Adoption of Two Indian E-Government Systems: Validation of Extended Theory of Planned Behavior (TPB)

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Abstract

The purpose of this study is to explore the adoption of two electronic government systems (i.e., e-District and Online PAN card registration system (OPCRS)) by non-adopters in the Indian context. The study validates extended theory of planned behavior (TPB) with some additional relevant factors including self-efficacy and anxiety. The proposed research model was validated using structural equation modelling (SEM) with sample sizes of 304 for e-District and 377 for OPCRS gathered from citizens in India. The empirical outcomes of the proposed research model indicated the significant relationships of all five hypotheses proposed between six constructs. The empirical justification, discussion, and managerial implications provided in this research can help the government to improve upon and fully utilise the potential of e-government systems in India.

Keywords

E-government, e-District, OPCRS, TPB, Adoption, Citizen, India

Introduction

Electronic government (hereafter, e-government) is a process of connecting citizens electronically with their government for the services provided by government agencies (Lau et al., 2008). It is one of the most interesting concepts to have appeared in the area of public administration in the last few years (Rana et al., 2015a). Many governments have improved the infrastructure and services provided to their citizens (Kim et al., 2007). The introduction of e-government is a move undertaken by governments to become more service-oriented and focused toward the implementation of the widespread digital services through one-stop points of access for citizens (Anthopoulos et al., 2007; Rana et al., 2015b). Although e-government provides obvious benefits to governments, businesses and professionals, it is citizens who are essentially predicted to receive the greatest benefits (Jaeger, 2003; Rana et al., 2015b). As governments develop e-government systems to deliver services to citizens, there is a need for evaluation to determine their effectiveness (Wang and Liao, 2008) and extent of adoption.

The purpose of this study is to discuss the factors affecting non-adopters' intention to use two relatively new and emerging e-government systems using the extended TPB model. While the prior literature studies (Rana and Dwivedi, 2015; Rana et al., 2015a, 2015c; Rana et al., 2016) have advanced the understanding of these e-government systems, none of them have performed any empirical research based on the TPB model. The TPB includes factors such as perceived behavioral control, subjective norm, and attitude. This research contributes to the existing literature by validating the impact of some additional and useful factors such as self-efficacy and anxiety along with the TPB model. This is the reason why we claim that this study will validate the extended TPB model to understand the adoption of e-government systems in question. The rationale behind selecting these

systems is largely motivated by the rapid growth of e-government services and their use to serve society in a better way. However, spending exorbitant amounts of money to develop and implement such systems is not of much use unless the intended users adopt these systems to a reasonable extent. As e-government system adoption is not a mature phenomenon in a country like India, it is deemed relevant to explore the citizens' adoption of these e-government systems using the TPB model, a theory that links human beliefs and behavior.

Research Model Development and Hypotheses

Overview of Research Model

The theoretical development for this research follows TPB, which is a well-defined model for describing information systems/information technology (IS/IT) acceptance behavior (Hung et al., 2009; Taylor and Todd, 1995a). As per the TPB, acceptance behavior of a specific IS is determined by behavioral intention, with behavioral intentions predicted by antecedents including attitude, subjective norm, and perceived behavioral control. Providing a framework for examining impacts of external variables on system acceptance is an essential benefit of using the TPB to explore IS acceptance behavior (Hung et al., 2009). In comparison to the theoretical establishment of the other IS/IT acceptance theories, the TPB offers a more relevant description. The TPB has been used by numerous studies in various IS/IT contexts, organizational perspectives, and user populations (Hung et al., 2009; Taylor and Todd, 1995a), as well as by several studies in the e-government context (e.g. Lu et al., 2010; Kanat and Ozkan, 2009). However, none of these studies have included emotional aspects of systems usage, such as anxiety, or level of self-confidence in one's ability to perform a behavior, using variables such as self-efficacy. As both e-government systems are relatively new and still to be adopted and used by the larger community, measuring actual usage is unfeasible. The design of the proposed model is presented below in Figure 1.

