

# SIMPLIFIED MODEL FOR E-GOVERNMENT ADOPTION IN INDIA

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## ABSTRACT

Aiming to improve public services delivery and information dissemination to public, governments all over the world have increased the use of Information and Communication Technologies, with the developed nations being at the advanced stage of e-governance implementation and developing nations having increased their focus only in the last decade.

India too has made significant progress in the e-governance technical implementation, utilizing the massive in-house world class technical resource pool, professional civil servants and committed leadership. Still, the adoption of e-governance is lagging, partly due to huge digital divide and largely due to issues related to the adoption of technology. This study examines the factors influencing the citizen's adoption of e-government services, focusing on the e-filing, the flagship implementation of e-governance in India having a huge potential for cost savings.

The Unified Theory of Acceptance and Use of Technology (UTAUT) model is extended to include perceived risk and system expertise.

The result supports that the system expertise has impact on effort expectancy and the perceived risk has impact on performance expectancy. The tax payers are uncomfortable providing personal information without face to face contact. The government, thus, has to improve the performance expectancy, effort expectancy and provide confidence to tax payers about the safe and risk free system and explore on the mechanism to improve the access and expertise of internet to larger mass.

## General Terms

Experimentation, Design, Verification, Theory

**Keywords**—Technology Adoption, Diffusion, E-government

## 1. INTRODUCTION

“E-Government” refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government.[1] These technologies can serve a variety of different

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ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management, resulting in benefits like less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.

It started in India with computerization of Government departments, gradually evolving into full scale e-governance with the introduction of National e-Governance Plan (NeGP) [2] in the mid 2006 with a vision of making all Government services accessible to the common man in his locality, through common service delivery outlets, and ensure efficiency, transparency, and reliability of such services at affordable costs to realize the basic needs of the common man.

E-filing of income tax was introduced in the year 2004 via Electronic Furnishing of Return of Income Scheme, 2004, notified Vide Notification No. 253 of 2004, dated 30th Sep., 2004 S.O.1073(E). Digital signature, e-return, e-return intermediary were later introduced in this scheme [24].

## 2. PROBLEM STATEMENT

As per the OECD statistics [5], most of the developed nations have a very high rate of e-filing with countries like Singapore (91%), Australia (88%), Netherlands (85%) and Korea (81%) leading the race. In 2009-2010, the number of tax payers who filed income tax returns through e-filing in India is 3,000,000 while the total number of tax payers was approximately 30,000,000 [4]. 90% of taxes are filed manually and is thus error prone. It also requires extraordinary effort for the Income tax department to enter the data from hard copies into the system. As e-filing brings enormous potential to benefit both the government and the taxpayers, it is important to have majority of the taxpayers e-file.

While the implementation of e-filing has been simplified over years, the growth in the number of e-filing didn't increase proportionally. This requires understanding of the tax payer's perception towards the service.

To understand the user's perception towards e-filing, many studies, (e.g. [6], [7]), have taken place in developed nation, but there have been very limited studies in India.

Due to its unique social structure, it becomes important that a study specific to India is carried out considering the social aspect of technological acceptance.

## 3. LITERATURE REVIEW

In order to arrive at an appropriate model, most prominent Information System theories were studied.

Theory of Reasoned Actions (Ajzen & Fishbein, 1980) [8] is inspired by Social psychology and postulates that the behaviour of an individual is driven by behavioral intentions which are function of two core constructs attitude toward behavior and subjective norm. Positive or negative feeling about performing behaviour is termed as attitude while individual's perception of whether people important to the individual think the behaviour should be performed is the subjective norms.

Technology acceptance model [9] postulates that perceived usefulness and perceived ease of use decide the individual's intention to use a system. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance." Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort."

Theory of Planned Behaviour [10] postulates that the behavioral intentions are dependant upon Attitude toward behaviour, Subjective norm and Perceived behavioral control. The definitions of Attitude toward behaviour and Subjective norm were adapted from TRA. Behavioral control is defined as one's perception of the ease or difficulty of performing a behaviour.

