Factors affecting citizen adoption of transactional electronic government

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Abstract

Purpose - This study has attempted to identify and model adoption criteria of citizens for E-government (eGov) service at the transaction maturity stage.

Design/methodology/approach - The empirical study was conducted among the citizens of Ontario, Canada who have experience of using Canadian e-Gov system.

Findings - From statistical analysis through LISREL, this study revealed that 1) Ability to use and 2) Assurance to use are the critical factors for adoption of eGov at the transaction phase (GAM—T).

Originality/value – The findings of this research can be considered as original as this paper concludes that eGov functional characteristics are not only different at different levels of service maturity, but adoption factors at different levels of service maturity are also potentially different. From static to interaction to transaction, citizens perceive different factors to be important for creating the behavioral attitude and intention to accept the eGov system and to use it.

Keywords: *GAM, E-government (e-Gov), Information and Communication Technology (ICT), Adoption, Transaction Service, Citizens*

Article Classification: Research Paper

1. Introduction

Almost all the countries in the world are now very optimistic to capture the maximum benefits of information and communication technology (ICT) by integrating it in the core of public service systems and increase the efficiency and effectiveness of government service through Electronic Government (eGov) (Jansen et al., 2010; Sharif and Irani, 2010; Shareef et al., 2011; Johnson, 2012). The ultimate goal of different governments in implementing eGov is to provide the best service to the tax payers, to develop competitive service in respect to service of private entities, and to establish good governance with citizens' relentless participation, so that citizens can perceive that they are paid off (Gauld et al., 2009; Robin et al., 2009). Implementation of eGov has several issues to resolve in order to meet the demands of 21st century from governments, public administrations, politics, and market economy. Among different pivotal issues, the most burning issues are to (Brown, 2007; Heeks and Bailur,2007; Silva and Batista, 2007; Van Dijk et al., 2008; Reddick, 2009; Shareef et al., 2010): i) curb citizens frustration on government service system provided through public administration, ii) open free competition between public and private service systems, iii) promote public and private partnership which is pushed by postmodernism, iv) make the public service system cost effective, efficient, and of high quality, v) enhance citizens' participation in government decision making considering them as customers and establish participative democracy, and vi) capitalize on the enormous benefits of ICT for better market economy and globalization.

Institutionalization of eGov attempts to synchronize public organizations to develop interoperable service systems. We can define this standardization of public service system in a country as isomorphism. In eGov, different demand side and supply side stakeholders are associated at different phases of service maturity. Their communal interests for the sake of proliferation of eGov are different which sometimes cause incoherence and might rule out institutional rules and, thus, isomorphism due to non-coherence of organizational rules in favor of their group interest. Nevertheless, governments at all levels are very enthusiastic to develop an interoperable public service domain which will meet its major stakeholders' group interest and fulfill their versatile and dynamic requirements. In this aspect proper identification of the interests of both sides of eGov and reflection of these attributes in eGov implementation model are invariably imperative. Consequently, identification of adoption criteria of citizens is an important aspect for proper institutionalization of eGov and thus interoperable public service system in any country (Reddick, 2004).

To formulate eGov adoption criteria for the prime users of eGov, i.e., citizens, based on technological, cultural, social, economic, organizational, behavioral, and political aspects, Shareef et al (2011) developed two distinct adoption models namely, i) GAM(S) — adoption model for government service at the static stage of eGov and ii) GAM (I) — adoption model for government service at the interaction stage of eGov. GAM(S) model proposed that 1) Attitude to use (measured by perceived awareness, PA), 2) Ability to use (measured by perceived ability to use, PATU), and 3) Adherence (reasoning) to use (measured by perceived functional benefit, PFB) are the critical factors for adoption of e-Gov at the static stage, i.e., the service maturity stage, when information in the government website can only be read, different government forms can be downloaded etc. GAM(I) model revealed that at the interaction stage, i.e., the service maturity stage, when government services are offered to citizens for their interactions, query, sending email, and sometimes for two way communications, 1) Attitude to use (measured by PA), 2) Ability to use (measured by PATU), 3) Assurance to use (measured by perceived trust,

PT and perceived information quality, PIQ), and 4) Adherence (reasoning) to use (measured by perceived image, PI) are the critical factors for adoption of e-Gov by citizens. From these findings, GAM model postulated that since functional characteristics of eGov are different at different levels of service maturity, when any government upgrades their service patterns for eGov, they should consider different behavioral, social, economic, technological, cultural, organizational, and political issues to facilitate citizens' adoption, usage, satisfaction, and loyalty for eGov (Shareef et al., 2011). Shareef et al. (2011, p. 27) concluded that "From static to interaction phase, citizens perceive different factors to be important for creating the behavioral attitude and intention to accept the e-Gov system and to use it."

