ASSESSING CITIZENS' ADOPTION OF A TRANSACTIONAL E-GOVERNMENT SYSTEM: VALIDATION OF THE EXTENDED DECOMPOSED THEORY OF PLANNED BEHAVIOR (DTPB)

Nripendra P. Rana, School of Management, Swansea University, Swansea, UK
    nrananp@gmail.com

Yogesh K. Dwivedi, School of Management, Swansea University, Swansea, UK
    ykdwivedi@gmail.com

Banita Lal, Business School, Nottingham Trent University, Nottingham, UK
    banita.lal@ntu.ac.uk

Michael D. Williams, School of Management, Swansea University, Swansea, UK
    m.d.williams@swansea.ac.uk

Abstract

The study explores the adoption of an electronic government (e-government) system called online PAN card registration system (OPCRS) in context of India. The study validates the extended decomposed theory of planned behaviour (DTPB) to understand the impact of some of its factors on the citizen's intention to adopt this system. The proposed research model is validated using the data collected from 377 respondents from six selected cities covering all different locations of India. The data is analysed using AMOS 22.0. The empirical findings of the proposed research model indicated the significant relationships of all proposed hypotheses. The study also provides its limitations, future research directions, and implications for theory and practice toward the end.

1   INTRODUCTION

For much of the last two decades, governments across the world have been adopting and expanding an innovative means of delivering government information and services to citizens (G2C), businesses (G2B), and governments (G2G). This phenomenon is known as electronic government or e-government (Norris and Reddick 2013). E-government allows citizens to search and acquire information at their own convenience without any limitations of geographical locations. The interactive nature of e-government provides benefits for citizens and bureaucrats alike (West 2008). When e-government first became a sustainable solution to the diffusion of government information, experts believed that the rise of G2C services would improve government transparency, enhance civic engagement, and offer new and innovative service possibilities. These G2C services were expected to cut-out information middlemen and let users interact directly with their government (Taylor et al. 2014). As e-government has matured into a vibrant socio-technical system covering issues of governance, societal trends, technological change, information management, interaction, and human factors (Dawes 2009), G2C services have become one of the central uses of e-government (Evans and Yen 2006; Reddick 2004; Taylor et al. 2014).

E-government services can be largely categorised into informational and transactional services. Informational services refer to the delivery of government information through Web pages whereas transactional services involve two-way transactions between government and citizens (e.g., submission of electronic forms) (Norris and Moon 2005). At one hand, e-government provides a number of benefits to its stakeholders including reducing corruption, citizen-oriented focus, promoting e-democracy, delivering more accountable, transparent, cost-effective, and easily accessible public services, prevailing over the social divide, and faster adaptation to meet citizens' requirements (Akman et al. 2005; Hackney et al. 2007; Huang and Bwoma 2003; Watson and Mundy 2001). On the other hand, governments face a number of challenges in implementing transactional e-government services (Al-Sebie and Irani 2005; Gauld et al. 2010), and these challenges are reflected in the low deployment rate of such services (Venkatesh et al. 2012). About 98% of the countries in the world have developed government websites with less than one-third providing transactional services, such as online form submission (United Nations 2010).

The online PAN (Permanent Account Number) card registration system (OPCRS) is one such e-government system, which provides transactional services to the citizens of India. This system is used voluntarily to obtain a PAN card, which is a mandatory document used for filing income tax return in India. PAN is essentially a ten-digit alphanumeric number, issued in the form of a laminated card by an investigating officer of the income tax department in India. It is mandatory to quote a PAN on the return of income in all correspondence dealing with the income tax authority, transaction of more than a certain amount of money through the bank, and for any payments to the income tax department. However, this card also serves as proof of identity. Every taxpayer who is required to furnish a return of income, even on behalf of others, must obtain a PAN. This system has been implemented with a goal of easing individual's burden of going through the cumbersome processes of obtaining a PAN card offline through government offices. As per the recent statistics, more than 35 million people in India pay direct tax on their incomes. This statistics indicates that only 3% of the overall population of India pay income tax, which is very less in comparison to the US where about 45% of the population pays taxes (Manshu 2011). As having PAN card is mandatory for every tax payer, it is important to understand what people think about this relatively new system (i.e. OPCRS), which is used In such case, importance of introducing an automated process of obtaining a PAN card is a welcoming initiative by the government of India.

Realising such significant benefits provided by the e-government particularly to citizens, a number of empirical studies (e.g., Belanger and Carter 2008; Horst et al. 2007; Hung et al. 2009; Lean et al. 2009; Rana and Dwivedi 2015; Rana et al. 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2015c; Wang and Liao 2008; Wang and Shih 2009) have been published to explore the adoption of such systems in the existing literature. These studies have largely employed the widely used models of information systems/information technology (IS/IT) adoption such as the technology acceptance model (TAM), the theory of planned behaviour (TPB), the diffusion of innovation (DOI), and the unified theory of

acceptance and use of technology (UTAUT) to understand the citizens' reluctance or slow adoption of various e-government services. However, only a few studies (e.g., Lau 2004) have used the decomposed theory of planned behaviour (DTPB) to analyse the citizens' intention to use certain e-government services. Moreover, none of the studies have explored this model to examine the citizens' intention to adopt transactional e-government services. Realising the lack of empirical research on transactional e-government system (like the OPCRS) in general and the absence of the model like the DTPB in particular, this research will use the extended DTPB (with perceived trust as an additional construct) to address this research problem to understand the citizens' behavioral intentions toward using the OPCRS system.

2   RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

This section will first present the overview of the proposed research model on the basis of the DTPB model. It then postulates hypotheses based on relationships identified.

2.1   Overview of the Proposed Research Model

The proposed research model is based on the theoretical foundation of the DTPB (Taylor and Todd 1995), an alternative version of the theory of planned behaviour (TPB) with decomposed belief structures. In this model, attitudinal (i.e. attitude), normative (i.e. subjective norm), and control (i.e. perceived behavioral control) beliefs are decomposed into multi-dimensional belief constructs. By decomposing beliefs, those relationships should become clearer and more readily understood. Moreover, the decomposition can provide a stable set of beliefs, which can be implemented across a number of settings. This would overcome some of the disadvantages in operationalisation that have been considered with respect to the traditional intention models (Berger 1993; Mathieson 1991; Taylor and Todd 1995). Also, by focusing on specific beliefs, the model becomes more managerially relevant, pointing to particular factors that may influence adoption and usage. Because it is more complex, it introduces a larger number of factors and hence, it may provide a more comprehensive and complete understanding of IT usage relative to the more parsimonious model such as the technology acceptance model (TAM) (Taylor and Todd 1995).

