

Adoption and Diffusion of E-Government Services in India: The Impact of User Demographics and Service Quality

Sayantana Khanra, Rojers P. Joseph

Abstract—This study attempts to analyze the impact of demography and service quality on the adoption and diffusion of e-Government services in the context of India. The objective of this paper is to study the users' perception about e-Government services and investigate the key variables that are most salient to the Indian populace. At the completion of this study, a research model that would help to understand the relationship involving the demographic variables and service quality dimensions, and the willingness to adopt e-Government services is expected to be developed. Dedicated authorities, particularly those in developing economies, may use that model or its augmented versions to design and update e-Government services and promote their use among citizens. After all, enhanced public participation is required to improve efficiency, engagement and transparency in the implementation of the aforementioned services.

Keywords—Adoption and diffusion of e-Government services, demographic variables, hierarchical regression analysis, service quality dimensions.

I. INTRODUCTION

ELECTRONIC government, abbreviated as “e-Government”, refers to the implementation of Internet-based technologies to provide efficient and effective governance by means of simple online access to required information and services to citizens [1]-[3]. E-Government initiatives have been or are now being embraced mainly to build a direct online connection with the common people, entrepreneurs and various other stakeholders [4], [5]. The world over, usage of e-Government is consistently on the rise with the increase in availability and quality of the Internet thanks to the radically descending expenses of providing Internet services to the people [4], [6]. A study by Sohail and Sheikh in Saudi Arabia indicates that the significance of Internet services and their quality is rapidly increasing in emerging economies [7].

In India too, a number of e-Government initiatives are enthusiastically embraced as of late for the reasons of transparency, responsiveness and efficiency [8]. However, e-Government projects in various nations have met diverse levels of accomplishment on the grounds that the same depends not only on the e-Government service providers, but also on the interest generated and acceptance among the end-

users [9], [10]. Therefore, it is vital for the administration to analyze the conceivable determinants influencing the utilization of e-Government services for improving the level of use as well as usefulness of these services [11], especially in the context of an emerging economy like India, where robust systems and adequate infrastructure required for e-Government projects are now progressively coming up [12].

II. LITERATURE REVIEW

One of the classic frameworks to explain the incidence of technology acceptance is provided by the Diffusion of Innovation (DoI) theory, which models the decision to adopt an innovation as an interactive process subject to information collection and risk reduction [13]. Prior to that, Davis advocated an intention-based model, namely, the Technology Acceptance Model (TAM) [14], a much acknowledged utilization of the Theory of Reasoned Action, which emphasizes the role of attitudes and intentions toward actual usage of new technology [15]. Various extensions of both DoI model and TAM perceive that service quality plays a critical part in shaping the users' perception toward a technology as well as their intention of actual use of the same [16]-[19]. To legitimize this, one can take the instance of customer satisfaction in the context of Internet banking, where the service quality dimensions are regularly observed to be crucial [20], [21].

Since the late 1990s, various research works are dedicated to the development of models and frameworks to outline the quality of Web-based services [22], [23]. Out of these extant researches, distinctive models that explain the users' perception about the Web-based service quality in respective industries and countries have emerged. WebQual, proposed by Barnes and Vidgen, is noticeable among these models [24]. Barnes and Vidgen have also extended the aforementioned model to assess an interactive e-Government Website [25]. The quality dimensions that are most commonly associated with e-Government services are reliability, security, efficiency and responsiveness [21], [26], and [27]. Interestingly, a low level of acceptance because of the users' perception of Internet-based technologies has supposedly brought about the disappointment to several e-Government projects across the globe. For example, Swartz delineated slow and moderate adoption of e-Government even in a developed economy such as the United Kingdom, in spite of the enormous success of e-Commerce there at that time [28]. Hence, it is argued that demographic variables such as gender, age, and education

Sayantana Khanra and Rojers P. Joseph are with the Indian Institute of Management Rohtak, Haryana 124001, India (phone: +91 7908 142824, +91 8607 053131, e-mail: fpm02.007@iimrohtak.ac.in, rojers.joseph@iimrohtak.ac.in).

among others have strong explanatory power for the differences among the users of e-Government to a great extent [29], [11]. The following sub-sections discuss the demographic variables and service quality dimensions that are relevant to this study.

