Examining Adoption of Electronic District (e-District) System in Indian Context: A Validation of Extended Technology Acceptance Model

Completed Research Paper

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

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

Vishanth Weerakkody
Business School, Brunel University, UK
vishanth.weerakkody@brunel.ac.uk

Niall C. Piercy
School of Management, Swansea University, UK
n.c.piercy@swansea.ac.uk

Michael D. Williams
School of Management, Swansea University, UK
m.d.williams@gmail.com

Abstract

The purpose of this study is to explore the adoption of e-District system for potential adopters in context of Bihar in India. The study validates technology acceptance model (TAM) along with some additional and important factors such as trialability and self-efficacy toward the adoption of e-District systems in context of India. The proposed research model was validated using a sample size of 304 citizens gathered from four districts namely Madhubani, Aurangabad, Gaya, and Nalanda of Bihar in India where the project was in the pilot testing phase. The data were analysed using structural equation modelling (SEM) technique of AMOS 20.0. The empirical outcomes of the proposed model indicated the significant relationships of all six hypotheses proposed between five constructs. The empirical justification, discussion, and managerial implications provided in this research can help the state government to improve upon and fully utilise the potential of the e-District system as a useful tool.

Keywords

E-government, e-District system, technology acceptance model, TAM, adoption, India

Introduction

Many governments have improved the infrastructure and services provided to their citizens (Kim et al., 2007). The introduction of electronic government (hereafter, e-government) projects is a move undertaken by the governments to become more service oriented by focusing on the implementation and extensive digital services through one-stop points of access for citizens (Anthopoulos et al., 2007). Initiatives like e-government can contribute to the socio-economic development of developing countries (Boateng et al., 2008) like India. E-government can be defined as government's use of information and communication technology (ICT) and especially Web-based Internet applications to augment the access to and delivery of government information and services to citizens, businesses, professionals, and other agencies and entities. As governments develop e-government systems to deliver services to citizens, there is a need for evaluation effort that could determine their effectiveness (Wang and Liao, 2008) and extent of adoption.

E-District system is one such e-government system, which has been planned as a pilot project by the state government of Bihar for integrated and seamless delivery of citizen's 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. It's services to citizens include certificate services (such as caste, residential, character, income, birth, and death certificates), pension services (such as national old aged pension, Indira Gandhi national widow pension, Bihar handicapped pension, etc.), land revenue-related services (such as land-related certificates, land less certificate, etc.), public distribution systems (such as below poverty line certificate, ration card, etc.), right to information (RTI) services (such as recording, listing, and status of RTI), grievance management services (such as recording, listing, and status of grievance), election services (such as addition, modification, or deletion of a name in the electoral role), and court case services.

This study will validate the extended TAM model to understand the adoption of e-District system implemented in the state of Bihar in India. A number of prior research (e.g. Colesca and Dobrica, 2008; Gumussoy and Calisir, 2009; Lee and Rao, 2009) on e-government have used TAM as a basic model to explore and validate the proposed models. In line with the common phenomenon of understanding the ease of use and usefulness of the e-government system in question, this research contributes to the existing literature by validating the influence of additional factors such as self-efficacy and trialability along the TAM model. The main reasoning behind using these constructs is motivated by two facts. Firstly, no research has yet empirically validated this combination with the TAM model before. Secondly, these additional constructs could be extremely useful to examine initially to the respondents who are well aware of the computer and Internet systems and can most likely to adopt this system based on their positive response and views related to the items of constructs used in this model. Moreover, with assimilation of additional constructs, the proposed research model still remains parsimonious and explores users' intention indirectly through self-efficacy and trialability. The rationale behind selecting this system is largely motivated by the rapid growth of this service and its use to serve the society in a better way. Moreover, spending exorbitant amount of money behind the development and implementation of such system is not of much use unless the target population adopts it to the reasonable extent. As e-government system implementation is not too mature phenomenon in the state of Bihar, it is deemed relevant to explore the citizens' adoption of this e-government system.