At this point, for the sake of clarity it is worth to conceptualize and define service maturity levels. Howard (2001) classified eGov service maturity levels into three stages: **Stage 1:** Publish (Static): Information about activities of government is available online; **Stage 2:** Interact: Enables citizens to have simple interactions with their governments such as sending e-mail or chat rooms; and **Stage 3:** Transact: Provides citizens with full benefits from transactions over the Internet, such as applying for programs and services, and purchasing licenses and permits.

Different governments in the world, specifically developed countries are very keen to upgrade their services offered through eGov. They are modifying and improvising services in eGov by adding different features so that eGov can be self-sufficient to meet citizens' requirements which citizens require from physical government offices (Reddick, 2009). In the streamline of upgrading, now in eGov, citizens can transact and establish complete a two-way communication. They can perform different functions with governments like financial transactions with government; participating in bids, tenders, procurements etc.; sharing government information; and participating in government decision making. As an extended external purpose, even citizens can vote electronically. For these purposes, different functions of government organizations might be integrated both horizontally and vertically to provide services from one central web portal, organized based on stakeholders demand. Internal and external users of these services can get electronic access through Internet using PC and laptop or from mobile devices like mobile phone. This upgraded stage where complete government services are being offered with a two-way communication is called transaction stage.

From both the developer's side and users' side, different stages of eGov in terms of service maturity and offerings have substantial differences in characteristics, functionality, facilities, technological association, and in security and privacy concerns (Gottschalk, 2009). To seek the highest government services at the transaction stage, since at this matured stage citizens have to disclose several vulnerable financial and personal identification information, technological and organizational characteristics at the transaction stage of eGov have significant differences from the static and interaction stages (Andersen and Henriksen, 2006; Evans and Yen, 2006; Irani et al., 2006). Since most of the countries are very eager and enthusiastically investing huge resources to achieve matured service stage like transaction phase in eGov, revealing adoption criteria for transaction phase by citizens might have significant implications. However, no literature so far has investigated adoption criteria distinctively for transaction stage of eGov. Therefore, this study, using the primary GAM model (see Shareef et al., 2011, p. 30) under the same context following the same methodology, has attempted to identify and model adoption criteria of citizens for eGov service at the transaction maturity stage, which is manifested by multidimensional aspects like technological, cultural, social, behavioral, political, economic, and organizational.

2. Research Design

Adoption of eGov at the transaction stage is defined here as, *the decision to accept and use an EG system to transact to pay, renew, and/or file taxes, etc., for different government services as the user requires with the positive perception of receiving a competitive advantage*.

Following the same concept of GAM model (Shareef et al., 2011) validation, three measuring items are chosen for the endogenous variable Adoption. This is illustrated below in Table 1.

Table 1: Endogenous Variable and Measuring Items from GAM Model

Construct	Items	Perspective of Identification	Source
Adoption	1. To pay fees/taxes/service charges, I use E-government websites. 2. To pay fees/taxes/service charges, I like to use E-government websites in future. 3. To pay fees/taxes/service charges, I recommend that my friends/ relatives use E-government websites.	Behavioral, Organizational, Economic, Technological, Political, Marketing, Social, and Cultural	Cap Gemini and Ernest & Young, 2001; Turner & Desloges, 2002; AGIMO, 2003; Murru, 2003; Sakowicz, 2007; Shareef et al., 2009; Shareef et al., 2011.

For the exogenous variables, this study followed the same measuring items of GAM model (Shareef et al., 2011) which are derived after exploratory and confirmatory factor analysis on the collected data as postulated below in Table 2.

Table 2: Exogenous Variables, Hypotheses, and Measuring Items of GAM Model (**Source:** Adapted from Shareef et al., 2011)

Exogenous Variable	Conceptual Definition	Hypothesis	Perspective of Identification	Measuring Items
Perceived Awareness (PA)	Gaining and acquiring knowledge, education, and consciousness as much as users perceive to be sufficient to learn the characteristics of a system, use it with skill, and realize its strategic functionality and competitive advantages and disadvantages	Perceived Awareness (PA) has a positive relation with Adoption of EG	Behavioral, Social, Political, and Marketing	PA1, PA2, PA4
Availability of Resources (AOR)	The availability and freedom of using electricity, telephones, computers, Internet, and ICT with competitive features like access, speed, and cost	Availability of Resources (AOR) has a positive relation with Adoption of EG	Behavioral, Economic,	AOR1, AOR2, AOR4
Computer-Self Efficacy (CSE)	The judgment of users' technological capability to use, interact, and transact in an EG system based on prior knowledge, experience, and skill as they perceive it is required to do so	Computer-Self Efficacy (CSE) has a positive relation with Adoption of EG	Cultural, Social, and Technological	CSE1
Perceived	The degree to which a user of	Perceived Ability	Behavioral,	PATU3,