A. Demographic Variables

The demographic variables on the willingness to adopt e-Government services yield relevant segmentation of the user base and interpret the usage pattern of different segments with the concerned services [30]-[32]. The demographic variables that are most frequently examined in the context of e-Government services include gender, age and education of the user [32]-[35].

Gender. Numerous studies such as [31]-[33], [35], [36] etc., have investigated the impact of gender on the adoption of Internet and technologies, in general. Although Chan and Chong found no noteworthy contrast between the usage of mobile technologies by men and women [33], most of the relevant literatures exhibit findings that indicate otherwise. For instance, while investigating the relationship between gender and Internet usage, Teo found that women use the Internet more for the purpose of messaging as compared to men, whereas men use Internet services more for downloading and shopping than women do [34]. Hence, we state our first proposition:

P1: Men are more likely to use e-Government services, compared to women.

Age. Various studies have demonstrated that age can significantly affect the adoption of Internet-based technologies [33], [34], [37]. Chan and Chong demonstrated that younger individuals are more occupied with mobile technologies than their senior counterparts [33]. Further, a stratified random sample drawn from the Portuguese capital has indicated that the ownership of a computer and its usage is negatively related to age [37]. Thus, we arrive at our second proposition:

P2: Young citizens are more likely to use e-Government services, compared to the older ones.

Education. The studies in the extant literature are often conflicting when it comes to determining the effect of an individual's formal educational level on the utilization of Internet-based technology. For example, Rhee and Kim reported that people having higher education are more inclined to use Internet-based technologies than people with lesser education [38], whereas Teo demonstrated that highly educated users actually use such technologies less frequently than individuals with lesser formal education [34]. One contention to resolve this conflict is that highly educated individuals generally have less time to spend on the Internet. However, consistent with the studies by Brown and Venkatesh and Chan and Chong that propose that individuals with higher education levels use more computers and Internet-based technologies in comparison with that of lower education levels [39], [33], we advance to our third proposition:

P3: People with higher levels of education are more likely to use e-Government services, compared to those with lower levels of education.

B. Service Quality Dimensions

As discussed earlier, the dimensions that are most commonly associated with the quality of e-Government services are reliability, security, efficiency and responsiveness.

Reliability. Extant researches have reported that in a digital economy, reliability is an important factor to measure service quality and, subsequently, customer satisfaction [21], [27]. In the context of e-Government services, reliability refers to the ability to produce similar results under consistent conditions, which is undoubtedly desirable for enhancing the ease of use of e-Government services [40]. With this understanding, we derive our next proposition:

P4: Reliability is likely to have a positive impact on the willingness to use e-Government services.

Security. In the field of information technology, security deals with safeguarding the user information from unapproved access [21]. Security stands out amongst the most vital components in the models of service quality of any electronic services [26]. Therefore, in our study, the significance of security is essential because of the association of personal and sensitive data with e-Government transactions [41]. Although Baumgarten and Chui reported that the risk associated with the usage of e-Government services has, over time, become quite manageable [42], the following proposition still assumes much importance:

P5: Security is likely to have positive impact on the willingness to use e-Government services.

Efficiency. Santos pointed out that efficiency is a prominent characteristic in the models relating to service quality [26]. From the perspective of Internet-based technology, efficiency alludes to the ease of use and time needed to fetch the required information online [43]. In other words, the more simple and well-organized a Web site is, the more efficient it becomes. In the case of e-Government services, users, understandably, are inclined toward an efficient Website to effectively minimize the investment in time and effort [44]. Therefore, our sixth proposition is:

P6: Efficiency is likely to have positive impact on the willingness to use e-Government services.

Responsiveness. Responsiveness is observed to be a noteworthy indicator of satisfaction in a digital economy [21]. In general, responsiveness focuses on the speedy response to the queries from the users within a stipulated time [45]. In a way, responsiveness also provides assurance to users that all conceivable help will be provided, should any sort of difficulties arise regarding the use of Internet-based services [46]. Similarly, in the case of e-Government services, users expect their problems to be solved promptly, if any issue arises with respect to the concerned service [47]. Accordingly, we put forward our final proposition:

P7: Responsiveness is likely to have positive impact on the willingness to use e-government services.