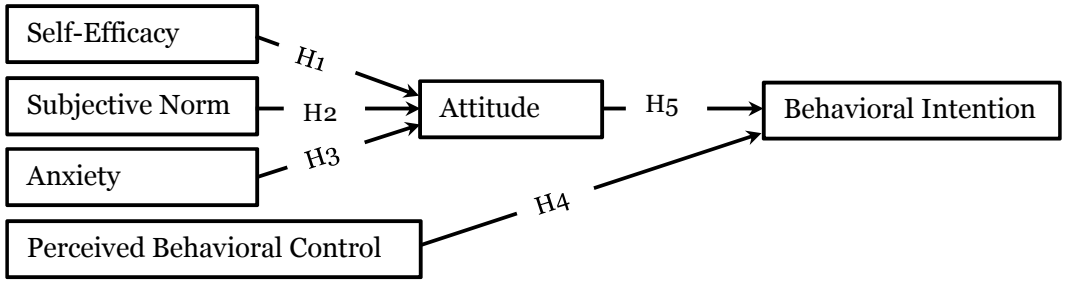

Figure 1. Proposed Research Model

Hypotheses Development

Under the proposed research model, five hypotheses are identified based on the relationships between six constructs adopted. The various hypotheses mentioned above in Figure 1 are discussed here.

Self-Efficacy

Self-efficacy refers to a judgement of one's capability to use a technology (Compeau and Higgins, 1995). Prior studies (e.g. Agarwal et al., 2000; Brown et al., 2002) have consistently shown the importance of self-efficacy in the computing domain. For example, Agarwal et al. (2000) found that self-efficacy affects computer use and early adoption of a computer system. Also, it has been suggested that self-efficacy can reinforce a user's beliefs about their ability to use a technology (Brown et al., 2002). In the context of e-government, self-efficacy can also be considered as an important variable that can drive individuals' behavioral intentions. This is particularly important for non-adopters as their prior experience with the use of similar IS can boost their confidence, which helps shape positive beliefs about using the e-District and OPCRS systems. Therefore, we hypothesize:

H1: Self-efficacy will have a positive and significant influence on users' attitude toward using e-District and OPCRS systems.

Subjective Norm

Subjective norm refers to an individual's perception that people who are important to him/her think he/she should or should not perform the behavior in question (Fishbein and Ajzen, 1975). It is generally believed that government service delivery or government policy-making will be further helped by incorporating subjective norms (Cook et al., 2002). Thus, in the new context of e-government systems like e-District and OPCRS, examining the effects of subjective norms is imperative (Hung et al., 2009). In the context of the current research, it could be easily justified that an individual's positive belief about whether to use the system or not can be largely impacted by his/her family, friends, colleagues, or someone referent in the community he/she lives in. Therefore, we can hypothesize:

H2: Subjective norm will have a positive and significant influence on users' attitude toward using e-District and OPCRS systems.

Anxiety

The emotional aspect of technology usage is expected to be captured through a construct called anxiety. It is defined as an individual's apprehension or even fear when he or she is faced with the possibility of using computers (Simonson et al., 1987). A substantial body of research in IS and psychology has revealed the relevance of computer anxiety by demonstrating its impact on attitudes (e.g., Igbaria and Chakrabarti, 1990; Korobili et al., 2010). For example, Igbaria and Chakrabarti (1990) suggested that individuals high in computer anxiety will have negative attitudes toward using a computer. Although anxiety has been researched extensively in the IS and psychology literature, its role as a determinant of an individual's attitude in the context of e-government adoption has been examined in very few studies (e.g. Rana et al., 2016). Therefore, we hypothesize:

H3: Anxiety will have a negative and significant impact on users' attitude toward using e-District and OPCRS systems.