Ability to Use (PATU)	EG perceives his/her competence in and comfortable ability for using an EG system technologically, organizationally, and psychologically that match with individual's values, social needs, and overall attitudes	to Use (PATU) has a positive relation with Adoption of EG	Organizational, Economic, and Technological	PATU4, PATU5, PC3, PC4, PC5, PIQ3
Multilingual Option (MLO)	Inclusion of different prime languages in EG websites to facilitate stakeholders in viewing, selecting, downloading, interacting, and transacting with their native language in the absence of human interaction	Multilingual Option (MLO) has a positive relation with Adoption of EG	Behavioral, Economic, Technological, Marketing, and Cultural	MLO1
Perceived Information Quality (PIQ)	Information quality covers the extent to which complete, accurate, organized, understandable, up to date, and timely information is provided in the website for the customers to obtain information about any of their intended objectives	Perceived Information Quality (PIQ) has a positive relation with Adoption of EG	Behavioral, Organizational, and Marketing	PIQ1, PIQ4, PIQ5
Perceived Trust (PT)	The degree to which users of EG have attitudinal confidence for reliability, credibility, safety, and integrity of EG from the technical, organizational, social, and political standpoints and also from the effective, efficient, prompt, and sympathetic customer service response	Perceived Trust (PT) has a positive relation with Adoption of EG	Behavioral, Organizational, Economic, Technological, Marketing, Social, and Cultural	PT2, PT3, PT4, PT5, PSR1, PSR2, PSR3, PSR4, PSR5
Perceived Uncertainty (PU)	The degree to which users of EG perceive risk in transactions due to uncontrollable and unknown situations in the virtual environment associated with EG	Perceived Uncertainty (PU) has a negative relation with Trust of EG	Behavioral, Organizational, Economic, Technological, Marketing, Social, and Cultural	PU1, PU2, PU3
Perceived Security (PS)	The degree to which users of EG perceive that it is safe to disclose personal and financial information during interaction and transaction with websites, and users are also assured that EG systems do not disclose or share their information with others or misuse for any purpose	Perceived Security (PS) has a positive relation with Trust of EG	Behavioral, Organizational, Economic, Technological, Marketing, Social, and Cultural	PS1, PS2, PS3, PS4, PP2, PP3
Perceived Functional Benefit (PFB)	The degree to which citizens perceive the overall functional benefits, both absolute and relative—including cost, time, efficiency, and effectiveness of using an EG system—instead of using traditional government physical office functions.	Perceived Functional Benefit (PFB) has a positive relation with Adoption of EG	Behavioral, Organizational, Economic, Marketing, and Social	PFB5, PFB6, PFB7, PFB8

Perceived Image (PI)	The degree to which citizens behaviorally and culturally perceive that adoption of EG enhances and improves social status and prestige	Perceived Image (PI) has a positive relation with Adoption of EG	Behavioral, Social, and Cultural	PI1, PI2, PI3

3. Research Methodology

The research methodology used in this research is adapted from the original study (Shareef et al., 2011) that developed GAM model. In this research, where we have tested the GAM model for eGov at the transaction phase of service, the respondents were the users of the Canadian e-Gov system. We conducted the empirical study among the citizens of Ontario, Canada who had experience of using Canadian e-Gov system. Similar to the survey pattern of GAM model, this study was conducted in four large cities in Ontario, Canada, namely Sudbury, London, Toronto, and Ottawa. For random and evenly distribution of questionnaire among the citizens, we divided each city into five regions, east, west, north, south, and center. The addresses of citizens living in houses, condominiums, and apartments were collected from the Telephone White Pages of each city. We also collected the addresses of the residents living in the suburban areas in the east, west, north, and south regions immediately outside the city. One half of the total questionnaires allocated for each city were distributed through mail with return prepaid postage. We distributed the other half among the citizens in the houses, condominiums, and apartments in different areas in the five zones physically. Maintaining roughly the population ratio of the four cities, we distributed 100 questionnaires in Sudbury, 200 in London, 500 in Ottawa, and 1400 in Toronto. So, a total of 2200 questionnaires were distributed in the four cities in a total 3 month period. We received a total of 245 questionnaires from the respondents. Thus a response rate of around 11 percent was achieved.

3.1 Statistical Analysis

We measured the reliability scores for the constructs by coefficient alpha. The reliability scores for all the final exogenous and endogenous variables are ranged from 0.724 to 0.966, which suggest an acceptable internal consistency among the items in each dimension (Nunnally & Bernstein, 1994). We also examined multicolinearity, normality, and outliers.