Several studies have suggested approaches to the decomposition of normative belief structures into appropriate referent groups such as peer and superior's influence (Taylor and Todd 1995). Moreover, segregating peer influences from superior influences may help explain IS acceptance in the organisational contexts (Bhattacherjee 2000). As the extract of peer influence is largely reflected by the items of subjective norm itself, this study will only consider superior influence as the antecedent of subjective norm. Moreover, as the OPCRS system is relatively new and validated only from the responses of the non-adopters (i.e. those users who have relatively good experience with the use of Internet but have not used this e-government system before) of this system, the use behaviour construct is not included in the proposed DTPB model.
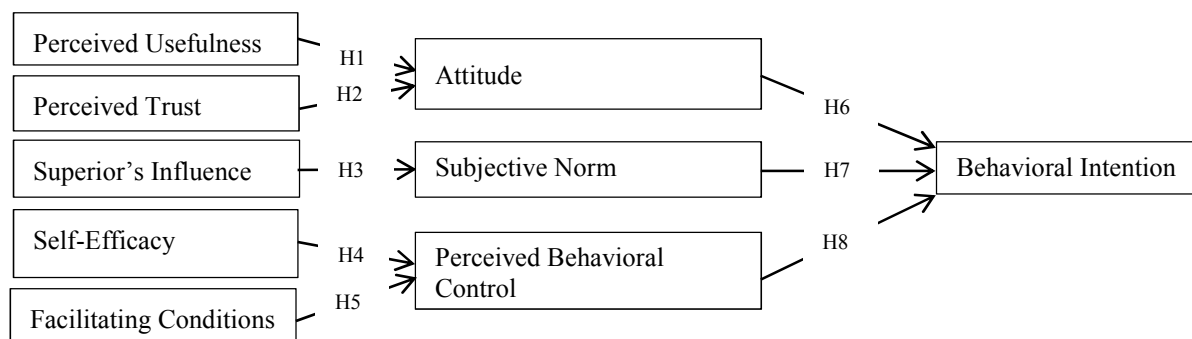

Figure 1. Proposed Research Model (Adapted from Taylor and Todd 1995)

Also, as this e-government system is possibly the first of its type so it may not be perceived as being consistent with the existing values, needs, and past experience of a potential adopter (Moore and Benbasat 1991). Therefore, we drop this variable as an antecedent of attitude as used in the DTPB

model. We incorporate an important additional construct called perceived trust along the DTPB model as use of such construct would explore the degree to which the user would like to provide their personal information related to the debit/credit card in pursuit of obtaining the PAN card online. Considering above discussion, the proposed research model hypothesises eight different relationships between nine constructs. The proposed research model postulates that perceived usefulness and perceived trust will significantly influence user's attitude, superior's influence will significantly influence subjective norm, and self-efficacy and facilitating conditions significantly influence perceived behavioral control. Finally, attitude, subjective norm, and perceived behavioral control will have a significant impact on user's behavioral intention to use the OPCRS system. Figure 1 shows the proposed research model with various hypotheses. Testing the postulated relationships (see Table 1 for the list of hypotheses) can help the researchers to understand the adoption of the OPCRS system.

2.2 Hypotheses Development

As shown in Figure 1, a total of eight hypotheses are proposed based on the relationships between nine constructs. The core constructs are listed and defined in Table 1.

Variable/Construct	Definition
Perceived Usefulness	The degree to which a person believes that using a particular system would enhance his or her job performance (Davis 1989, p. 320).
Perceived Trust	It is defined as expectancy that the promise of an individual or group can be relied upon (Rotter 1971).
Superior's Influence	The perception of how superiors will affect one's use of specific e-government system.
Self-Efficacy	An individual's perception of his or her ability to use the system on his or her own (Bandura 1986).
Facilitating Conditions	Facilitating conditions reflect the availability of resources such as time, money, and other specialised resources needed to engage in a behaviour (Taylor and Todd 1995).
Attitude	An individual's positive or negative feelings about performing the target behaviour (Fishbein and Ajzen 1975, p. 216).
Subjective Norm	The person's perception that most people who are important to him think he should or should not perform the behaviour in question (Fishbein and Ajzen 1975, p. 302).
Perceived Behavioral Control	The perceived ease or difficulty of performing the behaviour (Ajzen 1991, p. 188). In the context of IS research, perceptions of internal and external constraints on behaviour (Taylor and Todd 1995, p. 149).

Table 1. Definitions of core constructs used in proposed model

Table 2 presents the hypotheses for the various relationships for the proposed research model significantly supported by the relevant studies of IS and e-government adoption.

H#	IV→DV	Supporting Source(s)
H1	PU→AT	Hung et al. (2006), Lau (2004), Lau and Kwok (2007), Lu et al. (2010)
H2	PT→AT	Gefen et al. (2003), Ha and Stoel (2008), Hung et al. (2006)
H3	SI→SN	Mathieson (1991), Taylor and Todd (1995)
H4	SE→PBC	Hung et al. (2006), Hung et al. (2009), Susanto and Goodwin (2011)
H5	FC→PBC	Hung et al. (2006), Hung et al. (2009), Susanto and Goodwin (2011)
H6	AT→BI	Hung et al. (2006), Hung et al. (2009), Lau (2004), Lau and Kwok (2007)
H7	SN→BI	Lau (2004), Lau and Kwok (2007)
H8	PBC→BI	Chu et al. (2004), Lau (2004), Lau and Kwok (2007), Lu et al. (2010)

Table 2. Proposed hypotheses

[Legend: AT: Attitude, BI: Behavioral Intention, FC: Facilitating Conditions, PBC: Perceived Behavioral Control, PEOU: Perceived Ease of Use, PT: Perceived Trust, PU: Perceived Usefulness, SE: Self-Efficacy, SN: Subjective Norm]

3   RESEARCH METHODOLOGY

The sample of the study consists of wide spectrum of respondents from different cities of India including Delhi, Pune, Mumbai, Bangalore, Patna, Siliguri, and Gangtok covering all different cities. The final questionnaire consisted of total 39 questions including 10 of them from respondents' demographic characteristics and remaining 29 questions belonged to nine constructs of the proposed research model. All these questions were multiple-type, closed-ended and seven-point Likert scale type questions. Likert scales [1-7] with anchors ranging from 'strongly disagree' to 'strongly agree' were used for all non-demographic items. Appendix [A] lists all the items of constructs used in this study.