Unified Theory of Acceptance and Use of Technology [11] is the integration of eight prominent theoretical models - the theory of reasoned action [8], the technology acceptance model [9], the motivational model [12], the theory of planned behaviour [10], a model combining the technology acceptance model and the theory of planned behaviour (Taylor and Todd 1995), the model of PC utilization [15], the innovation diffusion theory [14], and social cognitive theory [13].

The model comprises of four determinants – performance expectancy, effort expectancy, social influence, and facilitating conditions.

Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance and is the strongest predictor of intention. Effort expectancy is defined as the degree of ease associated with the use of the system. Social influence is defined as the degree to which an Individual perceives that important others believe he or she should use the new system. Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

#### 4. RESEARCH MODEL

This study integrates the Unified Theory of Acceptance and Use of Technology (UTAUT) with perceived risk and system expertise to explore the adoption of e-filing services in India.

Perceived Risk (PR) is included in various studies of e-government (e.g. [16], [17]) which resulted in contradictory results – In [17], the perceived risk significantly influenced the behavioural intention of taxpayers while in [16] the perceived risk did not significantly impact the intentions. The effect of perceived risk and technology type on user's acceptance of technologies was studied using UTAUT as base and refining it to consider perceived risk on it [18].

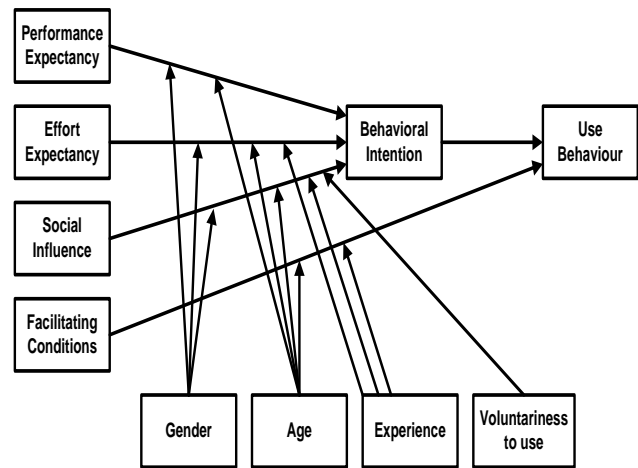


Figure 1: UTAUT (Source: Venkatesh et al. (2003))

Some studies like [19] have found that perceived overall risk plays an important role in adoption-related behaviours and integrated this construct into the technology acceptance model. Specifically, perceived risk was found to be a significant inhibitor of perceived usefulness (PU) and adoption intention. In the study of [20], similar effects of perceived risk on PU and behavioral intention (BI) regarding e-services were observed, which was echoed by Chan and Lu (2004) who too found that perceived risk is important for potential users that tend to see the hazard as decreasing the usefulness of an Internet banking service. Therefore, in parallel to these studies, it is reasonable to assume that perceived risk has negative impact on performance expectancy.

In addition to the perceived risk, the system expertise will also be considered for impact on the intentions. The system expertise for this study is defined as perceived ability to apply the computer and tax knowledge. The support for social cognitive theory perspective on computing behavior is found in [38] where system expertise is found to play an important role in shaping individual's feeling and behavior. Individuals with high self-efficacy used computers more, derived more enjoyment from their use and experienced less computer anxiety. Similar findings have been observed in many studies. [39], [40], [41]. It is found that more technologically advanced a product, the more important a factor is personal efficacy in the decision to adopt the technology, and (b) that people low in personal efficacy (as compared to people high in personal efficacy) with regard to computers tend to be more easily persuaded by expert communicators to try an advanced software product. [42]

Thus, following hypotheses are proposed:-

H1: Performance expectancy of Indian tax payers will have significant influence on Intention to Use.

H2: Effort Expectancy of Indian tax payers will have a significant influence on Intention to Use.

H3: Social Influence of Indian tax payers will have a significant influence on Intention to Use.

H4: System expertise of India tax payers will have a significant influence on Effort Expectancy.