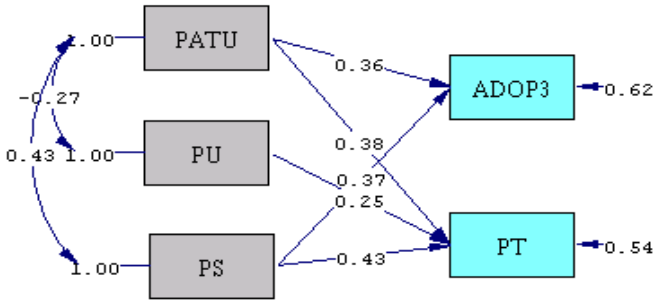
4. Research Findings

We have used LISREL for path analysis since in this study all the variables are measured through Likert Scale 1-5; path analysis is more preferable than SEM by maximum likelihood (Kline, 2005, p. 219). We took the average of the indicators of each of the latent variables individually for 245 cases and performed path analysis to find out causal relationships between the exogenous variables and eGov adoption. We have used the maximum likelihood procedure of LISREL for the analysis purpose. For path analysis, we have used correlation matrix as the input data for all the 11 exogenous variables (as shown in Table 2) (nine exogenous variables having direct relations with adoption, i.e., Perceived Awareness (PA), Availability of Resources (AOR), Computer- Self Efficacy (CSE), Perceived Ability to Use (PATU), Multilingual Option (MLO), Perceived Information Quality (PIQ), Perceived Trust (PT), Perceived Functional Benefit (PFB), and Perceived Image (PI) and two exogenous variables having indirect relations with adoption through PT, i.e., Perceived Uncertainty (PU), Perceived Security (PS)), and one endogenous

variable. For path analysis, we have tested 11 hypotheses to validate the primary GAM model at the transaction stage of Canadian eGov.

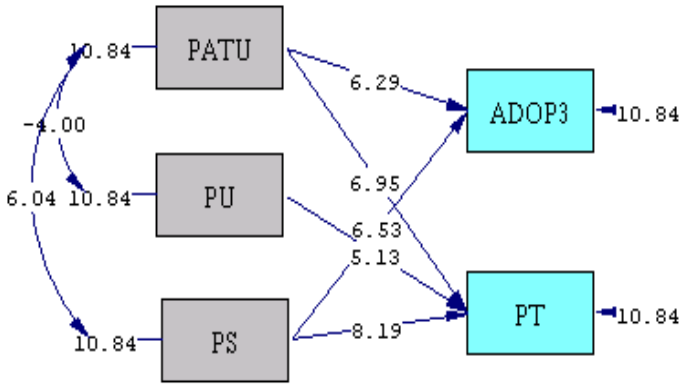
For the adoption of eGov at the transaction level – the primary model fit indices did not fit well with the data. The path diagram displays both the unstandardized and standardized regression weights (factor loadings) for the exogenous variables. We have found Chi-Square statistic 88.33, df 10, p-value 0.00000, and RMSEA .185. Therefore, the model did not fit well. Based on modification indices to improve the model fitness, we have added causal relation from PATU to PT and error covariance between PS and PT, PATU and PS, and PT and PATU. After doing this, we got better fitness of the model with Chi-Square statistic 48.97, df 9, p-value 0.00000, and RMSEA .140. However, the model still did not fit well, and it recommended a causal relation between PS and ADOP. Actually we hypothesized PS has indirect relation with ADOP through PT (like a mediating variable). However, we found direct relation between PS and ADOP from the modification index as suggested by the analysis for proper fitness. We have done accordingly. We have checked 't' values for all the exogenous variables. We found only PATU and PS are significant on Adoption. Before adding causal relation from PS to ADOP, PT was significant. However, when we added direct relation from PS to ADOP, PT became non-significant. The reason is obvious. PS is explaining enough sharing variance of PT on ADOP, so that when PS is significant, PT is no more. We also saw that PATU, PU, and PS have causal relations with PT. All other causal relations are not significant at the 0.05 level. The path coefficients for these non-significant factors are very low. So, these factors do not appear to have any relationship with the adoption of eGov at the transaction level and explains practically no variance in Adoption. Therefore, we removed all the non-significant causal relations and error covariance and ran the model again. This time all the model fitness indices are adequate as shown in Table 3.

The standardized path coefficients, Chi-Square statistic, degree of freedom (df), p-value, and RMSEA are shown in Figure 1 and 't' values in Figure 2. The two variables PATU and PS combined explained 38 percent of variances on the Adoption variable. We have also retained PATU, PU, and PS as having significant relations with PT ($R^2 = 0.46$) (Figure 1 and 2), although PT did not appear to be significant on "Adoption". Therefore, we are not very much interested in discussing details those relations, i.e., relations of PATU, PU, and PS with PT. However, since the model fitted with all those relations, we have shown those in Figures 1 and 2.