III. PROPOSED METHODOLOGY

Based on the literature review carried out, we propose to adopt the approach earlier used by Chong et al. [48] and Teo

[34] in their explorations under a similar setup of the present study. The methodology is pivoted to the analysis with Hierarchical Regression that involves two sequential steps. In the first step, this study aims to examine the impact of demographic variables on the willingness to use e-Government services. In the next step, to explain the variances in excess of the contribution made by the demographic variables towards the willingness to use e-Government services, the service quality dimensions are fed as inputs to the proposed research model, as exhibited in Fig. 1.

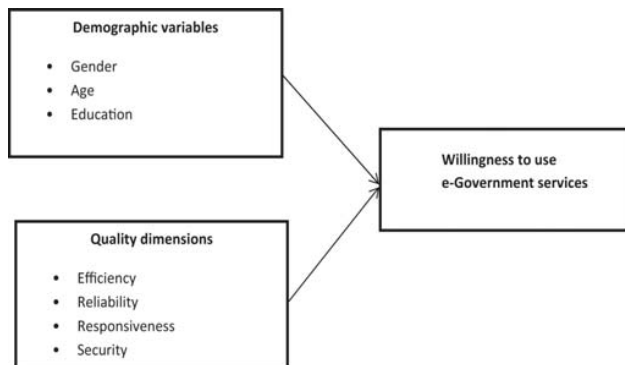


Fig. 1 Proposed research model

At this moment, the proposed study is in the data collection phase. We have collaborated with a well-known business organization which has agreed to provide highly reliable user data collected from their customers who would volunteer to fill out a questionnaire designed by the authors of this paper. A pilot survey has been carried out to refine the online survey questionnaire to be used for this study. Further, to enhance the clarity of the questions posed to the respondents, the questionnaire starts with a brief description of e-Government services and some examples as per the suggestions received from an expert in management information systems (MIS).

To begin with, a couple of questions measure the level and purpose of Internet usage of a respondent. Next, a question is asked to probe if the respondent is actually a user of any of the e-Government services offered in India. If yes, the respondent moves to an aggregate of 15 questions that are used to measure the quality dimensions under consideration and the willingness of the respondent to use e-Government services, on a five-point Likert scale. If no, the respondent has to answer a few questions regarding why he/she is yet to use e-Government services. The last four questions in the survey are dedicated to collect data related to the demography of every respondent. To avoid multiple responses from a person, the questionnaire form is set to restrict more than one submission per Internet Protocol address. Assuming that the population of the present study comprises all the Internet users in India, a sample size of more than 1,000 valid responses is desirable.

IV. DISCUSSION

This paper provides an in-depth review of the existing literature on the adoption and diffusion of e-Government

services. The study focuses on the key variables that are most salient to the populace of an emerging market like India. Government agencies can take note of these variables when designing, updating, and promoting e-Government services to enhance public participation. Improved participation in e-Government services is expected to yield better efficiency, convenience, engagement, and transparency. After adequate data are collected, the propositions as stated above will be used to develop hypotheses. The hypotheses will be tested using the methodology discussed in the paper in detail. The results of the study are expected to provide a robust understanding of the relationship involving demographic variables, service quality dimensions, and the willingness to adopt the e-government services in India. With this understanding, the study aims to develop a research model at its completion.