We visited all these cities to contact people particularly in organisations and handed them questionnaire personally. At the time of interacting to respondents, we came to know that although majority of respondents were computer and Internet literate, they were new to the system. Therefore, we decided to gather data only from the potential adopters (i.e. those users who are computers and Internet literate but have not used the OPCRS yet) of the system. We demonstrated the system to the respondents, largely in groups and gave them couple of days of time to interact with the system on their own before answering the questions. A total of 1000 questionnaires were distributed to respondents through one-to-one and group interactions. A total of 474 completed survey questionnaires were received from respondents in about two month of survey exercise. The further scrutiny of questionnaires revealed that 96 of them were either partially completed or filled in a biased manner (i.e. only one optioned ticked throughout the questionnaire) and so rejected from the subsequent analysis. Hence, we were left with 377 usable responses, which made the basis for the empirical analysis of the data. The overall response rate was found to be 47.4% with 37.7% valid questionnaires.

4   RESULTS

The data gathered were analysed using structural equation modelling (SEM) technique of AMOS. First, we report the respondents' demographic characteristics. Second, we will present the reliability analysis, factor loading, and descriptive statistics of various constructs. Finally, the hypotheses testing for each relationship is analysed using the structural model testing.

4.1   Respondent Demographic Characteristics

The characteristics of the data gathered from the respondents of various geographical locations indicated that the majority of the population was from a relatively younger generation. For example, 83.5% respondents belonged to an age group of 20-34 years. As far as the occupation of the respondents is concerned, the largest 56.1% of the total sample were students followed by the next largest 22.4% represented by the private-sector employees. The education qualification for close to 82% of the overall population was found to be undergraduate and above. All the students were either at the graduate or the postgraduate level in some of the leading business and engineering institutions from the different cities in India. The computer and Internet literacy and awareness of the respondents can be adjudicated from their very high computer and Internet experience percentage of approximately 96%. The Internet use frequency of the respondents indicates that more than two-third (i.e. 69.2%) of the overall population always or very frequently used the Internet.

4.2   Descriptive Statistics and Reliability Analysis

Table 3 presents the mean and standard deviation for the items of each construct used for developing the research model. The mean values of majority of constructs were closed to or above five. For example, the mean values for all the items of PBC, BI, FC, PU, AT, and SE were found greater than five. Also, the mean values for some or all items for PT, SN, and SI were also found very close to five. This indicates that users responded favourably for the system at large. The overall average standard deviation of all the items for constructs was computed as 1.404, which indicates that even though

users' opinion fluctuated quite considerably across the overall average mean of all items (i.e. 5.25), it still remains positive.

Construct	Item	Mean	SD	Construct	Item	Mean	SD
PU	PU1	5.18	1.47	SN	SN1	4.93	1.50
	PU2	5.37	1.37		SN2	4.95	1.53
	PU3	5.34	1.32	SE	SE1	5.33	1.41
PT	PT1	5.32	1.34		SE2	5.36	1.31
	PT2	5.24	1.42	FC	FC1	5.17	1.35
	PT3	4.94	1.51		FC2	5.11	1.45
	PT4	5.40	1.37	PBC	PBC1	5.16	1.41
SI	SI1	4.96	1.45		PBC2	5.33	1.31
	SI2	4.86	1.57		PBC3	5.40	1.27
AT	AT1	5.59	1.32	BI	BI1	5.31	1.46
	AT2	5.50	1.38		BI2	5.29	1.42
	AT3	5.63	1.32		BI3	5.33	1.46

Table 3.   Mean and Standard Deviation (SD) of Items (N=377)

[Legend: AT: Attitude, BI: Behavioral Intention, FC: Facilitating Conditions, PBC: Perceived Behavioral Control, PEOU: Perceived Ease of Use, PT: Perceived Trust, PU: Perceived Usefulness, SE: Self-Efficacy, SI: Superior's Influence, SN: Subjective Norm]

Reliability analysis was performed using Cronbach's alpha. It was used for determining the reliability of the scale, which provides an indication about the internal consistency of the items measuring the same construct (Hair et al. 1992; Zikmund 1994). Cronbach's alpha (α) reliability for constructs is in the range 0.786-0.891, which is considered as a good level of reliability. The value of Cronbach's alpha as 0.70 or greater is considered good (Nunnaly 1978; Hair et al. 1992). Therefore, alphas imply strong reliability for all constructs.

Construct	# of Items	CA (α)	Reliability Type
Perceived Usefulness	3	0.813	High
Perceived Trust	4	0.887	High
Attitude	3	0.891	High
Superior's Influence	2	0.786	High
Subjective Norm	2	0.831	High
Self-Efficacy	2	0.875	High
Facilitating Conditions	2	0.820	High
Perceived Behavioral Control	3	0.863	High
Behavioral Intention	3	0.847	High

Table 4. Cronbach's alpha for constructs [Legend: #: Number, CA: Cronbach's Alpha (α)]

4.3   Measurement Model

Convergent and discriminant validity of the scales were tested with confirmatory factor analysis. Convergent validity is examined using three ad hoc tests recommended by Anderson and Gerbing (1988). Table 5 lists the standardised factor loadings, composite reliabilities, and average variance extracted. Standardised factor loadings are indicative of the degree of association between scale items and a single latent variable. Two items from PU, one from facilitating conditions, and two from perceived behavioral control have been discarded as their loading factors were less than the expected minimal value of 0.50. The loadings for the remaining items for various constructs are highly significant in all the cases with minimum value of greater than 0.70. Composite reliabilities, similar to Cronbach's alpha, for all constructs including were found well beyond the minimum limit of 0.70 (Nunnally 1978).