Chi-Square=2.16, df=2, P-value=0.33877, RMSEA=0.019

Figure 1: Adoption Model of eGov at Transaction Level (Path coefficients)



Chi-Square=2.16, df=2, P-value=0.33877, RMSEA=0.019

Figure 2: Adoption Model of eGov at Transaction Level ('t' values)

The Chi-Square statistic of 2.16 (df = 2), which indicates that the null hypothesis of the model is a good fit for the data. The root mean square error of approximation (RMSEA) (.019) and 90 percent confidence interval for RMSEA (0.0 ; 0.13) are quite reasonable as goodness of fitness (Browne and Cudeck, 1993; Hu and Bentler, 1999; Kline, 2005). Other fit measures such as CFI, GFI, AGFI, RMR, and NFI indicate that the model fit compares reasonably with the literature (Churchill, 1979; Segars and Grover, 1993; Chau, 1997; Kline, 2005). The recommended values in literature and our findings are shown in Table 3.

Table 3: Fit Measures from Path Analyses

Fit Measures	Recommended Values	Adoption
Chi-square ($\chi 2$)	$p \geq 0.05$	2.16 (0.33877)
Degree of Freedom		2
$\chi 2$/Degree of freedom (DF)	≤ 3.0	1.085
Root Mean Square Residual (RMR)	≤ 0.05	0.019
Comparative Fit Index (CFI)	$\geq .90$	1.00
Goodness of Fit Index (GFI)	$\geq .90$	1.00
Adjusted Goodness of Fit Index (AGFI)	$\geq .80$	0.97
RMSEA	<0.06	0.019
Normed Fit Index (NFI)	≥ 0.90	0.99

5. Discussion

After conducting Path analysis for adoption of eGov at the transactional level, we find PATU and PS have significant causal relations with ADOP at 0.05 level. PATU, PU, and PS are significant predictors on PT. The final accepted hypotheses for adoption of eGov at the transaction level are listed in Table 4.

Table 4: Final Validated Hypotheses from Path Analysis

Name of Exogenous Variable	Endogenous Variable	Accepted Hypothesis from Path Analysis
Perceived Ability to Use (PATU)	Adoption (ADOP)	Perceived Ability to Use (PATU) has a positive relation with Adoption of eGov at transaction level
Perceived Security (PS)		Perceived Security (PS) has a positive relation with Adoption of eGov at transaction level
Perceived Uncertainty (PU)	*PT*	*Perceived Uncertainty (PU) has a positive relation with Trust in* eGov *at transaction level*
Perceived Security (PS)		*Perceived Security (PS) has a positive relation with Trust in* eGov *at transaction level*
Perceived Ability to Use (PATU)		*Perceived Ability to Use (PATU) has a positive relation with Trust in* eGov *at transaction level*

Dividing their loading factors on ADOP by corresponding Standard error (SE), we can get their 't' values, which indicate that these exogenous variables are highly significant on ADOP (at 0.01 level). For the adoption of eGov at the static and interaction stages, including other variables, Shareef et al. (2011) found that PA and PATU variables are significant predictors. For adoption of eGov at the transaction stage, PATU is still critical. In addition, PS is also significant. However, in the transaction stage, when eGov service level has matured (Howard, 2001; Accenture, 2003) and users have gained enough experiences and skill in operating eGov transaction, PS is stronger than PATU for predicting the adoption behavior of eGov for citizens at the transactional stage. A unit positive change on perceived ability to use (PATU) causes .36 unit positive change on adoption of eGov at the transaction stage (ADOP) when PS is constant. At the same time, a unit positive change on perceived security (PS) causes .37 unit change on adoption of eGov at the transaction stage (ADOP) when PATU is constant. Therefore, our hypothesis that PATU positively affects adoption of eGov at the transactional stage is supported. However, in our hypotheses, we conjectured that PT has a positive relation with ADOP and PS has an indirect relation with ADOP through PT. But our path analysis strongly suggests a direct positive causal relation of PS with adoption of eGov at the transactional stage. We have also verified the correlation matrix and regression coefficients from multiple linear regression analysis to support our Path analysis. Results of multiple linear regression analysis strongly support the results of Path analysis. From the correlation matrix, we find that the two exogenous variables are strongly correlated to ADOP.

