to use was predicted by attitude toward using (β=0.30), perceived usefulness (β=0.21), perceived ease of use (β=0.27), and perceived readiness (β=0.28). In addition these direct effects, perceived readiness, perceived ease of use, perceived usefulness, and compatibility also had small indirect effects on behavioral intention to use via the attitude toward using with corresponding β=0.06, β=0.26, β=0.08, and β=0.07 respectively. Attitude toward using, in turn, was predicted by perceived readiness (β=0.21), perceived ease of use (β=0.30), perceived usefulness (β=0.28), and compatibility (β=0.25). Perceived ease of use also had an indirect effect (β=0.16) on attitude toward using via the perceived usefulness. Finally, perceived ease of use was a significant predictor of perceived usefulness (β=0.58).

Results of the research model showed that the multiple predictors of attitude toward using, perceived usefulness, perceived ease of use, and perceived readiness had a great influence on behavioral intention to use ($R^2 = 0.72$). Meanwhile, attitude toward using was impacted by the multiple predictors of compatibility, perceived usefulness, perceived ease of use, and perceived readiness (R^2 =

0.63). In addition, perceived usefulness was impacted by perceived ease of use ($R^2 = 0.34$).

In this model, perceived readiness (PR) had significant impact on behavior intention to use (coefficient for direct and indirect effects are 0.28 with *t*-value of 3.53 and 0.06 with *t*-value of 2.03, respectively). It is worth noting that the total effect of perceived readiness (β=0.34) is much higher than that of compatibility (β=0.07) in predicting behavioral intention to use. It is because the taxpayers have to "equip" themselves with sufficient IT-related skills to file their income taxes through the Internet, and take the benefits from the Web-based tax-filing system (e-taxation). This could not be the case in other information systems for general purpose of use, such as surfing the Net for searching shopping news.

5. Conclusion

The current research represents an important contribution to theory by extending TAM and incorporating DOI to explain online SSTs user behaviors. Our model integrates a mental determinant that is rarely studied before. However, the theoretical and empirical work done in this study provides a solid basis for extension of our research. In conclusion, users' acceptance of online SSTs remains a complex, elusive yet extremely important phenomenon. Research on OTS user behavior has made significant progress toward unrevealing some of its mysteries.

References

[1] Agarwal, R. and Karahanna, E., Time flies when you're having fun: cognitive absorption and beliefs about information technology usage, *MIS Quarterly*, Vol.24, No.4, 2000, pp.665-694.

[2] Agarwal, R. and Prasad, J., Are individual differences germane to the acceptance of new information technologies? *Decision Science*, Vol.30, No.2, 1999, pp.227-247.

[3] Ajzen, I. and Fishbein, M., *Understanding Attitude and Predicting Social Behavior*, Prentice-Hall, Englewoood Cliffs, NJ, 1980.

[4] Anderson, J. C. and Gerbing, D. W. Structural modeling in practice: A review and recommended two-step approach, *Psychological Bulletin*, Vol. 103, No. 3, 1988. pp. 411-423.

[5] Bentler, P., Comparative fit indexes in structural models, *Psychological Bulletin*, Vol. 107, 1990, pp. 238–246.

[6] Browne, M.W. and Cudeck, R., Alternative ways of assessing model fit, In: Bollen, K.A., Long, J.S. (Eds.), *Testing Structural Equation Models*, Sage, Beverly Hills, CA, USA. 1992.

[7] Chau, Y.K. and Hu, J. H., Information technology acceptance by individual professionals: a model comparison approach, *Decision Sciences*, Vol.32, No.4, 2001, pp.699-718.

[8] Chen, L.-D, Gillenson, M. L., and Sherrell, D. L., Enticing online consumers: an extended technology acceptance perspective, *Information & Management*, Vol.39, 2002, pp.705-719.

[9] Chin, W.W. and Todd, P.A., On the use, usefulness, and ease of use of structural equation modeling in mis research: a note of caution, *MIS Quarterly*, Vol. 19, No. 2, 1995, pp. 237–246.

[10] Curran, J.M., Meuter, M.L., and Surprenant, C.F., Intentions to use self-service technologies: a confluence of multiple attitude. *Journal of Service Research*, Vol.5, No.3, 2003, pp.209-224.