Perceived Behavioral Control

Perceived behavioral control is the individual's perception of his or her control over performing the behavior (Mathieson, 1991). It includes the perceptions of the availability of ability, resources, and opportunities necessary for performing the behavior (Chau and Hu, 2001). Perceived behavioral control enhances the prediction rate of behavioral intention (Ajzen and Madden, 1986). Several studies (e.g., Hung et al., 2009; Lu et al., 2010) on e-government also confirm the effects of perceived behavioral control on behavioral intentions. Therefore, we hypothesize:

H4: Perceived behavioral control will have a negative and significant impact on users' behavioral intentions to use e-District and OPCRS systems.

Attitude

Attitude is defined as the degree to which an individual has a favorable or unfavorable appraisal or judgment of his or her behavior in question (Ajzen, 1991). In the field of public administration and e-government, a number of studies (e.g. Hung et al., 2009; Hung et al., 2013) have supported the relationship between attitude and behavioral intention. For example, analyzing users' acceptance of mobile e-government services in Taiwan, Hung et al. (2013) found that attitude is a critical factor for understanding and predicting mobile users' behavioral intentions. Therefore, in the recent perspective of mission-driven e-government, investigating the impacts of attitude is crucial (Hung et al., 2009). Based on the above discussion, the following hypothesis is formulated:

H5: Attitude will have a positive and significant impact on users' behavioral intentions to use e-District and OPCRS systems.

Research Methodology

This research examines the adoption of two e-government systems by non-adopters in India. E-District system is one such e-government system, which was planned as a pilot project by the state government of Bihar in India for integrated and seamless delivery of citizen services by the district administration through a single window. It is meant to ensure efficiency, transparency, and reliability of services enabled by an automatic district administration. Its benefits include faster processing of

citizens' cases, appeals and grievances, effective electronic work flow system, better and fast decision-making services to district administration, improvement in the efficiency of the workforce, post-delivery evaluation for further improvement, and faster service delivery to citizens (Rana et al., 2014; Rana et al., 2015a).

Similarly, the online PAN (Permanent Account Number) card registration system (OPCRS) is the second such e-government system, which provides transactional services to its users. 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. Every taxpayer who is required to furnish a return of income, even on behalf of others, must obtain a PAN (Rana et al., 2015c).

For the purpose of examining e-District and OPCRS systems adoption, we utilized a survey as an appropriate research method (Mingers, 2001). The final questionnaire consisted of 29 questions: 10 questions regarding respondents' demographic characteristics and 19 questions relating to the six different 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 questions. Overall 1,000 questionnaires were distributed for each e-government system to respondents from different cities of India such as Delhi, Pune, Mumbai, Bangalore, Patna, Siliguri, Gangtok, Aurangabad, Madhubani, Gaya, and Nalanda, thus covering all different demographics from India. They either had to return the survey after they had completed it on the spot or in maximum two days from the day of distributing the questionnaires. This research used convenience sampling as its sampling technique. Convenience sampling is drawn from a portion of the population that is close to hand, readily obtainable, or suitable to the researcher (Bhattacherjee, 2012). The distribution of questionnaires took place in phases, continuing for around two months, covering different locations from the above mentioned locations. All the respondents were non-adopters as these systems were relatively new. A total of 389 questionnaires for e-District system and 474 for the OPCRS system were returned within the specified time span. The further scrutiny of questionnaires indicated that 85 questionnaires from e-District system and 97 questionnaires from the OPCRS system were rejected as they were incomplete. Hence, we were left with 304 usable responses from the e-District system and 377 from the OPCRS system.

Research Findings

Respondents' Demographic Profile

The characteristics of the data gathered for e-District system from the respondents of various geographical locations indicated that the majority of the population was from a relatively younger generation: 72.6% of respondents belonged to an age group of 20-34 years. As far as the occupation of the respondents is concerned, the largest (39.1%) of the total sample were students followed by 18.4% and 17.4% represented by private-sector and public-sector employees. The education qualification for more than 84% of the overall population was found to be graduation and above. The computer and Internet literacy and awareness of the respondents can be judged from their very high computer and Internet experience percentage (≈ 98%).