Measure	FL	CR	AVE	Measure	FL	CR	AVE
Perceived Usefulness		0.828	0.748	Subjective Norm		0.770	0.679
PU1	0.82			SN1	0.85		

PU2	0.82			SN2	0.73		
PU3	0.71			Self-Efficacy		0.867	0.833
Perceived Trust		0.888	0.841	SE1	0.87		
PT1	0.79			SE2	0.88		
PT2	0.84			Facilitating Conditions		0.792	0.715
PT3	0.86			FC1	0.82		
PT4	0.77			FC2	0.80		
Attitude		0.893	0.859	Perceived Behavioral Control		0.867	0.817
AT1	0.82			PBC1	0.86		
AT2	0.83			PBC2	0.85		
AT3	0.77			PBC3	0.77		
Superior's Influence		0.770	0.679	Behavioral Intention		0.848	0.785
SI1	0.85			BI1	0.82		
SI2	0.73			BI2	0.83		
				BI3	0.77		

Table 5.   Cronbach's alpha for constructs [Legend: #: Number, CA: Cronbach's Alpha (α)]

Average Variance Extracted (AVE) is a measure of the variation explained by the latent variable to random measurement error (Netemeyer et al. 1990) and ranged from 0.763 to 0.901 for all constructs. These estimates by far exceeded the recommended lower limit of 0.50 (Fornell and Larcker 1981). All tests support the convergent validity of the scales. Discriminant validity was evaluated with the test recommended by Anderson and Gerbing (1988). The squared correlation between a pair of latent variables (see Table 6) should be less than the AVE of each variable (see Table 5). Each combination of latent variables was tested, and each pairing passed, providing indication of the discriminant validity of the scales. For example, correlation between PBC and PU is 0.779, which is less than the square root of AVE shown along the diagonal of both these variables (i.e. 0.904 and 0.865 respectively). In other words, a variable is considered to be different from other variables if the square root of the AVE for it is greater than its correlations with other latent variables (Barclay and Smith 1997), which is satisfied for every variable of the proposed research model of the current study.

Variable	PU	PT	AT	SI	SN	FC	SE	PBC	BI
PU	**0.865[b]**								
PT	0.675[a]	**0.917[b]**							
AT	0.589[a]	0.563[a]	**0.927[b]**						
SI	0.438[a]	0.477[a]	0.276[a]	**0.824[b]**					
SN	0.497[a]	0.469[a]	0.439[a]	0.436[a]	**0.824[b]**				
FC	0.614[a]	0.555[a]	0.410[a]	0.601[a]	0.425[a]	**0.845[b]**			
SE	0.659[a]	0.596[a]	0.530[a]	0.457[a]	0.505[a]	0.486[a]	**0.913[b]**		
PBC	0.779[a]	0.655[a]	0.518[a]	0.542[a]	0.486[a]	0.664[a]	0.636[a]	**0.904[b]**	
BI	0.557[a]	0.582[a]	0.732[a]	0.351[a]	0.454[a]	0.443[a]	0.521[a]	0.546[a]	**0.886[b]**

Table 6.   Factor correlation matrix [Legend: b Square roots of AVE [in bold] are shown on the main diagonal a Significant at p < 0.01]

4.4   Structural Model Testing

The overall model fit is adequate as it is presented through Table 7. The test of overall model fit resulted in a Chi-square value of 482.101 with degrees of freedom as 203 and a probability value of less than 0.001. The significant p-value indicates the absolute fit of the model is less than desirable. However, as the Chi-square test of absolute model fit is sensitive to sample size and non-normality, a better measure of fit is Chi-square over degrees of freedom. The ratio of Chi-square over degrees of freedom (i.e. 2.096) is within suggested 3 to 1 bracket (Chin and Todd 1995). Typically, researchers also report a number of fit-statistics to examine the relative fit of the data to the model (see Table 7).

In addition to the above-mentioned ratio, we also report some of the fit indices. Descriptive fit statistics compare a specified model to a baseline model, typically the independence model, with a view to show the superiority of the proposed model. We report the Goodness-of-Fit index (GFI), the

adjusted GFI (AGFI), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI). Gerbing and Anderson (1988) found CFI as one of the most stable and strong fit indices. We also report RMSEA (Root Mean Square Error of Approximation), which measures the discrepancy per degree of freedom (Steiger and Lind 1980).

Fit Index	Model	Recommendation
Chi-Square	482.101	N/A
Degree of Freedom (DF)	230	N/A
P	<0.001	Non-Significant
Chi-Square/DF	2.096	<3.00 (see Chin and Todd 1995)
GFI (Goodness-of-Fit Index)	0.901	>0.90 (see Hoyle 1995)
AGFI (Adjusted GFI)	0.871	>0.80 (see Chin and Todd 1995)
CFI (Comparative Fit Index)	0.959	>0.90 (see Bentler and Bonnet 1980)
TLI (Tucker-Lewis Index)	0.951	>0.95 (see Hu and Bentler 1999)
RMSEA	0.054	<0.06 (see Hu and Bentler 1999)

Table 7.   Model fit summary for the proposed research model

We found the fit-indices are well in accordance with the recommended values. For example, the GFI should be at or above 0.90 (Hoyle 1995), while the AGFI should be at or above 0.80 (Chin and Todd 1995; Segars and Grover 1993). The CFI statistics should be at or above 0.90 (Bentler and Bonett 1980; Hoyle 1995). Moreover, the TLI statistics should be at or above 0.95 (Hu and Bentler 1999). Finally, RMSEA has been suggested to represent a very good fit if below the more restrictive threshold of 0.06 (Hu and Bentler 1999).