H5: Perceived Risk of Indian tax payers will have a significant negative effect on Performance expectancy.

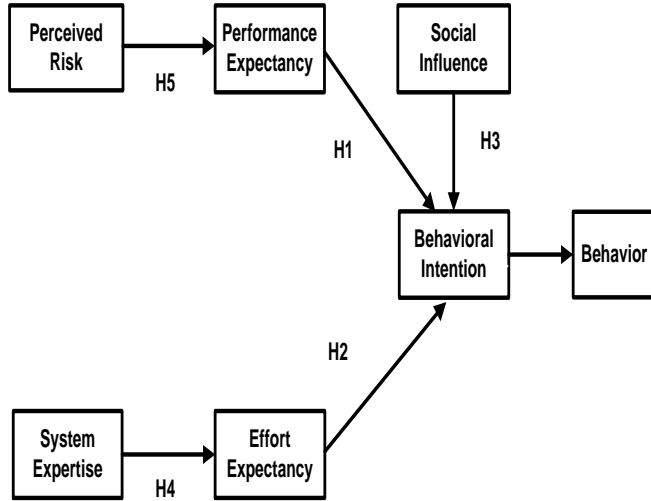


Figure 2: Research Model

## 5. RESEARCH METHODOLOGY

### 5.1 Survey Instrument Design and Measurement

The survey instrument, which is a 5 point Likert scale questionnaire survey, is divided into two sections. Section A contains questions on tax payers demography and section B contains questions measuring payer's perception on e-filing system. The scale was adapted from the scale used by Venkatesh Vishwanath, Michael G Morris and Gordon B Davis in their famous article on the Unified Theory of Acceptance and Use of Technology.

#### Section A – Background of Respondent

- 1) Name
- 2) Age (Years): ( ) <30 ( ) 30-45 ( ) 45+
- 3) E-filing method: ( ) Manual ( ) Internet
- 4) Tax return filed personally? ( ) Yes ( ) No
- 5) Internet Experience (years) ( ) < 5 ( ) > 5
- 6) Gender: ( ) Male ( ) Female
- 7) Education: ( ) Undergraduate ( ) Graduate ( ) Post Graduate

#### Section B (To be answered in 5 Likert Scale)

##### Effort Expectancy

- 1 It is easy for me to learn the usage of e-filing system
- 2 It is easy to find information required for e-filing
- 3 It is overall easy for me to e-file.

##### Performance Expectancy

- 1 E-filing system will improve my performance
- 2 E-filing system will improve my productivity in income tax filing.
- 3 E-filing system will enhance my effectiveness.

4 E-filing will help me better manage my returns by providing access to previous year's returns

5 E-filing system will increase chances of early refund

##### Behaviour Intent

1 If I have access to the electronic tax-filing system, I intend to use it.

2 My first preference for next year would be e-filing

3 I would recommend tax preparation software to my relatives and friends

##### Perceived Risk:

1 Using e-Filing system, I will lose control over the privacy of my personal information.

2 Using e-Filing system my personal information may be used without my knowledge

3 Using e-Filing system will expose me to hackers.

4 E-Filing system doesn't have security strong enough to protect my account.

5 E-Filing system may not perform well and process data transmission incorrectly

##### System Expertise (Computers and Taxation)

1. I use computer for variety of purposes
2. I often struggle to complete a task using computer for some reasons.
3. I can complete a task using computer if there is no one around to tell me how to do.
4. I can e-file if I can call someone when I get stuck with computer or tax calculation
5. I can e-file if instructions are provided on the usage of e-filing system and tax calculations
6. Lot of domain knowledge is required to fill out the tax return

##### Social Influence

1. People around me think that I should use tax preparation software.
2. People around me think I am trying to save money by e-filing
3. People will make fun if I am not able to use e-filing

### 5.2 Population and Study Sample

The survey was conducted based on convenience sampling method with target sample size of 200. The survey was floated to multiple companies of varying industry, varying size and at different location.