[11] Davis, F.D., Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, Vol.13, No.3, 1989, pp.319-339.

[12] Fishbein, M., and Ajzen, I., *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research,* Addison-Wesley, Reading, MA, 1975.

[13] Fornell, C. and Larcker, D. F., Evaluating structural equation models with unobservable variables and measurement error, *Journal of Marketing Research*, Vol.18, 1981, pp. 39-50.

[14] Gefen, D., and Straub, D., The relative importance of perceived ease of use in is adoption: a study of e-commerce adoption, *Journal of the Association for Information Systems*, Vol. 8, No. 1, 2000, http://jais.aisnet.org/articles/default.asp?vol=1&art=8

[15] Gilbert, D., Balestrini, P., and Littleboy, D., Barriers and benefits in the adoption of e-government, *The International Journal of Public Sector Management*, Vol,17, No,4/5, 2004, pp.286-301.

[16] Koufaris, M., Applying the technology acceptance model and flow theory to online consumer behavior, *Information System Research*, Vol.13, No.2, 2002, pp.205-223.

[17] Lederer, A. L., Maupin, D. J, Sena, M. P., and Zhuang, Y., The technology acceptance model and the World Wide Web, *Decision Support Systems*, Vol.29, 2000, pp.269-282.

[18] Legris, P., Ingham, J., and Collerette, P., Why do people use information technology? A

critical review of the technology acceptance model, *Information & Management*, Vol. 40, 2003, pp.191-204.

[19] Liljander, V., Gillberg, F., Gummerus, J., and van Riel, A., Technology readiness and the evaluation and adoption of self-service technologies, *Journal of Retailing and Consumer Services*, Vol. 13, Issue 3, 2006, pp. 177-191.

[20] Gillberg, F., Gummerus, J., and van Riel, A., Technology readiness and the evaluation and adoption of self-service technologies, *Journal of Retailing and Consumer Services*, Vol.13, 2006, pp.177-191.

[21] McKnight, D. H, Choudhuryb, V., and Kacmar, C. The impact of initial consumer trust on intentions to transact with a web site: a trust building model, *Journal of Strategic Information Systems*, Vol. 11, 2002. pp. 297–323.

[22] Meuter, M.L., Ostrom, A. L., Roundtree, R., and Bitner, M. J., Self-service technologies: understanding customer satisfaction with technology-based service encounters, *Journal of Marketing*, Vol.64, 2000, pp.50-64.

[23] Moon, J., and Kim, W. Y.G., Extending the TAM for a world wide web context, *Information & Management*, Vol. 38, No.4, 2001, pp.217-230.

[24] Moore,G.C., and Benbasat, I., Development of an instrument to measure the perceptions of adopting an information technology innovation, *Information System Research* Vol.2, No.3, 1991, pp.192-222.

[25] Parasuraman, A. Technology readiness index(tri):a multiple-item scale to measure readiness to embrace new technologies, *Journal of Service Research,* Vol.2, No.4, 2000, pp.307-320.

[26] Parasuraman, A., and Colby, C.L., *Techno-Ready Marketing: How and Why Your Customer Adopt Technology*. Free Press, New York, 2001.

[27] Reddick, C. G., Citizen interaction with e-government: From the streets to servers? *Government Information Quarterly*, Vol.22, 2005, pp.38-57.

[28] Rogers, E.M., *Diffusion of Innovation*, 4th ed., Free Press, New York, NY, 1995.

[29] Taylor, S. and Todd, P. Understanding information technology usage : a test of competing models, *International Journal of Research in Marketing*, Vol.6, 1995.pp.144-176.

[30] Tornatzky, L.G., and Klein, K.J., Innovation characteristics and innovation adoption-implementation: a meta-analysis of findings, *IEEE Transactions on Engineering Management*, Vol.29, No.1, 1982, pp.28-45.

[31] Zmud, R.W., and Boynton, A.C., Survey measures and instruments in mis: inventory and appraisal, in K. Kraemer (ed.), *The Information Systems Research Challenge: Survey Research Methods*, Boston: Harvard Business School Press, 1991. pp. 149–180.