Having recognised the relative competence of the model's fit, it is appropriate to evaluate individual path coefficients corresponding to our hypotheses. This analysis is presented in Table 8. All eight hypotheses are supported. Perceived usefulness and perceived trust significantly influenced attitude (i.e. hypotheses H1 and H2 respectively). Subjective norm was found to be significantly influenced by Superior's influence (i.e. H3). Self-efficacy and facilitating conditions significantly influence perceived behavioral control (hypotheses H4 and H5 respectively). Finally, user's positive level of attitude, subjective norm, and perceived behavioral control significantly influenced behavioral intentions (i.e. hypotheses H6, H7, and H8 respectively) to use the OPCRS system. Please refer Table 8 for path coefficients between constructs of different relationships, their significance levels, critical ratios, and the variance exerted by the model on its dependent variables.

H#	Hypothesis	SRW	CR	Sig.	Supported
H1	PU → AT	0.510	5.954	***	YES
H2	PT → AT	0.235	2.846	**	YES
H3	SI → SN	0.621	9.565	***	YES
H4	SE → PBC	0.432	7.235	***	YES
H5	FC → PBC	0.582	8.980	***	YES
H6	AT → BI	0.687	11.752	***	YES
H7	SN → BI	0.118	2.268	*	YES
H8	PBC→BI	0.176	3.094	**	YES
R^2(BI): 0.72; R^2(AT): 0.50 R^2(SN): 0.39; R^2(PBC): 0.81			[Legend: p:*p<0.05| **p<0.01| ***p<0.001]		

Table 8.   Path coefficients and hypotheses testing

[Legend: AT: Attitude, BI: Behavioral Intention, CR: Critical Ratio, FC: Facilitating Conditions, PBC: Perceived Behavioral Control, PEOU: Perceived Ease of Use, PT: Perceived Trust, PU: Perceived Usefulness, SE: Self-Efficacy, SN: Subjective Norm, SRW: Standardised Regression Weight]

5   DISCUSSION

This study measures the determinants of citizens' adoption of a transactional e-government system using the DTPB model in context of India. The constructs including perceived usefulness and perceived trust determine citizens' attitude toward using the e-government system, superior's

influence determines subjective norm, and self-efficacy and facilitating conditions influence perceived behavioural control. Furthermore, the causal relationships among the variables including attitude, subjective norm, and perceived behavioral control with behavioral intention that determine e-government service adoption were also examined.

The findings indicate perceived usefulness has a strong and significant impact on user's attitude. This could be due to the fact that users tend to have a positive view toward the system only when it demonstrates appropriate level of usefulness (because the system is new to the users). Some prior studies (e.g., Bhattacherjee 2000; Hung et al. 2006; Taylor and Todd 1995) also found perceived usefulness to have a stronger impact on attitude. It was also found that perceived trust has a significant impact on user's attitude. This relationship has been also supported by some prior research (e.g., Hung et al. 2006; Susanto and Goodwin 2011) on e-government adoption. One possible argument for this significant relationship is that the users are although well acquainted with Internet and computer systems in general, they are relatively new to this transactional e-government system. In such case, the high trust toward this system would lead them to develop positive attitude toward using the system. It is really important to analyse the impact of perceived trust as an additional attribute on the user's attitude as the e-government system being analysed in the current context is transactional in nature and users need to use their debit/credit card details through this OPCRS system to electronically get their PAN card done. However, the relatively weak association of perceived trust on user's attitude toward using the e-government system indicates that the government agencies need to communicate their abilities to serve their citizens in reliable and dependable manner through the electronic channels as well. Government agencies should publicise stories of e-services that have been successful and the statistics of citizens who were pleased with such services (Belanger and Carter 2008).

Moreover, the findings indicate that superior's influence positively impacts subjective norm. Taylor and Todd (1995) found that the influence of superiors has a direct impact on the individual's subjective norm. In other words, it is found that individual's perceived level of subjective norm is influenced by the expectation of his or her significant referents (e.g., supervisor, experts, elders, or seniors). The significant relationship between superior's influence and subjective norm indicates that the government should first probably encourage people who are at the top level management or having enough experience to use such transactional and useful systems who can later convince other users in their close proximity to use the system like the OPCRS. This initiative can be easily undertaken by the government top officials and also aligning the Internet and computer savvy people from the private sector organisations. As these people have good respect in the organisation and the locality they live in, they probably would be more effective medium to reach out to the larger section of our society.
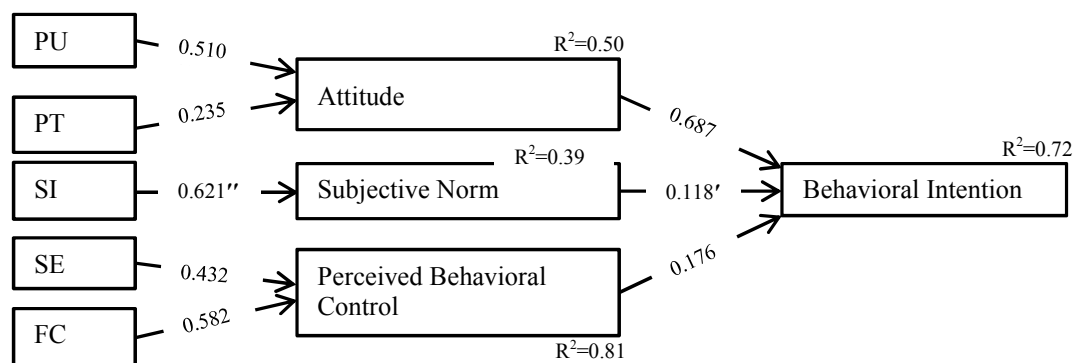

Figure 2. Validated research model [Note: ′: p<0.05, ″: p<0.01, □: p<0.001] [Legend: FC: Facilitating Conditions, PEOU: Perceived Ease of Use, PT: Perceived Trust, PU: Perceived Usefulness, SE: Self-Efficacy, SI: Superior's Influence]

Also, the findings of this research were found consistent with the hypotheses, which indicate that self-efficacy and facilitating conditions have significant impacts on perceived behavioral control. These findings are in accordance with the outcomes of the previous studies (Bhattacherjee 2000; Taylor and Todd 1995). The significant impact of facilitating conditions on perceived behavioral control reveals

that perceived behavioral control is reliant on resources such as time, money, and technological support to certain extent. It suggests that the presence of enabling resources such as computer systems, Internet, and proper training on how to use government facilitated electronic services allow citizens to have adequate command, resources, and above all knowledge to use the OPCRS system (Taylor and Todd 1995) whereas their absence may present barriers to the adoption of the OPCRS services and hence constrain the formation of intention (Lau 2004; Lau and Kwok 2007). The significant impact of self-efficacy on perceived behavioral control indicates that citizen's higher perceptions of his/her ability to use the OPCRS system lead to the perceived control over the behaviour more accurately (Hung et al. 2009).