Each of the levels of service maturity in eGov development represents different functions of services, different patterns of service characteristics, different levels of technological sophistication, and different orientations of stakeholders' association (Moon, 2002; Holden *et al.,* 2003). Each level is defined by different objectives, functions, presentations, transparency, and interaction with internal and external constituents (different stakeholders). The government can post information on the web and simply facilitate one-way communication to the public as an information provider (static level of eGov development). In the interaction level, citizens can communicate, send queries, or provide personal information through e-mail. However, functional characteristics of transactional level of eGov are quite different. They require a higher level of

privacy, security, and interactive technologies to facilitate the online transaction of payment and information (Moon, 2002; Sudhakar, 2012). In the transactional level, stakeholders can get the full interaction benefits of government service from eGov. Through the web interfaces, they can contact the service providers; get feedback from them; pay taxes, license fees, and any other financial dues; register; participate in bids, etc. (Accenture, 2003). For the adoption of this transaction phase – i.e., beliefs, behavioral attitude, intention, acceptance, use, satisfaction, and recurring use – we found that PATU and PS are significant predictors. Our hypothesis that PATU has a positive effect on the adoption of eGov at the transaction stage is supported. Therefore, PATU causes adoption of eGov at all levels of service maturity. Several researchers of E-commerce (EC) and eGov agreed that PS is a strong predictor of online behavior (Bélanger and Carter, 2005; Schaupp and Bélanger, 2005, Shareef *et al.,* 2009). However, several researchers also argued that perceived security basically contributes to the use of an online system through perceived trustworthiness (Balasubramanian *et al.,* 2003). We adopted the latter argument and hypothesized that PS indirectly affects ADOP through PT. We have done this because we developed our theoretical framework of adoption of eGov as a general situation that is irrespective to any level of service maturity. Typically, at the static or interaction stages, perceived security cannot be a reasonable predictor of eGov adoption. However, the functional characteristics of transactional phase can theoretically justify the inclusion of PS as the direct causes of eGov adoption at this specific phase (Bélanger and Carter, 2005; Shareef *et al.,* 2009).

From our path analysis, we now realize that PS has a strong positive causal relation to the adoption of eGov that is specific to the transaction phase and also not related to other phases of the service pattern of eGov. In the transaction phase, citizens actively participate in eGov operations. They might provide very confidential personal and financial information through eGov websites: information such as credit card number, bank account number, driving license number, date of birth, etc. As a result, they are always afraid of identity theft in online transaction (Fichtman, 2001). Therefore, for transactions in eGov or EC websites, perceived security is an important aspect that users consider when they decide to accept the system or not (Janda *et al.,* 2002; Wang, 2002; Carter and Bélanger, 2005; Shareef *et al.,* 2009). When citizens perceive that government web pages ensure security of financial and personal information disclosed during transaction through eGov and they have the technological and psychological ability to use it, they will most likely adopt it instead of going to brick and mortar government departments for service. We also get concrete support from our literature review that PATU and PS have a potential causal effect on adoption of eGov at the transaction level of service (Shareef et al., 2011).

We also discovered that other exogenous variables are not important for citizens to adopt eGov at the transaction phase. These variables include availability of resources (AOR), computer self-efficacy (CSE), a multi-lingual option (MLO), perceived functional benefits (PFB), perceived trust (PT), perceived image (PI), and perceived awareness (PA). These constructs basically contribute very little to the variances explained on ADOP. Therefore, these hypotheses are not significant. As we already explained, the transaction phase of eGov service is quite mature, consequently users of the transaction phase of eGov are already experienced in using eGov services, have higher skill, and are familiar with the characteristics of government web pages (Moon, 2002; Accenture, 2003; Al-adawi *et al.,* 2005; Andersen and Henriksen, 2006). Therefore, at this stage, AOR, CSE, MLO, PFB, PIQ, and PI are not important predictors for adoption of eGov.

Although we thought that perceived trust could be a good predictor of eGov adoption at this transaction stage, since PS has already explained enough shared variances of PT on ADOP, we did not find PT to be significant. We have seen that in the preliminary model of eGov, PT was a significant predictor of ADOP. However, based on the analysis recommendation, while we put direct causal relation from PS to ADOP, PT was not significant. This statistical finding was expected. Therefore, the final hypotheses related to the causal effects of PA, AOR, CSE, MLO, PFB, PIQ, PI, and PT were not supported for adoption of eGov at the transactional phase. On the other hand, the positive causal relation of PATU with ADOP was supported. And instead of PT, we found that PS has direct causal relation to ADOP. This inclusion of PS instead of PT could improve the fitness of model quite substantially. So we can conclude that since mature users of eGov at the transaction phase know the benefits, characteristics, and functions of eGov websites already from their experiences. If they are able to transact (since some transactional functions like paying taxes need high quality technology, process, and operational knowledge) through websites using specific software and believe that transactions through that particular websites are safe and secure, they simply adopt that system instead of going to physical government offices.