Model Development and Hypotheses

Overview of Research Model

The theoretical development for this research will follow up and emerge from TAM. Davis (1986) introduced TAM for modelling user acceptance of information systems. The goal of TAM is to provide an explanation of the determinants of the computer acceptance, which is capable of explaining user behavior over a wide range of end-user computing technologies and user populations by being parsimonious and theoretically justified. Ideally one would like a model that is helpful not only for prediction but also for explanation, so that researchers and practitioners can identify why a specific system may not be acceptable, and pursue relevant corrective steps (Davis et al., 1989). Among many variables that cause people to accept or reject any information system, two determinants are specially suggested to hold high significance. These are perceived usefulness and perceived ease of use (Davis, 1989; Davis et al., 1989). Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989).

Moreover, we have also included two additional constructs including self-efficacy from social cognitive theory (SCT) (Taylor and Todd, 1995) and trialability from innovation diffusion theory (IDT) (Moore and Benbasat, 1991). Self-efficacy is defined as "the judgement of one's ability to use a technology (e.g., computer) to accomplish a particular job or task" (Bandura, 1986). Trialability is the degree "to which an innovation may be experimented with on a limited basis (Rogers, 2002). These external constructs are supposed to play significant roles as far as a system like e-District system is concerned. As this system is in its pilot testing phase, citizens would probably try it a few times before deciding whether to accept the system. Moreover, their ability to use other similar information systems will also play a significant role toward adopting e-District system. Therefore, trialability and self-efficacy would be significant variables to understand the levels of adoption of the multi-faceted system such as e-District system. The design of the proposed model is presented below in Figure 1.

Hypotheses Development

Under the proposed research model, we have formulated six hypotheses based on the relationships between five constructs adopted. The various hypotheses mentioned above in Figure 1 will be discussed here.

Perceived Ease of Use

Perceived ease of use is linked with the user's evaluation of the effort involved in the process of using a specific system. It is examined in terms of how clear and understandable is the interaction with the system, ease of getting the system to do what it is required to do, mental effort required to interact with the system, and ease of use of the system (Davis et al., 1989). Davis (1989) argued that a system perceived to be easier to use than another is more likely to be accepted by the users. A number of studies (e.g., Phang et al., 2006; Sambasivan et al., 2010) have shown the significant relationship between perceived ease of use and behavioral intention to use the e-government system. In the context of e-District system, if the users perceive that the system is easy and comfortable to use, then the intention to use is reinforced and more users can start using the system. Therefore, we hypothesise:

H1: Perceived ease of use has a positive and significant influence on behavioral intentions to use e-District system.

The causal relationship of perceived ease of use on perceived usefulness makes a lot of sense conceptually. The easier a system is to interact with, the less effort needed to operate it and the more effort one can allocate to other activities (Radner and Rothschild, 1975), contributing to overall job performance (Davis, 1989). A number of studies (e.g., Chiang, 2009; Lu et al., 2010) have demonstrated the positive and significant relationship between perceived ease of use and perceived usefulness. In context of this research, easier to use e-District system will result in enhanced performance of the users. Therefore, we hypothesise:

H3: Perceived ease of use has a positive and significant influence on perceived usefulness.

Perceived Usefulness

Davis et al. (1989) concluded that perceived usefulness is a key determinant of behavioral intention to use. TAM explains considerable amount of behavioral intention to use variance only using perceived usefulness and perceived ease of use (Plouffe et al., 2001). A number of studies (e.g. Hu et al., 2011; Sambasivan et al., 2010) on e-government adoption have also endorsed this relationship. In the context of this research, it can be argued that the citizens are more likely to accept e-District system when they consider the use of the system is beneficial to their work tasks and performance. Therefore, we hypothesise:

H2: Perceived usefulness has a positive and significant influence on behavioral intentions to use e-District system.

Self-Efficacy

Taylor and Todd (1995) accepted that it might be reasonable to believe that ease of use and self-efficacy would be related to each other. It has been argued that individuals with high self-efficacy will perceive the system to be easy and useful due to the impact of self-efficacy on the level of effort (Bandura, 1977; Igbaria and Iivari, 1995). A moderate number of studies (e.g. Susanto and Goodwin, 2011; Wang, 2002) on e-government adoption have supported the significant impact of self-efficacy on perceived ease of use. In context of this research, we believe that user's higher levels of capability to accomplish an intended task would lead him or her to easier to use e-District system. Therefore, we hypothesise:

H4: Self-Efficacy has a positive and significant impact on perceived ease of use of the e-District system.