Similarly, the characteristics of the data gathered for the OPCRS system indicated that users were predominantly male (66.3%). Respondents' ages fell primarily between 20 and 39 (≈75%) and their minimal educational level was largely bachelor degree or higher (88%). Regarding computer and Internet experience, respondents with more than one-year experience (≈97%) dominated the sample. Finally, as far as computer and Internet access of the respondents is concerned, the majority (≈98%) of them have got it some place or the other (e.g., home, office, educational institution, Internet cafe, or common service center). Moreover, the majority (≈63%) of the overall sample were respondents from private- and public sector organizations.

Descriptive Statistics and Measurement Model

The high overall mean values (i.e. close to or greater than five in the scale of 1-7) for all constructs for both OPCRS and e-District systems indicate that respondents react favorably to all the measures directly or indirectly linked to behavioral intention. The value for overall minimum mean for self-

efficacy as '4.82' for e-District system on the Likert scale of 1-7 indicates that users have responded favorably to all the items of constructs. The mean values of 4.40 and 4.36 for OPCRS and e-District anxiety indicate that they are very close to the neutral value [4]. These low values for anxiety indicate that respondents are not overly anxious.

Measure	**Mean**	**S.D.**
Attitude	5.51[a] 5.30[b]	1.36[a] 1.29[b]
Subjective Norm	4.94[a] 4.92[b]	1.52[a] 1.35[b]
Perceived Behavioral Control	5.30[a] 4.87[b]	1.30[a] 1.34[b]
Self-efficacy	5.28[a] 4.82[b]	1.38[a] 1.38[b]
Anxiety	4.40[a] 4.36[b]	1.74[a] 1.55[b]
Behavioral Intention	5.31[a] 4.95[b]	1.44[a] 1.46[b]

Table 1. Descriptive statistics [Legend: [a]: OPCRS, [b]: e-District, N = Sample Size, S.D. = Standard Deviation]

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 2 lists the standardized factor loadings, composite reliabilities, and variance extracted estimates. Standardized factor loadings are indicative of the degree of association between scale items and a single latent variable. The loadings are highly significant in all the cases. Composite reliabilities, similar to Cronbach's alpha, for all constructs except SN (i.e. 0.695) for OPCRS were found well beyond the minimum limit of 0.70.

Measure	FL (EDS)	CR (EDS)	AVE (EDS)	FL (OPCRS)	CR (OPCRS)	AVE (OPCRS)
Attitude (ATT)		0.895	0.864		0.794	0.685
ATT1	0.90			0.76		
ATT2	0.81			0.73		
ATT3	0.87			0.76		
Subjective Norm (SN)		0.822	0.763		0.695	0.549
SN1	0.82			0.72		
SN2	0.85			0.74		
Perceived Behavioral Control (PBC)		0.880	0.826		0.777	0.619
PBC1	0.76			0.69		
PBC2	0.73			0.69		
PBC3	0.88			0.66		
PBC4	0.84			0.69		
Self-Efficacy (SE)		0.873	0.842		0.720	0.591
SE1	0.88			0.76		
SE2	0.88			0.74		
Anxiety (ANX)		0.801	0.707		0.709	0.538
ANX1	0.82			0.83		
ANX2	0.87			0.66		
ANX3	0.56			0.50		
Behavioral Intention (BI)		0.817	0.728		0.805	0.707
BI1	0.75			0.83		
BI2	0.77			0.75		
BI3	0.80			0.70		

Table 2. Results of confirmatory factor analysis [EDS: e-District System; OPCRS: Online PAN Card Registration System] [Legend: AVE: Average Variance Extracted; CR: Composite Reliability, ED: e-District, FL: Factor Loading, OP: Online PAN Card Registration System]

Average variance extracted is a measure of the variation explained by the latent variable to random measurement error (Netemeyer et al., 1990) and ranged from 0.538 to 0.864 for all constructs. These estimates exceed the recommended lower limit of 0.50 (Fornell and Larcker, 1981). All tests support the convergent validity of the scales. Discriminant validity was assessed with the test recommended by Anderson and Gerbing (1988). The squared correlation between a pair of latent variables (see Table 3) should be less than the square root of each variable (see Table 2). Each combination of latent variables was tested, and each pairing passed the test, providing indication of the discriminant validity of the scales.