REFERENCES

- [1] Ebrahim, Z., and Irani, Z. 2005. E-government adoption: architecture and barriers. *Business process management journal*, 11(5), 589-611.
- [2] Saxena, K. B. C. 2005. Towards excellence in e-governance. *International Journal of Public Sector Management*, 18(6), 498-513.
- [3] Warkentin, M., Gefen, D., Pavlou, P. A., and Rose, G. M. 2002. Encouraging citizen adoption of e-government by building trust. *Electronic markets*, 12(3), 157-162.
- [4] Bertot, J. C., Jaeger, P. T., and Grimes, J. M. 2010. Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for societies. *Government information quarterly*, 27(3), 264-271.
- [5] Zhao, F., José Scavarda, A., and Waxin, M. F. 2012. Key issues and challenges in e-government development: An integrative case study of the number one eCity in the Arab world. *Information Technology and People*, 25(4), 395-422.
- [6] Reddick, C. G. 2010. *Comparative E-government* (Vol. 25). Springer Science and Business Media.
- [7] Sohail, M.S. and Shaikh, N.M. 2008. "Internet banking and quality of service: perspectives from a developing nation in the Middle East", *Online Information Review*, Vol. 32 No. 1, pp. 58-72.
- [8] Kaur, R. 2016. *E-Governance: Problems, Challenges and Prospects in India*.
- [9] Verdegem, P., and Verleye, G. 2009. User-centered E-Government in practice: A comprehensive model for measuring user satisfaction. *Government information quarterly*, 26(3), 487-497.
- [10] Al-Sobhi, F., Weerakkody, V., and El-Haddadeh, R. 2011. The relative importance of intermediaries in eGovernment adoption: a study of Saudi Arabia. In *International Conference on Electronic Government* (pp. 62-74). Springer Berlin Heidelberg.
- [11] Weerakkody, V. 2010. *Applied Technology Integration in Governmental Organizations: New E-Government Research: New E-Government Research*. IGI Global.
- [12] Bwalya, K. J. 2012. *Handbook of Research on E-Government in Emerging Economies: Adoption, E-Participation, and Legal Frameworks: Adoption, E-Participation, and Legal Frameworks*. IGI Global.
- [13] Rogers, E. M. 1995. Diffusion of Innovations: modifications of a model for telecommunications. In *Die Diffusion von Innovationen in der Telekommunikation* (pp. 25-38). Springer Berlin Heidelberg.
- [14] Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
- [15] Kucukusta, D., Law, R., Besbes, A., & Legohérel, P. 2015. Re-examining perceived usefulness and ease of use in online booking: The case of Hong Kong online users. *International Journal of Contemporary Hospitality Management*, 27(2), 185-198.
- [16] Al-Qeisi, K. I. 2009. *Analyzing the use of UTAUT model in explaining an online behaviour: Internet banking adoption* (Doctoral dissertation, Brunel University Brunel Business School PhD Theses).
- [17] Cai, Y. 2016. *Consumers' Adoption of Online Shopping in China*.
- [18] López-Nicolás, C., Molina-Castillo, F. J., and Bouwman, H. 2008. An assessment of advanced mobile services acceptance: Contributions from