Trialability

Trialability is the degree to which one can experiment with an innovation on a limited basis before making an adoption or rejection decision (Karahanna et al., 1999; Moore and Benbasat, 1991; Rogers, 1995). Examining the factors influencing subscription of mobile services in China, Deng et al. (2008) revealed that a number of users realised the benefits of such services after the trial and found a significant relationship between trialability and perceived usefulness. This research believes that experimenting with

the e-District system a few times would enhance user's views about his or her improved performance in using this system. Therefore, we hypothesise:

H5: Trialability has a positive and significant influence on perceived usefulness.

Similarly, while analysing factors influencing Internet banking adoption among young adults in Malaysia, Eze et al. (2011) found a strong correlation between trialability and self-efficacy. This research also believes that user's ability to use e-District system to accomplish intended task would get enhanced with certain trials of the system. Therefore, we hypothesise:

H6: Trialability has a positive and significant influence on self-efficacy.

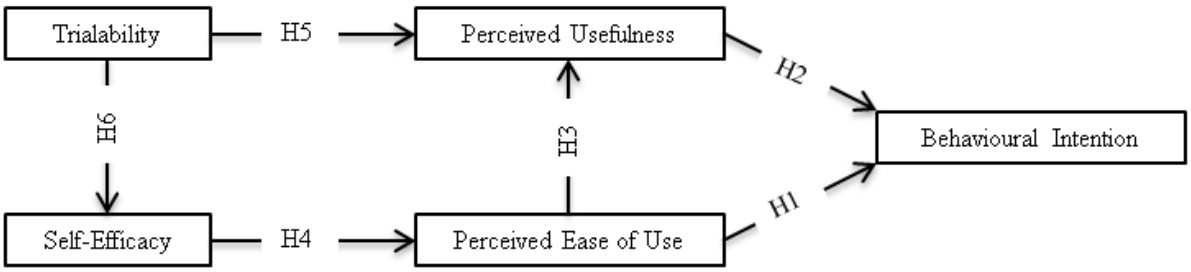

Figure 1. Proposed Research Model

Method

For the purpose of examining e-District system adoption, we adopted survey as an appropriate research method. The final questionnaire consisted of total 28 questions including 10 questions from respondent's demographic characteristics and remaining 18 questions on five different constructs of the proposed research model. However, we removed one item each from *perceived ease of use*, *perceived usefulness*, *self-efficacy*, and *trialability* for the data analysis. This action was performed because the factor loading value for each of these items was found to be less than 0.70 levels. Therefore, we were left with 14 items (see Appendix A for detailed research instruments) including four from perceived usefulness, three each from perceived ease of use and behavioral intention, and two each from self-efficacy and trialability. 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. At the time of gathering data, the pilot testing for this system was ongoing in only four districts (i.e. Madhubani, Gaya, Nalanda, and Aurangabad) of Bihar, therefore, the sample frame constituted the selected users who were part of this trial.

Of the overall 1,000 questionnaires distributed to the respondents, they either had to return them after they had completed them on the spot or in maximum two days of time from the day of distributing of questionnaires. The distribution of questionnaires took place in phases which continued for about two months' time covering different locations from four above mentioned districts. All the users of this system were potential adopters as this system is implemented for the first time in the state of Bihar. A total of 389 questionnaires were returned to the researchers within the specified time span. The further scrutiny of questionnaires indicated that 85 of them were incomplete. Hence, we were left out with 304 usable responses, which made the basis for our empirical analysis for measuring the adoption of e-District system. The overall response rate was found to be 38.9% with 30.4% valid questionnaires.

Results

Respondents' Demographic Profile

This section analyses demographic data obtained from the respondents. 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, 72.6% 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 the 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%).