The third set of hypotheses exhibited that the three beliefs (i.e. attitudinal, normative, and control) are positively linked to the individual's intention to use the OPCRS system (Bhattacherjee 2000; Lau 2004; Lau and Kwok 2007). In these, attitude is stronger predictor of behavioral intentions than subjective norm and perceived behavioral control. The strong and significant impact of attitude on behavioral intentions indicates that individuals' attitude is shaped up by usefulness and perceived trust of the system, which in turn positively influence their intention to use it. In other words, the usefulness and perceived trust that e-government services carry positively impact users' positive feelings toward using the OPCRS system, which is finally transformed into their positive intent to use it. The relatively weak though significant influence of subjective norm on behavioral intentions indicates that the OPCRS system is relatively a new e-government system and hence citizens' important others (i.e. family, friends, and colleagues) can persuade them to ensure that they tend to use the system. Similarly, the weak though significant impact of perceived behavioral control on behavioral intentions indicates that users need more confidence, command, and resources (such as infrastructure, Internet, computer systems etc.) for enhanced intentions toward using the system.

5.1 Limitations and Future Research

Like any other research this research is not without certain limitations. Firstly, the proposed research model has been validated without the use of usage behavior variable. The future research can incorporate usage behaviour in the proposed research model as it is originally defined in there. Secondly, the current research only uses the non-users' views of the OPCRS system. The future research can consider the existing users' views on the questions linked to the factors of the proposed model. The existing users' views would be easier to obtain as the OPCRS system is in use for some time. Lastly, the current model has been validated considering the cross-sectional design views of citizens in India. The future research can possibly consider validating this research model with the employee's perspective using the longitudinal approach, as they are relatively easier to reach out again.

5.2 Implications for Theory

Firstly, this is one of the very few studies on e-government adoption that have implemented the DTPB to understand the citizens' adoption. Second, as this study has implemented a more comprehensive model based on the DTPB that have relatively high number of diverse factors (including an important additional construct such as perceived trust), it will provide a more complete and wide-ranging understanding of an e-government system adoption than the other parsimonious models (such as the TRA, the TAM, the TPB etc.) of information technology adoption. Third, compared with the study relating to the originating DTPB model (with a variance on BI as 57%) (Taylor and Todd 1995), the total variance in intention (i.e. 72%) to use the OPCRS system indicates that the proposed model has been efficiently implemented and hence, provides a good basic grounds to measure non-user's intention to adopt any e-government services.

5.3 Implications for Practice

The research has validated three direct (i.e. attitude, subjective norm, and perceived behavioral condition) and five indirect antecedents (i.e. perceived usefulness, perceived trust, superior's influence, self-efficacy, and facilitating conditions) of behavioral intentions. To successfully evaluate

the performance of e-government system, we suggest that policy makers can enhance strategic planning by monitoring these factors as performance indicators (Dwivedi et al. 2015; Hung et al. 2009). The findings indicate that perceived usefulness and perceived trust are particularly significant factors for the government policy makers to improve users' attitude toward using the OPCRS system. A relatively weak though significant impact of perceived trust on attitude indicates that the government policy makers should ensure that a true belief is created about the online functioning of the OPCRS system to its citizens. This could probably be done by using all previous successful efforts made by the government. The government can gain citizen's trusts using its successful story-telling, distributing pamphlets in the brick-and-mortar offices, and doing the actual work through its electronic services.

The significant impact of superior's influence on subjective norm illustrates that the government organisations should be instructed to promote the use of the e-government services such as the OPCRS system through its top management where employees tend to listen more of what their line managers suggest or ask them to do. Also, the higher government officials have a good prestige and image in their society, hence, they can be working to promote and persuade the people in their locality toward using the evolving and emerging systems of the likes of the OPCRS system through which obtaining the PAN card becomes much more easier.

The significant impact of self-efficacy on perceived behavioral control indicates that governmental agencies need to develop a training plan to improve users' independent operation ability (Hung et al. 2009) can strengthen users' perceived behavioral control. Similarly, the significant impact of facilitating conditions on perceived behavioral control indicates that the government agencies should provide more basic infrastructural and technological resources to their users to improve their perceived control. Finally, the significant influence of attitude, subjective norm, and perceived behavioral control on behavioral intentions indicate that policy makers should make plan of actions on enhancing users' positive attitude, develop more local project champions in the society and ask them to persuade their important ones in the society.

6   CONCLUSION

The purpose of this study was to examine the factors influencing adoption of an e-government system using the extended DTPB model. All eight hypotheses concerning nine constructs were found significant. The findings indicated that the variables such as perceived usefulness, perceived trust, superior's influence, self-efficacy, facilitating conditions, attitude, subjective norm, and perceived behavioural control were directly or indirectly found to well explain the citizens' intention to use a transactional e-government system like the OPCRS system. The overall high variance of 72% explained by the model on behavioral intentions indicates that these constructs are extremely significant in determining citizens' intentions to adopt the OPCRS system. This paper is one of those few research studies on e-government that has implemented the DTPB as a model to understand the impact of various factors on citizens' intention to adopt it. The policy makers should consider all these factors to improve upon their strategic planning for better adoption of the OPCRS system.