Variable	ATT	SN	PBC	SE	ANX	BI
ATT	0.930[a] 0.828[b]					
SN	0.483**[a] 0.439**[b]	0.873[a] 0.741[b]				
PBC	0.494**[a] 0.523**[b]	0.427**[a] 0.499**[b]	0.909[a] 0.787[b]			
SE	0.437**[a] 0.542**[b]	0.475**[a] 0.501**[b]	0.576**[a] 0.674**[b]	0.917[a] 0.769[b]		
ANX	0.035[a] 0.123*[b]	0.201**[a] 0.374**[b]	0.127*[a] 0.324**[b]	0.194**[a] 0.273**[b]	0.841[a] 0.733[b]	
BI	0.704**[a] 0.732**[b]	0.483**[a] 0.454**[b]	0.528**[a] 0.552**[b]	0.417**[a] 0.538**[b]	0.019[a] 0.131*[b]	0.853[a] 0.841[b]

Table 3. Squared pairwise correlations and alpha internal reliabilities [Legend: [a]: e-District System, [b]: Online PAN Card Registration System; Square root of AVEs are shown in the diagonal; ** Significant at $p < 0.01$; * at $p < 0.05$; all other correlations are non-significant]

Structural Model Testing

The overall model fit is acceptable, as can be seen from Table 4. The test of overall model fit resulted in a Chi-square value of 188.654 for e-District system and 255.350 for OPCRS with degrees of freedom as 108 and a probability value of less than 0.001 for both. 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 is well within suggested 3 to 1 bracket (Chin and Todd, 1995; Gefen, 2000). Typically, researchers also report a number of fit-statistics to examine the relative fit of the data to the model (see Table 4). We found the fit-indices largely in accordance with the recommended values. We also report RMSEA (Root Mean Square Error of Approximation) well within the recommended level, which measures the discrepancy per degree of freedom (Steiger and Lind, 1980).

Fit Index	Model (EDS)	Model (OPCRS)	Recommendation
Chi-Square	188.654	255.350	N/A
Degree of Freedom (DF)	108	108	N/A
P	0.000	0.000	Non-Significant
Chi-Square/DF	1.747	2.364	<3.000 (see Chin and Todd, 1995)
GFI (Goodness-of-Fit Index)	0.930	0.930	>0.90 (see Hoyle, 1995)
AGFI (Adjusted GFI)	0.901	0.900	>0.80 (see Chin and Todd, 1995)
CFI (Comparative Fit Index)	0.957	0.963	>0.90 (see Bentler and Bonnet, 1980)
TLI (Tucker-Lewis Index)	0.946	0.953	>0.95 (see Hu and Bentler, 1999)
RMSEA	0.050	0.060	<0.08 (see Steiger and Lind, 1980)

Table 4. Model fit summary for the proposed research model

All the fit indices values for e-District as well as OPCRS systems clearly indicate that they are well within the recommended set of values. The RMSEA values for both these systems are also found to be less than 0.08, which indicates a very good fit for the model (Belanger and Carter, 2008).

Having established the relative adequacy of the models' fit, it is appropriate to examine individual path coefficients corresponding to our hypotheses. This analysis is presented in Table 5. All five hypotheses for both e-government systems are supported here. Self-efficacy (i.e. Hypothesis H1) and subjective norm (i.e. Hypothesis H2) are found to exert a positive significant impact on user's attitude whereas anxiety shows a negative significant impact on attitude (i.e., Hypothesis H3). Further, both

perceived behavioral control (i.e. Hypothesis H4) and attitude (i.e. Hypothesis H5) are found positively determining users' behavioral intentions for both e-government systems.