### 5.3 Collection of Data

The most appropriate form for data collection is a web based questionnaire. The survey was posted on Survey monkey and the link was made available to various friends and forums. In addition, the hard copy of the survey was made available for people without having access to computers. All the data will be gathered into Excel sheet for ease of analysis and then uploaded into SPSS and Lisrel for further analysis.

## 6. DATA ANALYSIS

The aim of the quantitative study is the empirical investigation of the research model and the hypothesis formulated. This section comprises of two parts. First part describes the sample characteristics and the second part verifies the reliability and validity of scales used and assessed the relationship between the constructs used in the regression model.

### 6.1 Sample characteristics

The total response received was 203. Of these, 23 were invalid owing to incompleteness, resulting in final usable response from 180 respondents. The demographic profile of the sample is below

**Table 1. Sample Characteristics**

Feature	Description	Sample	Percentage
Method of e-filing	Internet	75	41.7
	Manual	105	58.3
Filed Tax Returns Personally	No	106	58.9
	Yes	74	41.1
Computer Experience	< 5 years	41	22.8
	> 5 years	139	77.2
Age	< 30	29	16.1
	30 – 45	111	61.7
	45 +	40	22.2
Gender	Female	31	17.2
	Male	149	82.8
Academic Background	Undergraduate	5	2.8
	Graduate	43	23.9
	Post Graduate	132	73.3

### 6.2 Scale Reliability

Reliability is a measure of consistency of the scale for the construct it is measuring. In order to measure the reliability of the instrument, the Cronbach's coefficient alpha was examined [21]. The average of these values is Cronbach's  $\alpha$  represented in Table 2. Hinton, Brownlow, McMurvay and Cozens have suggested four different points of reliability, excellent ranges (0.90 and above), high (0.70- 0.90), high moderate (0.50-0.70) and low (0.50 and below) [22]. The high Cronbach alpha coefficients obtained for all the study constructs indicates that they are internally consistent and are measuring the same construct.

This calculation was performed using SPSS 10.0.1.

The scales was refined by deleting items that did not load meaningfully on the underlying constructs and those that did not highly correlate with other items measuring the same construct.

**Table 2: Measurements OF Reliability**

Construct	Items	Cronbach's $\alpha$
Effort Expectancy	3	0.82
Performance Expectancy	4	0.70
Behavior Intent	3	0.81

Perceived Risk	5	0.92
System Expertise*	2	0.58
Social Influence	2	0.64

\*se2 was reverse coded

### 6.3 Fit Statistics

Structural Equation Modeling using LISREL 8.80 [25] was employed to test the hypothesis. As SEM estimates multiple and interrelated dependence relationships [26] it is an ideal technique to test the hypotheses.

The model fit is judged based on number of fit indices including chi-square tests, goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the normed fit index (NFI), the comparative fit index (CFI), the root mean square residual (RMR), and the root mean square error of approximation (RMSEA). The complete list of fit indices is available in the appendix. We will discuss the important ones in this section.

Chi-square is the traditional measure of overall fit of a model [27]. The norm is that the chi-square adjusted to the degree of freedom (chi-square/df) should be less than 5, whereas the most rigorous criteria have been set at three, even two [28].

The Goodness-of-Fit statistic (GFI) was created by Jöreskog and Sorbom [25] as an alternative to the Chi-Square test and calculates the proportion of variance that is accounted for by the estimated population covariance [29]. It represents the overall degree of fit, the squared residuals from prediction compared with actual data, but is not adjusted for degrees of freedom [26]. A GFI value higher than .90 indicates better fit of the model. AGFI is an extension of GFI, adjusted by the ratio of degrees of freedom for the proposed model to the degrees of freedom for the null model [26]. The recommended acceptance level is a value greater than .90.

NFI assesses the model by comparing the  $\chi^2$  value of the model to the  $\chi^2$  of the null model [30]. Values for this statistic range between 0 and 1 with Bentler and Bonnet [32] recommending values greater than 0.90 indicating a good fit.