Descriptive Statistics and Measurement Model

The high overall as well as individual items' means for most of the constructs indicate that respondents react favorably to the all the measures directly or indirectly related to behavioral intention. The value for overall minimum mean for self-efficacy as '4.88' on the Likert scale [1-7] indicates that users have responded favorably to all items of constructs.

Measure	Mean	S.D.	CA
Perceived Ease of Use (PEOU)	5.00	1.06	0.739
Perceived Usefulness (PU)	5.20	1.09	0.814
Self-Efficacy (SE)	4.88	1.25	0.638
Trialability (TRB)	4.99	1.16	0.670
Behavioral Intention (BI)	4.95	1.25	0.811

Table 1. Descriptive statistics
[Legend: CA: Cronbach's Alpha (α), S.D. = Standard Deviation]

Cronbach's alpha (α) for constructs such as PEOU (i.e. 0.739), PU (i.e. 0.814), and BI (i.e. 0.811) were found exceeding the minimum acceptable level of 0.70 (Nunnally, 1978). However, the corresponding values for SE (i.e. 0.638) and TRB (i.e. 0.670) were found at the moderate range (i.e. $0.6 \leq \alpha \leq 0.7$) and hence indicate the acceptable level of internal consistency estimate among test items.

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 average variance extracted. 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 except self-efficacy (with CR 0.608). Composite reliabilities, similar to Cronbach's alpha, for PEOU (i.e. 0.746), PU (i.e. 0.850), and BI (0.817) were found well beyond the minimum limit of 0.70. However, it was relatively low for trialability (i.e. 0.670) and self-efficacy (i.e. 608). The probable reason for this could be relatively less items considered for this two constructs.

Measure	FL	CR	AVE
Perceived Ease of Use (PEOU)		0.746	0.594
EOU1	0.66		
EOU2	0.74		
EOU3	0.71		
Perceived Usefulness (PU)		0.850	0.607
PU1	0.69		
PU2	0.70		
PU3	0.74		
PU4	0.77		
Self-Efficacy (SE)		0.608	0.404
SE1	0.70		
SE2	0.62		
Trialability (TRB)		0.670	0.506
TR2	0.71		
TR3	0.71		
Behavioral Intention (BI)		0.817	0.731
BI1	0.89		
BI2	0.75		
BI3	0.67		

Table 2. Results of confirmatory factor analysis

[Legend: AVE: Variance Extracted Estimate, CR: Composite Reliability, FL: Factor Loading]

Variance extracted estimates are measures of the variation explained by the latent variable to random measurement error (Netemeyer et al., 1990) and ranged from 0.51 to 0.73 for all constructs except self-efficacy (where AVE was found as 0.404). Again, this relatively lower value is probably due to lower factor loading of SE2 to 0.62. These estimates exceed the recommended lower limit of 0.50 (Fornell and Larcker, 1981). Tests (except self-efficacy in terms of AVE and trialability in terms of CR, which were found at the tolerable levels) related to convergent validity of the scales were supported. Discriminant validity was assessed with the test recommended by Anderson and Gerbing (1988). The factor correlation between a pair of latent variables (see Table 3) should be less than the square root of variance extracted estimate of each variable (see Table 2). Each combination of latent variables was tested, and each pairing passed, providing indication of the discriminant validity of the scales.

Variable	PU	PEOU	SE	TRB	BI
PU	**0.779**[b]				
PEOU	0.625[a]	**0.771**[b]			
SE	0.504[a]	0.606[a]	**0.636**[b]		
TRB	0.474[a]	0.447[a]	0.474[a]	**0.711**[b]	
BI	0.510[a]	0.543[a]	0.456[a]	0.355[a]	**0.855**[b]

Table 3. Factor correlation matrix
[Legend: [b] Square roots of AVE [in **bold**] are shown on the main diagonal
[a] Significant at p < 0.01]