Appendix [A]: Survey Questionnaire Items [Likert Scale [1-7]: '1'-Extremely Disagree, '7'-Extremely Agree] [Source: Davis et al. (1989) [PU], Gefen et al. (2003) [PT], Taylor and Todd (1995) [SN, PBC, SE, SI], Thompson et al. (1991) [FC], Venkatesh et al. (2003) [BI]]

BI1. I intend to use the online PAN card registration system
BI2. I predict that I would use the online PAN card registration system
BI3. I plan to use the online PAN card registration system in the near future
AT1. Using the online PAN card registration system would be a good idea
AT2. Using the online PAN card registration system would be a wise idea
AT3. I would like the idea of using the online PAN card registration system
SN1. People who influence my behaviour think that I should use the online PAN card registration system
SN2. People who are important to me think that I should use the online PAN card registration system

PU1. Using the online PAN card registration system would enable me to accomplish my tasks more quickly

PU2. Using the online PAN card registration system would make it easier to obtain my PAN card

PU3. I would find the online PAN card registration system useful for obtaining my PAN card

PBC1. I would have the resources necessary to use the online PAN card registration system

PBC2. I would be having the knowledge necessary to use the online PAN card registration system

PBC3. Given the resources, opportunities and knowledge it takes to use the online PAN card registration system, it would be easy for me to use this system

FC1. Guidance would be available to me in the selection of the online PAN card registration system

FC2. Specialized instruction concerning the online PAN card registration system would be available to me

PT1. I believe that the online PAN card registration system would be honest

PT2. I believe that the online PAN card registration system would care about citizens

PT3. I believe that the online PAN card registration system would provide good service

PT4. I would trust online PAN card registration system

SI1. The income tax officials think that I should use the online PAN card registration system

SI2. I will have to use the online PAN card registration system because my income tax officials require it

SE1. I would feel comfortable while using the online PAN card registration system on my own

SE2. If I want to, I could easily operate the online PAN card registration system on my own

References

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50 (2), 179-211.

Akman, I., Yazici, A., Mishra, A. and Arifoglu, A. (2005). E-Government: A global view and an empirical evaluation of some attributes of citizens. Government Information Quarterly, 22 (2), 239-257.

Al-Sebie, M. and Irani, Z. (2005). Technical and organisational challenges facing transactional e-government systems: an empirical study. Electronic Government, an International Journal, 2 (3), 247-276.

Anderson, J.C. and Gerbing, D.W. (1988). Structural equation modeling in practice: a review and recommended two-step approach. Psychological Bulletin, 103 (3), 411-423.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Barclay, D.W. and Smith, J.B. (1997). The effects of organizational differences and trust on the effectiveness of selling partner relationships, Journal of Marketing, 61 (1), 3–21.

Belanger, F. and Carter, L. (2008). Trust and risk in e-government adoption. The Journal of Strategic Information Systems, 17(2), 165-176.

Bentler, P. and Bonett, D. (1980). Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin, 88 (3), 588-606.

Berger, I. (1993). A framework for understanding the relationship between environmental attitudes and consumer behavior. In R. Varadrajan and B. Jaworski (Eds.). Marketing theory and application, 4, 157-163.

Bhattacherjee, A. (2000). Acceptance of e-commerce services: The case of electronic brokerages. IEEE Transactions on Systems, Man and Cybernetics, Part A: Systems and Humans, 30 (4), 411-420.

Chin, W.W. and Todd, P.A. (1995). On the use, usefulness, and ease of use of structural equation modeling in MIS research: A note of caution. MIS Quarterly, 19 (2), 237-246.

Chu, P-Y., Hsiao, N., Lee, F.W. and Chen, C.W. (2004). Exploring Success factors for Taiwan's government electronic tendering system: Behavioral perspectives from end users. Government Information Quarterly, 21(2), 219-234.

Davis F.D., Bagozzi R.P., and Warshaw, P.R. (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35 (8), 982-1002.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13 (3), 319-339.

Dawes, S.S. (2009). Governance in the digital age: A research and action framework for an uncertain future. Government Information Quarterly, 26 (2), 257–264.

Dwivedi, Y.K., Wastell, D., Laumer, S., Henriksen, H.Z., Myers, M.D., Bunker, D. and Srivastava, S.C. (2015). Research on information systems failures and successes: Status update and future directions. Information Systems Frontiers, 17 (1), 1-15.

Evans, D. and Yen, D.C. (2006). E-government: Evolving relationship of citizens and government, domestic, and international development. Government Information Quarterly, 23 (2), 207–235.

Fishbein, M. and Ajzen, I. (1975). Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Reading, MA: Addison-Wesley.

Fornell, C. and Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18 (1), 39-50.

Gauld, R., Goldfinch, S. and Horsburgh, S. (2010). Do they want it? Do they use it? The 'Demand-Side' of e-Government in Australia and New Zealand. Government Information Quarterly, 27 (2), 177-186.

Gefen, D., Karahanna, E. and Straub, D.W. (2003). Trust and TAM in online shopping: An integrated model. MIS Quarterly, 27 (1), 51-90.

Gerbing, D.W. and Anderson, J.C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. Journal of marketing research, 25 (2), 186-192.

Ha, S. and Stoel, L. (2008). Promoting customer-retailer relationship building: Influence of customer trustworthiness of customer loyalty programme marketing. Journal of customer behaviour, 7 (3), 215-229.

Hackney, R., Jones, S. and Losch, A. (2007). Towards an e-Government efficiency agenda: The impact of information and communication behaviour on e-Reverse auctions in public sector procurement. European Journal of Information Systems, 16 (2), 178-191.

Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1992). Multivariate data analysis with readings. 3rd edn. New York, NY: Macmillan Publishing Company.

Horst, M., Kuttschreuter, M. and Gutteling, J.M. (2007). Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-government services in the Netherlands. Computers in Human Behavior, 23 (4), 1838-1852.

Hoyle, R.H. (1995). The Structural Equation Modeling Approach: Basic Concepts and Fundamental Issues. Thousand Oaks, CA: Sage Publications.

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: a multidisciplinary journal, 6 (1), 1-55.

Huang, Z. and Bwoma, P.O. (2003). An Overview of Critical Issues of E-Government. IACIS-2003. 164-170.

Hung, S.Y., Chang, C.M. and Yu, T. (2006). Determinants of user acceptance of the e-government services: The case of online tax filing and payment system. Government Information Quarterly, 23 (1), 97-122.