Based on technology adoption model (TAM) (Davis, 1989) and diffusion of innovation theory (DOI) (Rogers, 1995) we cannot exactly explain the adoption criteria of eGov at the transaction stage. The construct PATU that captures the integrated view of perceived ease of use (PEOU) of TAM and Complexity and Compatibility of DOI is one of the strongest contributing constructs of eGov adoption at the transaction stage. However, perceived usefulness (PU) of TAM or Relative advantage of DOI does not influence the acceptance and use of eGov at the transaction stage. For the mature and experienced users of eGov, perception of security during transaction is the other cause for them to transact using government web pages.

From the theory of planned behavior (TPB) (Ajzen and Fishbein, 1980), we can clearly see that PATU and PS are attitudinal beliefs toward adopting eGov that, in turn, affect intention to use and, finally, adoption of eGov at the transaction stage. Finally, from developing the theoretical framework of the critical factors of eGov adoption, conducting the empirical study, analyzing collected data, and interpreting findings, we have now the extended GAM model for the transaction stage of eGov system namely GAM (T) as shown in the Figure 3.

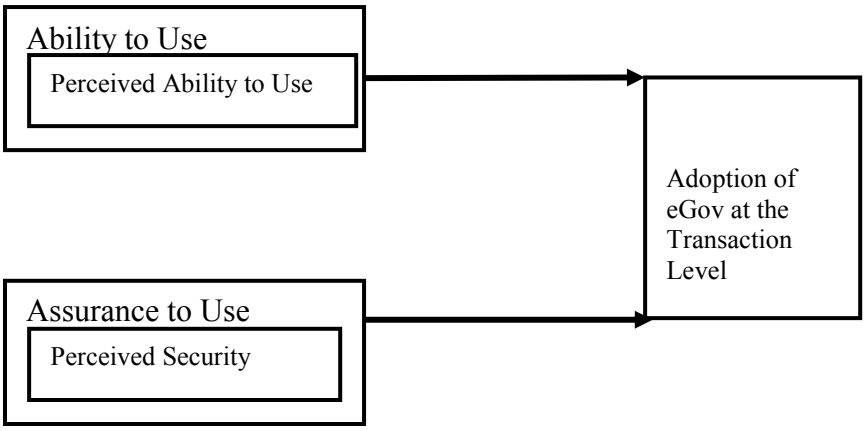


Figure 3: Final Model GAM (T) for Adoption of eGov at Transaction Level

6. Conclusion

The speculation of the prime stakeholder, i.e., citizens, is potentially important in developing and gradually maturing service level offered by eGov. Citizens' opinion should significantly contribute in selecting the critical factors for the adoption model and also identifying the effect of different levels of service maturity in the critical factors of adoption. The findings of this research approved that the contextual setting, i.e., the level of service maturity of eGov is important for exploring critical factors. Therefore, while gradually improving service level of eGov, policy makers should be careful to articulate citizens' requirements which are not similar for all levels of service delivery patterns and functionalities of eGov system. The significant contribution of this research also reflects the necessity of maintaining proper balance between complexity and security of the system. Security is a vital issue in the transaction level that is explicitly expected. However, perceived ability to use is also a vital issue at this level of system use. So, there should be a definite tradeoff between the complexity of the security and the user-friendliness of the software.

Technological sophistication improves significantly at the transaction stage. At this stage, citizens perform several transactional functions, such as paying their income tax, property taxes, and driving license fees; renewing licenses, and making appointments. To do this, users may need to disclose confidential personal information, such as credit and debit card numbers, driving license number, home phone number, address, date of birth, and income. As a result, different types of security measurements are the prime issues related to this service pattern. From an intuitive rationale, literature review (Shareef et al., 2011), and cross tab analysis of adoption of this stage with Internet experience, we find that citizens who are skilled in and familiar with Internet use and online behavior are basically users of eGov at the transaction phase. Nevertheless, ensuring security of this site requires integration of different technological sophistication that sometimes creates difficulties in performing intended jobs. Therefore, at this upgraded level of service functions of eGov – the transaction phase – users are mostly concerned with security and ability to handle the system. Therefore, PS and PATU are two significant factors for citizens to create the belief, attitude, intention, and, finally, adoption of eGov at this stage.