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 137.61 with degrees of freedom as 71 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 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	Recommendation
Chi-Square	137.61	N/A
Degree of Freedom (DF)	71	N/A
P	0.000	Non-Significant
Chi-Square/DF	1.938	<3.000 (see Chin and Todd, 1995)
GFI (Goodness-of-Fit Index)	0.939	>0.90 (see Hoyle, 1995)
AGFI (Adjusted GFI)	0.910	>0.80 (see Chin and Todd, 1995)
CFI (Comparative Fit Index)	0.960	>0.90 (see Bentler and Bonnet, 1980)
TLI (Tucker-Lewis Index)	0.950	>0.95 (see Hu and Bentler, 1999)
RMSEA	0.056	<0.10 (see Steiger and Lind, 1980)

Table 4. Model fit summary for the proposed research model

Having established the relative adequacy of the model's fit, it is appropriate to examine individual path coefficients corresponding to our hypotheses. This analysis is presented in Table 5.

H#	Hypothesis	Coeff.	CR	Sig.	Supported
H1	Perceived Ease of Use → Behavioral Intention	0.489	3.948	***	YES
H2	Perceived Usefulness → Behavioral Intention	0.246	2.062	*	YES
H3	Perceived Ease of Use → Perceived Usefulness	0.643	6.219	***	YES
H4	Self-Efficacy → Perceived Ease of Use	0.896	8.754	***	YES
H5	Trialability → Perceived Usefulness	0.229	2.418	*	YES

H6	Trialability → Self-Efficacy	0.712	7.051	***	YES

Table 5. Path coefficients and hypotheses testing

[Legend: *|**|***=significance level, *p<0.05, 0.05<**p<0.01, ***p<0.001, Coeff. = Coefficient, CR: Critical Ratio, H# = Hypothesis Number, Sig. = Significance]

All six hypotheses are supported. Perceived ease of use positively influenced behavioral intention (H1) and perceived usefulness (H3). Perceived usefulness significantly influenced behavioral intention (H2). Self-efficacy significantly influenced perceived ease of use of the e-District system (H4). Moreover, higher levels of Trialability resulted in higher perceived usefulness (H5) and self-efficacy (H6) toward adopting e-District system.

Figure 2 shows the path coefficients for each significant relationship using structural equation modelling technique of AMOS 20.0. The relationships between PEOU and PU, PEOU and BI, SE and PEOU, and TRB and SE were found significant at the levels of $p < 0.001$ whereas that of between PU and BI and TRB and PU were found significant at $p < 0.05$ level.

The higher level of significance and strong path coefficients are also indicated by relatively higher critical ratios of relationships. The variance explained on dependent variables *self-efficacy, perceived ease of use, perceived usefulness*, and *behavioral intentions* were found as 51%, 80%, 65%, and 49% respectively.

Discussion and Implications

The positive significance of perceived ease of use on behavioral intentions indicates that the users of e-District system are not sophisticated IS users with the navigation through the system must be as simple as possible and the users must perceive that they can use the system with minimum effort (Sambasivan et al., 2010). It is indispensable for the improved usage of the system. The designers of the e-District system must ensure that the system is designed in such a way that facilitates easy navigation through the system. A number of studies (e.g. Phang et al., 2006; Sambasivan et al., 2010) on e-government adoption have supported and provided similar arguments for this relationship. While the user-interface design is a typical focal point to enhance user adoption, this research shows that there are other factors that are not directly related to the user-system interaction but perhaps are more important (Venkatesh, 2000) (e.g. self-efficacy, trialability) for deciding the adoption of the e-government system. The positive and significant influence of perceived ease of use on perceived usefulness indicates that easier to use the e-District system would make the system more beneficial and useful to use at the end. The relationship is again supported by a number of studies (e.g. Chiang, 2009; Lu et al., 2010) on e-government adoption.