H#	Hypothesis	Coeff. (EDS)	Sig. (EDS)	Coeff. (OPCRS)	Sig. (OPCRS)
H1	SE→ATT	0.51	***	0.47	***
H2	SN→ATT	0.31	*	0.28	***
H3	ANX→ATT	-0.15	*	-0.15	**
H4	PBC→BI	0.20	**	0.22	***
H5	ATT→BI	0.76	***	0.76	***

Table 5. Path coefficients and hypotheses testing [Legend: Coeff. = Path Coefficient, EDS: e-District System, H# = Hypothesis Number, OPCRS: Online PAN Card Registration System, Sig. = Significance level such as ***p < 0.001, **p<0.01, *p<0.05]

Figure 2 shows the path coefficients for each significant relationship using structural equation modelling technique of AMOS 22.0. The significance of each relationship has also been shown (***p<0.001, **p<0.01, *p<0.05).

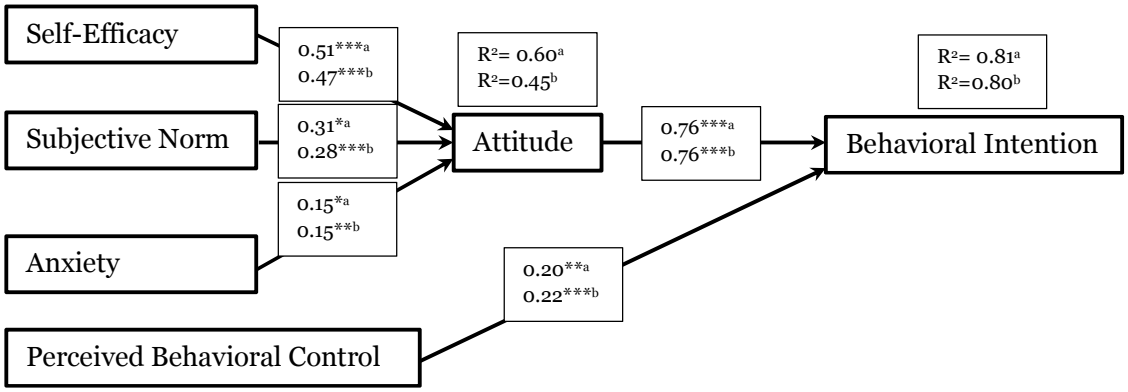

Figure 2. Validated research model [a: Path-coefficient for e-District System, b: Path-coefficient for OPCRS System]

The variances explained by the validated research model for attitude by e-District system and OPCRS system were found to be 60% and 45% respectively, and variances for these systems on behavioral intention were 81% and 80% respectively.

Discussion and Implications

This research examines the adoption of two e-government systems namely e-District and OPCRS by non-adopters in the context of India. We considered extended TPB model with self-efficacy and anxiety as additional variables to evaluate the adoption of these systems. All the five hypotheses between six variables were found significant for both e-government systems under consideration. The relative high variances explained by the validated research model in BI exerted by the independent variables for both the systems clearly indicate that these variables are very relevant as far as evaluating them in context of these e-government systems is concerned. The variance explained by the model in attitude is also fairly adequate given that only three variables (i.e. self-efficacy, subjective norm, and anxiety) determine it.

A very strong and significant impact of self-efficacy on attitude for both e-government systems indicates that the users' individual self-beliefs and capabilities to handle the system effectively would lead them to think positively about the systems, which eventually would result in the adoption of such systems. This also indicates that even though the individuals are not much exposed to the relatively new systems such as e-District and OPCRS, their levels of comfort with other information and e-government systems would help them to develop a positive attitude toward using the intended system. As most of the respondents surveyed were computer and Internet literate, a positive and significant relationship between these constructs is further explained (Rana and Dwivedi, 2015). This relationship conveys important information for policy-makers regarding making their citizens confident and capable to use their systems. Possibly arranging more training programs for them and also providing online help so that they can make themselves aware of the proper functioning of the

systems through such help can achieve this objective. Policy makers need to take strategic initiative to leverage the whole community through their widespread action plan in this direction. This is particularly challenging for e-District system as its benefits reach directly to the poor who still struggle even for their basic education particularly in rural India.