The Comparative Fit Index [31] is a revised form of the NFI which takes into account sample size [27] that performs well even when sample size is small [29]. The CFI value lies between 0 and 1.0, and the larger value of CFI indicates higher levels of goodness-of-fit.

The RMR and the SRMR are the square root of the difference between the residuals of the sample covariance matrix and the hypothesised covariance model. [30]. Values for the SRMR range from zero to 1.0 with well fitting models obtaining values less than .05 ([27]; Diamantopoulos and Siguaw [33], however values as high as 0.08 are deemed acceptable [34].

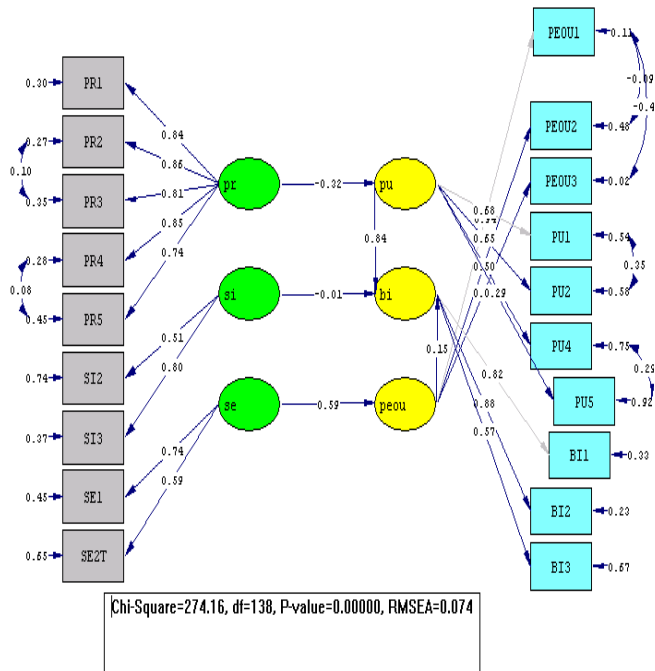
The RMSEA tells us how well the model, with unknown but optimally chosen parameter estimates would fit the population covariance matrix [27]. RMSEA in the range of 0.05 to 0.10 was considered an indication of fair fit and values above 0.10 indicated poor fit. RMSEA between 0.08 to 0.10 provides a mediocre fit and below 0.08 shows a good fit [35].

Through a series of scale purification processes, final acceptable CFA results were achieved.

**Table 3: Fit Statistics**

$\chi^2$	df	$\chi^2/df$	RMSEA	GFI	AGFI	NNFI	CFI	RFI
274.16	138	1.98	0.074	0.86	0.81	0.93	0.95	0.88

All indicators loaded to a respective construct, providing unidimensionality and validity of the measurement.



**Figure 3: Path coefficients for research model.**

**Table 4: Confirmatory Factor Analysis**

Construct	Item Description	Coeff.	t-Value
Effort Expectancy	PEOU1	0.89	
	PEOU2	0.60	5.91
	PEOU3	0.88	6.57
Performance Expectancy	PU1	0.59	5.81
	PU2	0.54	11.17
	PU4	0.37	5.30
	PU5	0.26	3.23
Behaviour Intent	BI1	0.63	5.96
	BI2	0.77	11.41
	BI3	0.47	7.62
Perceived Risk	PR1	0.94	13.37
	PR2	0.98	13.70
	PR3	0.88	12.39
	PR4	0.79	13.46
	PR5	0.70	11.07
System Expertise	SE1	0.62	8.97
	SE2T	0.77	7.23
Social Influence	SI2	0.50	4.74
	SI3	0.78	5.58

### 6.4 Confirmatory Factor Analysis

Before the analysis of the hypotheses, the confirmatory factor analysis was performed to confirm the validity of each construct.

Confirmatory factor analysis is suggested as a more precise method to test the unidimensionality and validity of the measurements than an exploratory factor analysis and item-total correlations [36]. CFA measures whether each factor exhibits convergent and discriminant validity. Convergent validity is defined as the agreement among measures of the same factor. Convergent validity is established when a CFA model fits satisfactorily and all factor loadings are significantly and preferably high [37]. Discriminant validity is the distinctiveness of the two conceptually similar constructs [26].