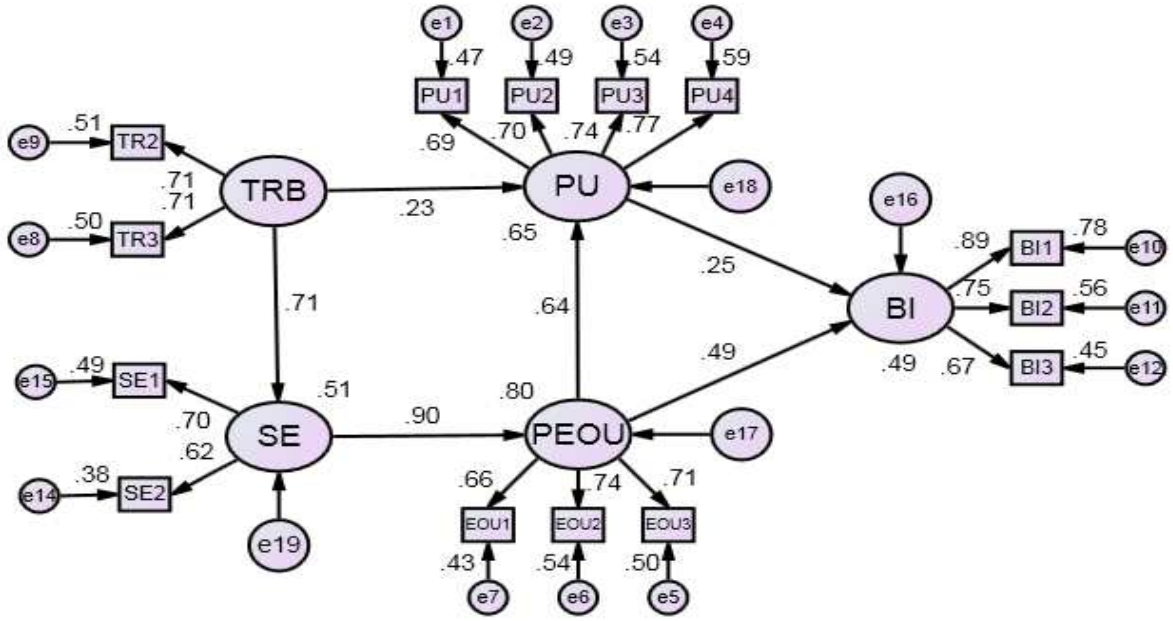

Figure 2. Validated research model

The significant influence of perceived usefulness on behavioral intentions indicates that higher beneficial and useful system perceived by users is more likely candidate of adoption. In other words, if users perceive that using e-District system is beneficial, it would be widely used system in the time to come. The relatively less strong relationship between perceived usefulness and behavioral intentions indicates that users have yet to perceive this system highly useful. This might be due to the fact that this system is new to the users and it will still take some time for them to get used to it. Moreover, it has been argued that the relationship between perceived usefulness and behavioral intentions is strong for experienced Internet users (Fusilier and Durlabhji, 2005). Since, 67.1% respondents in this research had more than 4 years of Internet experience; such experience might have influenced a significant relationship between perceived usefulness and behavioral intention to use the e-District system.

The result of this research provides evidence of the significant effect of self-efficacy on behavioral intentions through perceived ease of use. Consistent with the proposed hypothesis, users who have higher self-efficacy are likely to have more positive ease-of-use beliefs (Wang, 2002). It has been argued that the individual's beliefs of his or her capabilities would allow him or her to perceive the system as easy to use (Bandura, 1977; Igbaria and Iivari, 1995) which can further contribute to his or her positive intent toward using it (Venkatesh, 2000). In order to enhance the self- efficacy of users, the government organisations can organise training courses on different e-government systems to increase the users' familiarity with such information systems. Even if these courses are not directly related to the e-District system itself, they can still help the users to develop positive ease of use beliefs about the system (Wang, 2002). In other words, government organisations should consider putting in place general computer training programs that target increasing computer awareness and enhancing computer self-efficacy among the users of the system (Venkatesh, 2000).

A significant though weak influence of trialability on perceived usefulness indicates that users should try the e-District system to certain extent to understand its usefulness and benefits, which eventually leads to its enhanced adoption. To encourage adoption of this system, the government should reassure users to take some trials of the system (Deng et al., 2008) by making such services available to public places. In order to do so, the government should develop proper infrastructure and arrangements of necessary resources in terms of technologies and Internet services for users to avail such facilities. The significant impact of trialability on self-efficacy reveals that more number of trials also boosts up judgement of users' ability to accomplish intended task using the e-District system. Therefore, it becomes government's key responsibility to make necessary arrangements for getting the system available to a widespread population to realise its benefits and adoption of the system at large. This has been argued that trialability is more significant to less developing environments than to developed ones where such e-government systems might be more available to explore and hence trialable (Al-Gahtani, 2003).

