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Satish Krishnan
School of Computing, National University of Singapore, Singapore, satishk@comp.nus.edu.sg

Thompson S.H. Teo
School of Business and School of Computing, National University of Singapore, Singapore, bizteosh@nus.edu.sg

Vivien K.G. Lim
School of Business, National University of Singapore, Singapore, bizlimv@nus.edu.sg

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CONTEXTUAL FACTORS, E-PARTICIPATION, AND E-GOVERNMENT DEVELOPMENT: TESTING A MULTIPLE-MEDIATION MODEL

Satish Krishnan, School of Computing, National University of Singapore, Singapore, satishk@comp.nus.edu.sg

Thompson S.H. Teo, School of Business and School of Computing, National University of Singapore, Singapore, bizteosh@nus.edu.sg

Vivien K.G. Lim, School of Business, National University of Singapore, Singapore, bizlimv@nus.edu.sg

Abstract

Utilizing the Technology-Organization-Environment (TOE) theory and the literature on citizen engagement (or participation), we formulated a multiple-mediation model, examining (1) the contextual antecedents of e-participation and e-government development; and (2) the mediating role of e-participation (in form of e-information sharing, e-consultation, and e-decision-making) on the relationships between the TOE contextual factors and e-government development. Specifically, we hypothesized that information and communication technology (ICT) infrastructure, human capital and governance in a country have both direct and indirect relationships with its e-government development through the mediating roles of e-participation. Based on archival data from 170 countries, our results showed that ICT infrastructure, human capital and e-participation had a direct relationship with e-government development. Of the three dimensions of e-participation, e-information sharing and e-decision-making were positively associated with e-government development, and e-consultation was negatively related. Further, all three dimensions of e-participation partially mediated the influence of ICT infrastructure and human capital on e-government development. Results also indicated that governance in a country did not significantly contribute to its e-government development, and their relationship was not mediated by e-participation. Implications of our findings are discussed.

Keywords: E-government development, E-participation, ICT infrastructure, Human capital, Governance, Archival data.

1   INTRODUCTION

E-government can be defined as the application of ICTs and the Internet to provide stakeholders (i.e., citizens, businesses, employees and other governments) with more convenient access to and delivery of government information and services (Srivastava & Teo 2007). E-government development in a country represents the level of functional sophistication of its e-government websites (UN-Report 2010). Notwithstanding the massive amount of resources invested in e-government development, the purported benefits of e-government (e.g., increased responsiveness to citizens' needs) continue to be an "elusive dream" for many governments worldwide (Chan et al. 2008). That is, despite numerous motivations and service targets underlying public institutions, successful development of e-government is a challenging task faced by government agencies in most countries.

It is widely acknowledged that "citizen engagement" is key to the successful development of e-government (Chan & Pan 2008; Olphert & Damodaran 2007). According to the Organization for Economic Cooperation and Development (OCED 2001), citizen engagement is defined as the active participation of citizens, in partnership with government, in decision- and policy-making processes. The concept of citizen engagement is exercised through e-participation, which involves the extension and transformation of participation in societal democratic and consultative process mediated by ICTs and the Internet (Saebo et al. 2008). E-participation is the total sum of both the government programs to encourage participation from its citizens (i.e., supply side) and the willingness of the citizens to do so (i.e., demand side). For this study, we focus only on the supply side of e-participation (i.e., G2C aspect of participation) and adopt the definition as defined by the UN; e-participation is defined as "the willingness of a government (and its agencies) to use ICTs to provide high quality information and effective communication tools for the specific purpose of empowering people for able participation in consultations and decision-making, both in their capacity as consumers of public services and as citizens" (UN-Report 2003, p. 11).