The moderate though significant impact of subjective norm on attitude for both e-government systems clearly indicates that the influence from important others including friends, colleagues, and family not only enhances individuals' efficiency and performance, but also positive attitude to use the e-government systems. In the present societal structure across India, each one of us struggles with the inherent corruption spread across government departments, organizations, and ministry at state and central government levels. The government should motivate citizens to encourage influential ones to use such systems (Rana and Dwivedi, 2015; Rana et al., 2014). For this, the government can pick some local champions from each selected location who would have good understanding of operating such systems and financially support them to open common service centers (CSCs) in the rural areas; from there they can make other people in their society aware about the e-government systems and their benefits. The digitally illiterate individuals of the society can also be served through such CSCs as they may be more likely to trust someone from their own location more than outsiders.

The research also empirically established the impact of anxiety on behavioral intention indirectly through attitude. The significant though negative influence of anxiety on attitude indicates that non-adopters' apprehensions about using e-government systems would negatively influence their feelings. Anxiety is considered as a type of deterrent emotion that occurs when any IT event is considered as a threat and the individual feels that he or she has only partial control over the outcome from the system (Beaudry and Pinsonneault, 2010). This relationship also indicates that users utilize their emotions along with cognitions while developing a strong belief toward using e-government systems (Rana et al., 2016). Anxiety can genuinely surface in the individual thinking process when they use any e-government system. It becomes even more apparent when it is considered in the context of non-adopters. The government should make an effort to make users confident in the systems to alleviate anxiety.

The positive and significant impact of perceived behavioral control on behavioral intention indicates that users' perceptions of the availability of ability, resources, and opportunities necessary to use the systems would enhance their overall intentions toward using them (Chau and Hu, 2001). The government should provide widespread technical infrastructure to its citizens so that they can easily avail and use e-government systems. Opportunities such as training programs and the e-government services provided through CSCs established across the country may be instrumental in enabling individuals to form positive intentions toward the corresponding systems (e.g., Chiu et al., 2012; Pynoo et al., 2007). Finally, the strong and significant impact of mediating construct attitude on behavioral intention implies that a user might intend to use the e-District and OPCRS systems based on the strength of their attitudes. A number of studies on technology adoption (e.g., Chiu et al., 2012; Park et al., 2007) in general and e-government adoption (e.g., Lu et al., 2010) in particular have acknowledged this strong and significant relationship. Considering the attitudes towards e-governmental services, three factors (self-efficacy, anxiety, subjective norm) have been found to be significant determinants of users' attitudes for e-District and OPCRS systems. Specifically, attitude has a direct impact on behavioral intentions — which imply that policymakers will find it beneficial to shape the attitudes of individuals for influencing intentions to use e-government systems.

Conclusion

The purpose of this study is to examine the adoption of the e-District and OPCRS systems using the extended TPB model. The empirical findings of the study are a step forward toward filling the research gap, where validation of the extended TPB model along with constructs including self-efficacy and anxiety has not been validated by any other research study on e-government adoption yet. The findings of this research show that external variables such as anxiety and self-efficacy play significant roles in adoption of relatively new e-government systems like e-District and OPCRS. If government agencies really want their e-government systems to be acknowledged, appreciated, and adopted by their citizens, they must acknowledge and understand the citizens' views concerning the credibility of e-government services provided to them.

There are some limitations of this research. Firstly, as e-District and OPCRS systems are relatively new systems not used by many people, the exploration of an extended TPB model has been validated only using the non-adopters from some selected cities in India. Hence, caution needs to be taken while

generalizing its findings to adopters and users of different cultural and geographical locations in India. Secondly, the proposed research model can also be validated using organizational users. Such research would allow the researchers to understand the variations of factors used across to the different levels and their influence on subsequent adoption of the systems.

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