Conclusion

The purpose of this study is to examine the adoption of the e-District system using the TAM model. The empirical findings of the study are step forward toward filling the research gap, where validation of the TAM model along with constructs including self-efficacy and trialability has not been validated by any other research study on e-government adoption yet. The research report shows that trialability and self-efficacy can play a significant role in adoption of an e-government system like e-District system, which is in its pilot testing phase. If government agencies really wish 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.

Limitations and Future Research

Firstly, as the e-District system was at the pilot testing phase, the exploration of an extended TAM model has been validated only using the potential adopters from a specific geographical location in India. Hence, the caution needs to be taken while generalising its findings to adopters and users of different cultural and geographical locations in India. Secondly, the model only explains 49% variance on behavioral intentions. The future research might explore some more additional constructs (such as trust, risk, security, privacy etc.) in order to enhance overall variance of the model on behavioral intentions. Thirdly, the proposed research model can also be validated using organisational 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 system. Fourthly, the sample gather from only four cities with 304

responses cannot be representative of more than 100 million population of Bihar. Therefore, the future research can explore large and diversified responses from across various cities of the state. Finally, as this research considered only three items each for self-efficacy and trialability and dropped one item each from these constructs due to their lower factor loadings, the reliability and the average variance extracted for these constructs were found slightly less than the lower threshold value. The future research should consider more number of items for each construct to avoid such discrepancies.

REFERENCES

Al-Gahtani, S.S. 2003. "Computer technology adoption in Saudi Arabia: Correlates of perceived innovation attributes," *Information Technology for Development* (10:1), pp. 57-69.

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

Anthopoulos, L.G., Siozons, P., and Tsoukalas, L.A. 2007. "Applying participatory design and collaboration in digital services for discovering and re-designing e-Government services," *Government Information Quarterly* (24:2), pp. 353-376.

Bandura, A. 1977. "Self-Efficacy: Toward a Unifying Theory of Behavioral Change," *Psychology Review* (84:2), pp. 191-215.

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

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

Boateng, R., Heeks, R., Molla, A., and Hinson, R. 2008. "E-commerce and socio-economic development: conceptualizing the link," *Internet Research* (18:5), pp. 565-594.

Chiang, L. 2009. "Trust and security in the e-voting system," *Electronic Government, an International Journal* (6:4), pp. 343-360.

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), pp. 237-246.

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), pp. 982-1002.

Davis, F.D. 1986. *A Technology Acceptance Model for Empirically Testing New End-user Information Systems: Theory and Results*. Doctoral Dissertation. Massachusetts: Sloan School of Management, Massachusetts Institute of Technology.

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

Deng, Z., Lu, Y., Zhang, J., and Wang, B. 2008. "Subscription of Mobile Services: The Role of TAM and Trust," *4th International Conference on Wireless Communications, Networking and Mobile Computing*, pp. 1-4.

Eze, U.C., Yaw, L.H., Manyeki, J.K., and Har, L.C. 2011. "Factors Affecting Internet Banking Adoption among Young Adults: Evidence from Malaysia," *International Proceedings of Economics Development & Research* (5:1), pp. 377-381.

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

Fusilier, M., and Durlabhji, S. 2005. "An exploration of student Internet use in India the technology acceptance model and the theory of planned behavior," *Campus-Wide Information Systems* (22:4), pp. 233-246.

Gefen, D. 2000. "E-commerce: The role of familiarity and trust," *Omega: The International Journal of Management Science* (28:6), pp. 725-737.

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

Hu, L.-T., and Bentler, P.M. 1999. "Cutoff criteria for fit indexes in covariance structure analysis: conventional versus new alternatives," *Structural Equation Modeling* (6:1), pp. 1–55.