- TAM and diffusion theory models. *Information & Management*, 45(6), 359-364.
- [19] Roca, J. C., Chiu, C. M., and Martínez, F. J. 2006. Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of human-computer studies*, 64(8), 683-696.
- [20] George, A., and Kumar, G. G. 2014. Impact of service quality dimensions in internet banking on customer satisfaction. *Decision*, 41(1), 73-85.
- [21] Liao, Z., and Cheung, M. T. 2008. Measuring consumer satisfaction in internet banking: a core framework. *Communications of the ACM*, 51(4), 47-51.
- [22] Kettinger, W. J., and Lee, C. C. 1999. Replication of measures in information systems research: the case of is Servqual. *Decision Sciences*, 30(3), 893-899.
- [23] Liu, C., and Arnett, K. P. 2000. Exploring the factors associated with Web site success in the context of electronic commerce. *Information and management*, 38(1), 23-33.
- [24] Barnes, S., and Vidgen, R. 2000. WebQual: an exploration of website quality. *ECIS 2000 Proceedings*, 74.
- [25] Barnes, S. J., and Vidgen, R. T. 2006. Data triangulation and web quality metrics: A case study in e-government. *Information and Management*, 43(6), 767-777.
- [26] Santos, J. 2003. E-service quality: a model of virtual service quality dimensions. *Managing Service Quality: An International Journal*, 13(3), 233-246.
- [27] Zeithaml, V. A., Parasuraman, A., and Malhotra, A. 2002. Service quality delivery through web sites: a critical review of extant knowledge. *Journal of the academy of marketing science*, 30(4), 362-375.
- [28] Swartz, N. 2003. British slow to use e-government services. (Up front: news, trends and analysis). *Information Management Journal*, 37(2), 7-8.
- [29] Al Athmay, A. A. R. A. 2015. Demographic factors as determinants of e-government adoption: A field study in the United Arab Emirates (UAE). *Transforming Government: People, Process and Policy*, 9(2), 159-180.
- [30] Sahu, G. P. 2009. E-Government Development and Diffusion: Inhibitors and Facilitators of Digital Democracy: Inhibitors and Facilitators of Digital Democracy. IGI Global.
- [31] Tarhini, A., Hone, K., and Liu, X. 2015. A cross-cultural examination of the impact of social, organisational and individual factors on educational technology acceptance between British and Lebanese university students. *British Journal of Educational Technology*, 46(4), 739-755.
- [32] Tarhini, A., Teo, T., and Tarhini, T. 2015. A cross-cultural validity of the E-learning Acceptance Measure (ELAM) in Lebanon and England: A Confirmatory Factor Analysis. *Education and Information Technologies*, 1-14.
- [33] Chan, F. T., and Chong, A. Y. L. 2013. Determinants of mobile supply chain management system diffusion: a structural equation analysis of manufacturing firms. *International Journal of Production Research*, 51(4), 1196-1213.
- [34] Teo, T. S. 2001. Demographic and motivation variables associated with Internet usage activities. *Internet Research*, 11(2), 125-137.
- [35] Venkatesh, V., Sykes, T. A., and Venkatraman, S. 2014. Understanding e-Government portal use in rural India: role of demographic and personality characteristics. *Information Systems Journal*, 24(3), 249-269.
- [36] Al-Somali, S. A., Gholami, R., and Clegg, B. 2009. An investigation into the acceptance of online banking in Saudi Arabia. *Technovation*, 29(2), 130-141.
- [37] Neves, B. B., and Amaro, F. 2012. Too old for technology? How the elderly of Lisbon use and perceive ICT. *The Journal of Community Informatics*, 8(1).
- [38] Rhee, K. Y., and Kim, W. B. 2004. The adoption and use of the Internet in South Korea. *Journal of Computer-Mediated Communication*, 9(4), 00-00.
- [39] Brown, S. A., and Venkatesh, V. 2005. Model of adoption of technology in households: A baseline model test and extension incorporating household life cycle. *MIS quarterly*, 399-426.
- [40] Choudrie, J., Ghinea, G., and Songonuga, V. N. 2013. Silver surfers, e-government and the digital divide: An exploratory study of UK local authority websites and older citizens. *Interacting with Computers*, iws020.
- [41] Alsmadi, I., and Abu-Shanab, E. 2016. E-government website security concerns and citizens' adoption. *Electronic Government, an International Journal*, 12(3), 243-255.
- [42] Baumgarten, J., and Chui, M. 2009. E-government 2.0. *McKinsey Quarterly*, 4(2), 26-31.
- [43] Griffiths, J. R., and Brophy, P. 2005. Student searching behavior and the web: use of academic resources and Google.
- [44] Carter, L., and Bélanger, F. 2005. The utilization of e-government services: citizen trust, innovation and acceptance factors. *Information systems journal*, 15(1), 5-25.
- [45] Hughes, D., Crowley, C., Daniels, W., Bachiller, R., and Joosen, W. 2014. User-rank: generic query optimization for participatory social applications. In *2014 47th Hawaii International Conference on System Sciences* (pp. 1874-1883). IEEE.
- [46] Phiri, M. A., and Mcwabe, T. 2013. Customers' expectations and Perceptions of Service Quality: The Case of Pick N Pay Supermarket Stores in Pietermaritzburg Area, South Africa. *International Journal*, 3(1), 2307-227X.
- [47] Sussha, I., Grönlund, Å., and Janssen, M. 2015. Driving factors of service innovation using open government data: An exploratory study of entrepreneurs in two countries. *Information Polity*, 20(1), 19-34.
- [48] Chong, A.Y.L., Chan, F.T. and Ooi, K.B. 2012, "Predicting consumer decisions to adopt mobile commerce: cross country empirical examination between China and Malaysia", *Decision Support Systems*, Vol. 53 No. 1, pp. 34-43.