Government achieves the goals of e-participation through three means: (1) e-information sharing; (2) e-consultation; and (3) e-decision-making (UN-Report 2003). Whereas the focus of e-information sharing is on the use of the Internet to facilitate the provision of information by governments to citizens, e-consultation is concerned with stakeholder interaction. In contrast, the focus of e-decision-making is on the engagement of citizens in the decision-making process. While e-participation has the potential to establish more transparency in government (Van Dijk 2000), a recent study conducted by the UN highlighted that e-participation is still in a "nascent state" indicating disconnectedness between government and its citizens (UN-Report 2010).

Using the TOE theory (Tornatzky & Fleischer 1990) as a guiding theoretical lens, we first identify the contextual factors facilitating e-participation (in form of e-information sharing, e-consultation, and e-decision-making) and e-government development in a nation. Further, by drawing from the citizen engagement literature, we investigate the direct effects of e-information sharing, e-consultation, and e-decision-making on e-government development in a nation, and the mediating effects of e-information sharing, e-consultation, and e-decision-making on the relationships between the TOE contextual factors and e-government development. Although some research has been done to examine the factors affecting e-government development at cross-country level, relatively little is known about the roles of e-information sharing, e-consultation, and e-decision-making on the relationships between TOE contextual factors and e-government development. In sum, the specific research questions are:

RQ1: What TOE contextual factors facilitate e-participation and e-government development in a nation?

RQ2: What is the relationship between e-participation and e-government development in a nation?

RQ3: How does e-participation mediate the effects of TOE contextual factors on e-government development in a nation?

The rest of the paper is organized as follows. First, using the TOE theory, we explain the contexts necessary for facilitating e-participation and e-government development. Next, by drawing from citizen engagement literature, we hypothesize the mediation effects of e-information sharing, e-consultation and e-decision-making between TOE contextual factors and e-government development relationships. Thereafter, using archival data from 170 countries, we test the hypothesized model. Lastly, we discuss the implications of our findings and offer future research directions.

2 THEORY AND HYPOTHESES

According to Tornatzky and Fleischer (1990), innovation adoption or technology deployment in a firm is influenced by the technological context, organizational context and environmental context. Extant research has demonstrated that the TOE theory (though have been originally proposed as an organization-level theory) has broad applicability and possess explanatory power across a number of technological, industrial, national and cultural contexts (Baker 2011). In a meta-analysis of research on information technology implementation, Premkumar (2003) found consistent empirical support for the TOE theory although specific factors examined within the three TOE contexts varied across different studies. Another study by Srivastava and Teo (2010) established the usefulness of the TOE theory in global context (i.e., cross-country level) by empirically examining the facilitators of e-government and e-business development, and their collective impact on national economic performance.

While the TOE theory is often criticized for its inability to provide the theoretical rational to establish causal relationships (Mishra et al. 2007), extant studies have attempted to develop the TOE theory through the means of "theoretical synthesis," an approach of combining the best attribute of one theory with the other for the purpose of furthering explanations pertaining to a phenomenon (e.g., innovation adoption). For instance, Mishra et al. (2007) combined the TOE theory with the RBV of a firm to examine antecedents and consequences of Internet use in the context of procurement in US manufacturing firms. Similarly, Srivastava and Teo (2010) combined the TOE theory with the value perspective to examine the country-level facilitators and the impact of e-government and e-business developments on national economic performance. These studies indicate that the dependent construct in the TOE theory (i.e., technological innovation) can be enlarged to include an element of organizational (and national) performance. Given the fact that the individual theories lack the breadth of variables in the TOE theory, and its simple yet elegant taxonomy (Mishra et al. 2007), we extend and enrich the TOE theory by (1) combining it with the citizen engagement perspective and e-government development literature; (2) establishing its usefulness in the global context; and (3) demonstrating its applicability by using archival data for empirical validation (in contrast, most extant studies applying the TOE theory have used primary survey data for analyses).