Hung, S-Y., Tang, K-Z., Chang, C-M. and Ke, C-D. (2009). User acceptance of intergovernmental services: An example of electronic document management system. Government Information Quarterly, 26 (2), 387-397.

Lau, A.S.M. (2004). Strategies to encourage the adoption of G2C e-government services in Hong Kong. Electronic Government, an International Journal, 1(3), 273-292.

Lau, A.S.M. and Kwok, V.W.S. (2007). How e-government strategies influence e-commerce adoption by SMEs. Electronic Government, an International Journal, 4 (1), 20-42.

Lean, O.K., Zailani, S., Ramayah, T. and Fernando, Y. (2009). Factors influencing intention to use-government services among citizens in Malaysia. International Journal of Information Management, 29 (6), 458-475.

Lu, C-T., Huang, S-Y. and Lo, P-Y. (2010). An empirical study of on-line tax filing acceptance model: Integrating TAM and TPB. African Journal of Business Management, 4 (5), 800-810.

Manshu (2011). Number of income tax payers in India and US. Economy, Accessed from http://www.onemint.com/2011/01/19/number-of-income-tax-payers-in-india-and-us, Feb 18, 2015.

Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. Information Systems Research, 2 (3), 173-191.

Moore, G.C. and Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. Information Systems Research, 2 (3), 192-222.

Netemeyer, R.G., Johnston, M.W. and Burton, S. (1990). Analysis of role conflict and role ambiguity in a structural equations framework. Journal of Applied Psychology, 75 (2), 148-157.

Norris, D.F. and Moon, M.J. (2005). Advancing E-Government at the Grassroots: Tortoise or Hare? Public Administration Review, 65 (1), 64-75.

Norris, D.F. and Reddick, C.G. (2013). Local E-Government in the United States: Transformation or Incremental Change? Public Administration Review, 73 (1), 165-175.

Nunnaly, J. (1978). Psychometric theory. New York: McGraw-Hill.

Rana, N.P., and Dwivedi, Y.K (2015). Citizen's adoption of an e-government system: Validating extended social cognitive theory (SCT). Government Information Quarterly, 32 (2), 172-181.

Rana, N.P., Dwivedi, Y.K. and Lal, B. (2015c). Factors Influencing Citizens' Adoption of an E-Government System: Validation of the Decomposed Theory of Planned Behavior (DTPB). UKAIS, Keeble College, University of Oxford, UK.

Rana, N.P., Dwivedi, Y.K. and Williams, M.D. (2013a). Examining the Factors Affecting Intention to Use of, and User Satisfaction with Online Public Grievance Redressal System (OPGRS) in India. IFIP 8.6, Bangalore, India.

Rana, N.P., Dwivedi, Y.K. and Williams, M.D. (2013b). Examining Factors Affecting Adoption of Online Public Grievance Redressal System: A Case of India. UKAIS, Oxford University, UK.

Rana, N.P., Dwivedi, Y.K., Piercy, N.C. and Williams, M.D. (2014b). Factors Influencing Adoption of Online Public Grievance Redressal System (OPGRS): A Validation of Extended Social Cognitive Theory. Academy of Marketing Conference, Bournemouth University, UK.

Rana, N.P., Dwivedi, Y.K., Williams, M.D. and Lal, B. (2014a). Examining the Success of the Online Public Grievance Redressal Systems: An Extension of the IS Success Model. Information Systems Management, 32(1), 39-59.

Rana, N.P., Dwivedi, Y.K., Williams, M.D. and Piercy, N.C. (2015b). An extended DeLone and McLean's information system model for examining success of online public grievance redressal system in Indian context. International Journal of Indian Culture and Business Management, 10 (3), 267-290.

Rana, N.P., Dwivedi, Y.K., Williams, M.D. and Weerakkody, V. (2015a). Investigating Success of an E-Government Initiative: Validation of an Integrated IS Success Model. Information Systems Frontiers, 17 (1), 127-142.

Reddick, C.G. (2004). A two-stage model of e-government growth: Theories and empirical evidence for U.S. cities. Government Information Quarterly, 21 (1), 51–64.

Rotter, J. (1971). Generalized expectancies for interpersonal trust. American Psychologist, 26 (5), 443-452.

Segars, A.H. and Grover, V. (1993). Re-examining perceived ease of use and usefulness: A confirmatory factor analysis. MIS Quarterly, 17 (4), 517-525.

Steiger, J.H. and Lind, J.C. (1980). Statistically-based tests for the number of common factors. Annual Spring Meeting of the Psychometric Society, Iowa City.

Susanto, T.D. and Goodwin, R. (2011). User Acceptance of SMS-Based eGovernment Services. In M. Janssen, H.J. Scholl, M.A. Wimmer, and Y-H. Tan (eds.): EGOV 2011, LNCS 6846, 75-87.

Taylor, N.G., Jaeger, P.T., Gorham, U., Bertot, J.C., Lincoln, R. and Larson, E. (2014). The circular continuum of agencies, public libraries, and users: A model of e-government in practice. Government Information Quarterly, 31, S18-S25.

Taylor, S. and Todd, P.A. (1995). Decomposition and crossover effects in the theory of planned behaviour: A study of consumer adoption. International Journal of Research in Marketing, 12 (2), 137-155.

Thompson, R.L., Higgins, C.A., and Howell, J.M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. MIS Quarterly, 15 (1), 124-143.

Venkatesh, V., Chan, F.K. and Thong, J.Y. (2012). Designing e-government services: Key service attributes and citizens' preference structures. Journal of Operations Management, 30 (1), 116-133.

Wang, Y-S. and Liao, Y-W. (2008). Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. Government Information Quarterly, 25 (4), 717-733.

Wang, Y-S. and Shih, Y-W. (2009). Why do people use information kiosks: A validation of the Unified Theory of Acceptance and Use of Technology. Government Information Quarterly, 26 (1), 158-165.

Watson, R.T. and Mundy, B. (2001). A strategic perspective of electronic democracy. Communications of the ACM, 44 (1), 27-30.

West, D.M. (2008). Improving technology utilization in electronic government around the world. Washington, D.C.: The Brookings Institution.

Zikmund, W.G. (1994). Business research methods. 4th Edition, New York, NY: The Dryden Press.