The figure before \* is the validity coefficient of the indicator. Number below the coefficient is the standard error of the estimates. Below the standard errors are t-values. A t-value larger than 1.96 is significant.

### 6.5 Hypothesis Testing

The structural equations of the model are below:

$$pu = -0.32*pr, \text{ Errorvar.} = 0.90, R^2 = 0.10$$

(0.097)      (0.23)  
-3.33      3.92

$$bi = 0.84*pu + 0.15*peou - 0.0072*si, \text{ Errorvar.} = 0.25, R^2 = 0.75$$

(0.16) (0.066) (0.081)      (0.12)  
5.37   2.21   -0.088      2.02

$$peou = 0.59*se, \text{ Errorvar.} = 0.65, R^2 = 0.35$$

(0.089)      (0.23)  
6.63      2.83

The estimated path coefficients appear in front of the \* symbol before each variable. The positive values of these coefficients indicate that the contribution of these factors is positive. The figure below the \* is the t value and is significant if the t-value is greater than 1.96.

**Table 5. Summary of hypotheses results**

Hyp.	Path	Coeff.	t-Val	Result
H1	Performance expectancy -> Intention	0.84	5.37	Supported
H2	Effort Expectancy -> Intention	0.15	2.21	Supported
H3	Social Influence -> Intention	0.0072	- 0.088	Not Supported
H4	System expertise -> Effort Expectancy	0.59	6.63	Supported
H5	Perceived Risk -> Performance expectancy	0.32	-3.33	Supported

## 7. CONCLUSION

Performance expectancy, effort expectancy and perceived risk had significant impact on the intention to use. This means that to encourage the use of technology, it is important to consider the effort and performance of the system and eliminate the perception of risk associated with the use of technology.

It is also established that higher the risk perceived of the system, lower will be the performance expectancy. Similarly, more the ease associated with the system, lesser the system will be perceived as risky.

Social influence is not found to be having impact on the intention to use. This could be due to the bias in sampling. Studies have found that social influence on females were significantly higher than males [43] but most of the respondents are in this study are males (82.8%). The UTAUT model suggests that older workers place more emphasize on Social Influence [11] whereas majority of the respondents (78%) are less than 45 years. Since majority of the respondents are educated, 97% being graduate or post graduate and have good experience with computers, 77.2% having greater than 5 years of experience, the effect from social influence may be less [44].

Considering the benefit of e-filing, citizens should be encouraged to use e-filing. Government should address the risk perception of citizens. While there has been considerable advertisement in national news papers, this can be extended to local news papers and using radio stations. From a long term perspective, the awareness can be best spread by introducing the e-governance in the high school or college curriculum. This will ensure that the new generation will know of the existence, advantages and will encourage complete participation in not just e-filing, but also on other e-governance initiatives.

For the older generation who are averse to technology, the e-filing can still be promoted by organizing camps at the societies and colonies to ensure that the effort expectancy and system expertise factor can be eliminated.

Also, the perceived risk is due to the socio political life of contemporary India, where corruption is widespread as evident from the media around us. Even IT and computer technology have not been spared by unethical methodology of tapping and tampering. Hence people prefer to file the returns manually. Cultivation of trust in the government machinery can go long way in inculcating trust and hence reducing the perceived risk.

This first limitation of the study is the sample which was concentrated on IT professionals and government employees. Hence the future research can be conducted to include, non-IT professionals in private sector and individuals having income from business. The second limitations of the study is that it did not incorporate actual behavior. Thus the relationship between behavioral intention and actual behavior needs further validation.

Although the study establishes the impact of perceived risk on the intention to use, this is done at the abstract level only. The detailed examination of different facets of risk, as given by Featherman and Pavlou [23] can give insight as to which facets are salient for potential users of e-filing.