Hu, P.J-H., Chen, H., Hu, H-F., Larson, C., and Butierez, C. 2011. "Law enforcement officers' acceptance of advanced e-government technology: A survey study of COPLINK Mobile," *Electronic Commerce Research and Applications* (10:1), pp. 6-16.

Igbaria, M., and Iivari, J. 1995. "The effects of self-efficacy on computer usage," *Omega* (23:6), pp. 587-605.

Karahanna, E., Straub, D.W., and Chervany, N.L. 1999. "Information Technology Adoption Across Time: A cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs," *MIS Quarterly* (23:2), pp. 183-213.

Kim, H.J., Pan, G., and Pan, S.L. 2007. "Managing IT-enabled transformation in the public sector: A case study on e-government in South Korea," *Government Information Quarterly* (24:2), pp. 338-352.

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), pp. 800-810.

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), pp. 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), pp. 148-157.

Phang, C.W., Sutanto, J., Kankanhalli, A., Li, Y., Tan, B.C.Y., and Teo, H-H. 2006. "Senior Citizens' Acceptance of Information Systems: A Study in the Context of e-Government Services," *IEEE Transactions on Engineering Management* (53:4), pp. 555-569.

Plouffe, C.R., Hulland, J.S., and Vandenbosch, M. 2001. "Research report: Richness versus parsimony in modeling technology adoption decisions – Understanding merchant adoption of a smart card-based payment system," *Information Systems Research* (12:2), pp. 208–222.

Radner, R., and Rothschild, M. 1975. "On the allocation of effort," *Journal of Economic Theory* (10:3), pp. 358-376.

Rogers, E.M. 2002. "Diffusion of preventive innovations," *Addictive Behaviors* (27:6), pp. 989-993.

Rogers, E.M. 1995. *Diffusion of Innovation*. New York: Free Press.

Sambasivan, M., Wemyss, G.P., and Rose, R.C. 2010. "User acceptance of a G2B system: A case of electronic procurement system in Malaysia," *Internet Research* (20:2), pp. 169-187.

Steiger, J.H., and Lind, J.C. 1980. "Statistically-based tests for the number of common factors," Paper presented at *the 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, pp. 75-87.

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), pp. 137-155.

Venkatesh, V. 2000. "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model," *Information Systems Research* (11:4), pp. 342-365.

Wang, Y-S. 2002. "The adoption of electronic tax filing systems: An empirical study," *Government Information Quarterly* (20:4), pp. 333-352.

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), pp. 717-733.

Appendix A. Description of the final survey items

Perceived Usefulness (PU) [Source: Davis (1989), Davis et al. (1989)]

PU1. Using the e-District system would increase my productivity

PU2. Using the e-District system would enhance my effectiveness

PU3. Using the e-District system would make it easier to get my Birth|Marriage|Death|Caste Certificate|Monthly Ration|Land Registry|Bill Payments|Delivery and Collection etc.

PU4. I would find the e-District system useful for obtaining my Birth|Marriage|Death|Caste Certificate|Monthly Ration|Land Registry|Bill Payments|Delivery and Collection etc.

Perceived Ease of Use (PEOU) [Source: Davis (1989), Davis et al. (1989)]

EOU1. Learning to operate the e-District system would be easy for me

EOU2. My interaction with the e-District system would be clear and understandable

EOU3. It would be easy for me to become skilful at using the e-District system

Self-Efficacy (SE) [Source: Taylor and Todd (1995)]

SE1. I would feel comfortable while using the e-District system on my own

SE2. If I wanted to, I could easily operate the e-District system on my own

Trialability (TRB) [Source: Moore and Benbasat (1991)]

TR2. I know where I can go to satisfactorily try out different uses of an e-District system (e.g. Information/Application/Payment/Monitoring/Collection etc.)

TR3. An e-District system would be available to me to adequately test run various applications (e.g. Registration/Payment/Monitoring Modules etc.)

Behavioral Intention (BI) [Source: Davis (1989), Davis et al. (1989)]

BI1. I intend to use the e-District system

BI2. I predict that I would use the e-District system

BI3. I plan to use the e-District system in the near future