Based on our extensive review of academic (e.g., Siau & Long 2009; Srivastava & Teo 2008; 2010) and practitioner literature (e.g., UN-Report 2003) examining e-participation and e-government development, we identify three factors: (1) ICT infrastructure; (2) human capital; and (3) governance that correspond to the three contexts (technological, organizational, and environmental) defined in the TOE theory. ICT infrastructure is the gradual convergence of broadcasting content, telecommunications, and computing (Tapscott 1996). Human capital, on the other hand, refers to the knowledge, skills, and abilities embodied in people (here, citizens) (Coff 2002). Governance, as noted by Kaufmann et al. (1999), is defined as the traditions and institutions by which authority in a country is exercised. According to Singh et al. (2007), ICT infrastructure and governance facilitates the supply of e-government, and human capital stimulates the demand for e-government in a country. Given the fact that the trends in e-participation is closely linked to online public service delivery (UN-Report 2010), we believe that ICT infrastructure and governance will also alleviate the supply of e-participation and human capital will induce the demand for e-participation in a country. Taken together, including both supply and demand factors in our model (see Figure 1) enables us to estimate the relative contributions of these factors towards attaining varying levels of e-participation and e-government development in a country. We next derive and explain each hypothesis.

2.1 Relating ICT Infrastructure to E-Government Development and E-Participation

According to neoclassical and new growth theories, technological progress and creativity is a critical determinant of growth and development (Lucas 1988; Romer 1990). Extending this argument in the context of e-government development, we argue that ICT infrastructure can contribute towards the development of e-government systems as e-government development needs to utilize the information infrastructure to deliver online public services (Siau & Long 2009). In a similar vein, Srivastava and Teo (2010) stressed that government and its agencies can fulfil their duties related to the daily activities of citizens and businesses only when they are connected with the citizens and businesses, which indeed is possible only with a sound ICT infrastructure. Warkentin et al. (2002) emphasized that e-government is characterized by extensive use of ICTs that stimulates the growth and development of e-government. Koh et al. (2005) and Singh et al. (2007) highlighted that e-government development will remain an "unrealized dream" in the absence of sound and reliable ICT infrastructure. Extant literature on public administration (e.g., Bellamy & Tylor 1998; Heeks 1999) also highlighted the pivotal role of ICTs in the delivery of public services. Hence, we posit:

H1: ICT infrastructure in a country is positively associated with its e-government development.

E-participation has the potential to establish more transparency in government by allowing citizens to use new channels of influence that reduce barriers to public participation in policy-making (Van Dijk 2000). For e-information sharing, e-consultation, and e-decision-making to be successful, robust ICT infrastructure that allows citizens access to decision makers is required (UN-Report 2008). OECD (1997) highlighted that information infrastructure facilitates greater citizens' participation in the government process. Meso et al. (2009) indicated that the availability of ICTs (1) allows greater access by the population to government services; (2) facilitates public participation in policy-making process by rapidly disseminating news and information to the citizens; and (3) eliminates or minimizes barriers to participation in the country's economic markets. Further, information infrastructure (e.g., Web 2.0) plays a critical role in empowering citizens to become more active in expressing their views on issues concerning environment, health, education and other areas of government policy (UN-Report 2010). In sum, a government's ability to (1) request, receive and incorporate feedback from its constituents; and (2) tailor the policy measures to meet the needs and priorities of citizens can be enhanced only when a sound, robust and reliable ICT infrastructure is in place. Therefore, we propose:

H2: ICT infrastructure in a country is positively associated with its (H2a) e-information sharing; (H2b) e-consultation; and (H2c) e-decision-making.