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## 9. REFERENCES

- [1] World Bank definition of e- government.  
<http://www1.worldbank.org/publicsector/egov/definition.htm>
- [2] National E-governance Plan  
<http://www.mit.gov.in/content/national-e-governance-plan>
- [3] <http://law.incometaxindia.gov.in/DIT/Income-tax-acts.aspx>  
Accessed on 14 January, 2011
- [4] Income tax department, Government of India.  
(<https://incometaxindiaefiling.gov.in> ) Accessed: Jan, 2011.
- [5] E-filing Statistics Survey of Trends and Developments in the Use of Electronic Services for Taxpayer Service Delivery © OECD March 2010; Accessed on 14 January, 2011 (<http://www.oecd.org/dataoecd/20/50/45036057.pdf> )
- [6] Fu, J.R., Farn, C.K., and Chao, W.P. (2006) 'Acceptance of Electronic Tax Filing: A Study of Taxpayer Intentions', *Information & Management*, vol. 43, pp. 109-126.
- [7] Ludwig Christian Schaupp, Lemuria Carter, Jeff Hobbs. 2009. E-File Adoption: A Study of U.S. Taxpayers' Intentions. Proceedings of the 42nd Hawaii International Conference on System Sciences – 2009 pp 1-10
- [8] Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intention and Behaviour: An Introduction to Theory and Research*, Addison-Wesley, Reading, MA.
- [9] Davis, F. D. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* (13:3), 1989, pp. 319-339.
- [10] Ajzen, I. (1991) "The Theory of Planned Behavior," *Organizational Behavior and Human Decision Processes* 50(2), pp. 179-211.
- [11] Venkatesh, V., Morris, M., Davis, G. & Davis, F. D. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly*, 27(3), 425-478.
- [12] Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace," *Journal of Applied Social Psychology* (22:14), 1992, pp. 1111-1132.