6.1 Implications and Recommendations

GAM (S) (Shareef et al., 2011) identified that at the static stage, PA, PATU, and PFB are the critical factors for adoption of eGov. According to GAM (I) (Shareef et al., 2011) model, at the interaction stage, PA, PATU, PIQ, PI, and PT are significant for adoption of eGov. At the transaction level, PATU is still significant. However, PS is a significant predictor for adoption of eGov by citizens at the transaction level. Therefore, we can determine that PATU is common for adopting eGov at any level of service maturity of eGov. Since the static and interaction stages offer preliminary government services through online. We can treat those two inceptions of government services and gradual upgrading as the introductory pace of eGov. Consequently, both for the static and interaction stage, awareness of eGov is a critical factor for adopting eGov, although at the transaction level this has no causal effect on adoption. Since the static stage of eGov is the beginning of government service offered through a completely new mode, citizens' perception of functional benefits of eGov in compare to brick and mortar government offices is potentially important for citizens to use the static eGov to collect government information. However, in the interaction and transaction stages, relative or absolute advantage is not a critical component in creating the behavioral intention to accept eGov. Perception of information

quality, image, and trust play a significant role in using eGov at the interaction stage, although while services gradual upgrade to transactional stage, these issues are no more requirements for citizens to use transactional government services through eGov. In the transaction stage, excluding PATU (a common critical factor for adoption of eGov at any service level) PS is the only critical factor for adoption. If citizens feel safe in online transactions in eGov websites, they will do that if they have the technological and psychological ability to do so. Perception of security is the most influential factor for performing transactions in eGov, although security plays no role at the interaction and static stages. Therefore, we show that, as different levels of service maturity of eGov has different aspects and attributes, the critical factors for adopting those levels individually are also remarkably different; these are compatible to the differences in functional characteristics of those levels of service maturity of eGov.

So, finally based on the extended form of GAM model at the transaction stage namely GAM (T), we can remark that functional characteristics, organizational reformation through interoperability and standardization, technological upgrading, and inclusion of new features and facilities are not only different in different maturity stages of eGov, while seeking government services through eGov from static to interaction to transaction, users perceives different issues to be potentially significant for pursuing the behavioral attitude and intention to accept the eGov system and to use it at different levels of services offered through eGov. Therefore, while upgrading eGov service systems, governments and policy makers should focus on reforming eGov and fulfilling citizens' needs separately considering service patterns. Since at the transaction stage, citizens are disclosing vulnerable financial and personal identification information in the virtual medium, security is the most important issue in the transaction level that is explicitly expected. However, perceived ability to use is also a vital issue at this level of system usage. When any government offers higher web security through different encryptions, technologically authenticated software, and tight data management, eGov system automatically becomes more complex at the transaction stage. While higher web security and service security in eGov expedites higher participation and use of eGov at this stage, higher complexity associated with this matured service deters citizens, particularly who are not very capable in handling difficult computer, Internet, and software systems, to adopt eGov at the transaction phase. However, different governments both developed and developing are very aggressive to promote transaction phase of eGov to offer different government services so that citizens do not need paper based documents in brick and mortar government offices to return income tax, renew license, pay different government fees and utility service charge etc. To offer better quality service particularly in those sectors which are mandatory for citizens to interact with governments (like income tax pay, utility service charges pay etc.), to reduce government expenditures in publishing million pages forms and sending these to citizens, and to develop cost effective and efficient government service through eGov, promoting transaction phase among all levels of citizens is the crucial for any governments to be successful in launching eGov. So, governments must pay sincere attention to design transaction phase eGov systems which could ensure a balance between the complexity of the security and the user-friendliness of the software.

6.2 Limitation and Future Research Direction

Identifying citizens' adoption criteria particularly at the transactional stage is an exploratory research, and we did not find any research specifically focused on this issue. So the limitations of exploratory research are applicable in this study. Though Ontario, Canada, is an appropriate venue to conceptualize adoption behavior of citizens at the transactional stage, the generalization

of this study can only be achieved if this study can be replicated in some other countries implementing same level of matured services through eGov.

From previous research, it is observed that the adoption of eGov is not a general perspective; rather it is task oriented (Chen and Thurmaier, 2005). Identifying adoption criteria of those tasks of eGov has significance to academicians and practitioners and a potential impact on eGov implementation strategy. However, different individuals use eGov websites to accomplish different tasks. Defining any specific task for adoption in the proposed questionnaire could reduce the response rate in terms of adoption. Therefore, this study decided to formulate the instruments of "Adoption" not for any specific tasks, but for general tasks. Nevertheless, finding adoption criteria based on specific tasks could capture respondents' more specific experience while keeping consistency in the response. Future research can capture citizens' experience for adoption of some specific and popular tasks of eGov. Since gender inequality is very high in developing countries, adoption behavior might vary based on gender. However, we did not consider this as a controlling variable in Canada. Future research conducted in developing countries, can consider gender as a potential controlling variable. This identification might have some good insight for the digital divide.

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