- [13] Compeau, D. R., and Higgins, C. A. "Application of Social Cognitive Theory to Training for Computer Skills," *Information Systems Research* (6:2), 1995a, pp. 118-143.
- [14] Rogers, E. *Diffusion of Innovations*, Free Press, New York, 1995.
- [15] Thompson, R. L., Higgins, C. A., and Howell, J. M. Personal Computing: Toward a Conceptual Model of Utilization," *MIS Quarterly* (15:1), 1991, pp. 124-143.
- [16] Carter, L. and Belanger, F. (2005). The utilization of e-government services: citizen trust, innovation and acceptance factors. *Information Systems Journal*, 15, 5-26.
- [17] Fu, J.R., Farn, C.K., and Chao, W.P. (2006) 'Acceptance of Electronic Tax Filing: A Study of Taxpayer Intentions', *Information & Management*, vol. 43, pp. 109-126.
- [18] Il Im a, Yongbeom Kim, Hyo-Joo Han The effects of perceived risk and technology type on users' acceptance of technologies *Science Direct Information & Management* 45 (2008) 1-9
- [19] Featherman, M.S., and Pavlou, P.A. (2003) 'Predicting e-Services Adoption: A Perceived Risk Facets Perspective', *International Journal of Human Computer Studies*, vol. 59, no.1, pp. 451-474
- [20] Featherman, M. S., and Wells, J. D. (2004), "The Intangibility of E-Services: Effects of Artificiality, Perceived Risk, and Adoption", *Proceedings of the 37th Hawaii International Conference on System Sciences* 2004. <http://csdl2.computer.org/comp/proceedings/hicss/2004/2056/07/2056701776.pdf>
- [21] Cronbach L. J. 1951. Coefficient alpha and the internal structure of tests. *Psychometrika*. 6, pp297-334
- [22] Hinton, P.R., Brownlow, C., McMurvay, I. and Cozens, B. (2004) *SPSS explained*. East Sussex,: Routledge Inc.
- [23] Featherman, M., and Pavlou P. Predicting e-services adoption: A perceived risk facets perspective. In *Proceedings of the Eighth Americas Conference on Information Systems*. Dallas, August 9-11, 2002.
- [24] Income tax department, Government of India. (<https://incometaxindiaefiling.gov.in> ) Accessed: 14 January, 2011.
- [25] Jöreskog, K., & Sörbom, D. (2000). *Lisrel 8: User's Reference Guide*, Lincolnwood, IL: Scientific Software International.
- [26] Hair, J.F., Anderson, R.L., Tatham, R.L., & Black, W.C. (1998). *Multivariate Data Analysis* (5th ed.). Upper Saddle River, NJ; Prentice Hall.
- [27] Byrne, B 1998. *Structural Equation Modeling with Lisrel, Prelis and Simplis: Basic Concepts, Application and Programming*. Mahwah (N.J.) Lawrence Erlbaum Associates
- [28] Pedhazur and Schmelkin, 1991. *Measurement, Design, and Analysis: An integrated approach*. Hillsdale (N.J.) Erlbaum
- [29] Tabachnick, B.G. and Fidell, L.S. (2007), *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon.
- [30] Hooper, D., Coughlan, J. and Mullen, M. R. "Structural Equation Modelling: Guidelines for Determining Model Fit." *The Electronic Journal of Business Research Methods* Volume 6 Issue 1 2008, pp. 53 - 60
- [31] Bentler, P 1990. Comparative Fit Indexes in Structural Models. *Psychological Bulletin* 107(2), 238-246
- [32] Bentler, P.M. and Bonnet, D.C. (1980), "Significance Tests and Goodness of Fit in the Analysis of Covariance Structures," *Psychological Bulletin*, 88 (3), 588-606.
- [33] Diamantopoulos, A. and Siguaw, J.A. (2000), *Introducing LISREL*. London: Sage Publications.
- [34] Hu, L.T. and Bentler, P.M. (1999), "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives," *Structural Equation Modeling*, 6 (1), 1-55.
- [35] MacCallum, R.C., Browne, M.W., and Sugawara, H., M. (1996), "Power Analysis and Determination of Sample Size for Covariance Structure Modeling," *Psychological Methods*, 1 (2), 130-49.
- [36] Gerbing, D.W., & Anderson, J.C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, 25(2), 186-192.
- [37] Bagozzi, R. P., Yi, Y., & Phillips, L.W.(1991). Assessing construct validity in organizational research. *Administrative Science Quarterly*, 36(3), 421-458.
- [38] Compeau, D., & Higgins, C. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*. 19, 189-211.
- [39] Eastin, M. S. and LaRose, R. (2000), Internet Self-Efficacy and the Psychology of the Digital Divide. *Journal of Computer-Mediated Communication*, 6: 0. doi: 10.1111/j.1083-6101.2000.tb00110.x
- [40] Burkhardt, M.E. and Brass, D.J. (1990), Changing Patterns or Patterns of Change: The Effects of a Change in Technology on Social Network Structure and Power, *Administrative Science Quarterly* (35:1), pp.104-127.
- [41] Gist, M.E., Schwoerer, CE., and Rosen, B, (1989), Effects of Alternative Training Methods on Selfefficacy and Performance in Computer Software Training, *Journal of Applied Psychology* (74:6), pp, 884-891,
- [42] Thomas Hill, Nancy D. Smith, and Millard F. Mann (1986), *Communicating Innovations: Convincing Computer Phobics to Adopt Innovative Technologies*, in *NA - Advances in Consumer Research* Volume 13, eds. Richard J. Lutz, Provo, UT: Association for Consumer Research, Pages: 419-422.
- [43] S. Güzin Mazman, Yasemin Koçak Usluel, and Vildan Çevik (2009) Social Influence in the Adoption Process and Usage of Innovation: Gender Differences. *International Journal of Behavioral, Cognitive, Educational and Psychological Sciences* 1:4
- [44] Waransanang Boontarig, Wichian Chutimaskul, Vithida Chongsuphajsiddhi and Borworn Papasatorn, 2012, Factors Influencing The Thai Elderly Intention to Use Smartphone for e-Health Services. 2012 IEEE Symposium on Humanities, Science and Engineering Research 978-1-4673-1310-0/12