2.2 Relating Human Capital to E-Government Development and E-Participation

Human capital indicates how well educated are the citizens in a nation. Schultz (1961) and Lewis (1955) in their human capital theory (an economic theory) have stressed the critical role of "human capital" in growth and development of individuals and nations. Specifically, Schultz argued that human capital is one of the critical reasons that explain the differences in growth (e.g., income and productivity) between human beings as well as nations. Like human capital theory, the new growth theory also supported knowledge-based economy by recognizing the importance of human capital and indicates that the investment in human capital generates returns in the future (Lucas 1988; Romer 1986). A study by Flak and Rose (2005) indicated that citizens is one of the important stakeholder groups for successfully implementing e-government initiatives and their knowledge is a valuable resource in the process of e-government development. Another study by Burn and Robins (2003) argued that human factors in form of learning and knowledge capabilities facilitate e-government development. Further, Singh et al. (2007) found that human capital is a significant determinant of e-government maturity in a country, and Srivastava and Teo (2010) established that human capital (in terms of education and training) in a country is positively associated with the level of its e-government and e-business developments. Therefore, we propose:

H3: Human capital in a country is positively associated with its e-government development.

Drawing from human capital theory, it is appropriate to argue that the knowledge, skills and abilities embodied in citizens have raised their expectations of their government. UN, in its large scale study, established the expectations of citizens to be directly involved in designing government programs and services (UN-Report 2008). That is, at various stages of policy process, from elections to policy planning and implementation, citizens are becoming increasingly involved, through various participation tools such as online discussion forums, email, online surveys, online chat, and group support systems (Phang & Kankanhalli 2008). Such participation is possible only when the citizens have sufficient learning skills and knowledge capabilities embodied within them. This will indeed facilitate governments to (a) increase e-information sharing; (2) enhance e-consultation; and (3) support e-decision-making. Hence, when citizens are empowered, they are not only able to participate, but also create a different relationship with their respective governments, characterized by enhanced effectiveness (UN-Report 2010). Hence, we posit:

H4: Human capital in a country is positively associated with its (H4a) e-information sharing; (H4b) e-consultation; and (H4c) e-decision-making.

2.3   Relating Governance to E-Government Development and E-Participation

Governance refers to the collection of processes and institutions that creates the conditions for ordered rule and collective action (Jessop 1998; Kazancigil 1998). Madon et al. (2007) established that effective implementation of government-based information systems (IS) for the provision of services is impacted by the macro-level policy-making organs; thereby shaping the type of system that eventually gets implemented. Moon (2002) found that institutional factors significantly contributed to the adoption of e-government among municipalities. Norris and Moon (2005) showed that level of adoption and sophistication of e-government systems are correlated with the presence of well-developed institutional factors. A study conducted by West (2004) highlighted the importance of institutional arrangements and governance mechanisms in ensuring e-government development. Similarly, McNeal et al. (2003) established that legislative professionalism and professional networks are associated with extensive use of e-government. Most recently, Srivastava and Teo (2010) found that public institutions (in association with macro-economic stability) in a country is positively associated with the level of its e-government development. As effective governance assures an environment conducive to investment (Meso et al. 2006), we posit:

H5: Governance in a country is positively associated with its e-government development.

Governance entails public debate and open, participatory decision-making. For e-information sharing, e-consultation, and e-decision-making to be successful and to become the norm, governments need to create an environment that allows citizens to voice their views online and more importantly, to create a feedback mechanism which shows citizens that their views are taken seriously (UN-Report 2008). Such an environment is assured only when governance in a country is effective (Meso et al. 2006). According to the participatory model of governance in e-government implementation (Chadwick & May 2003), governance is seen as open communications (i.e., voicing of one's concerns), where the opinions are not directed only to government but to all players within the governance communications space. Hence, governance fosters the collaboration and information sharing among disparate stakeholders. In addition, effective governance ensures an enhanced supply of the desired services, eliminates or minimizes the barriers to participation, and promotes rule of law (Meso et al. 2006). In sum, governance provides direction to creation of environment in which citizens can be more active and supportive of their governments, and increase the willingness of governments to use ICTs to provide high quality information and effective communication tools for able participation in consultations and decision-making. Therefore, we propose:

H6: Governance in a country is positively associated with its (H6a) e-information sharing; (H6b) e-consultation; and (H6c) e-decision-making.

2.4 Relating E-Participation to E-Government Development

According to e-government stage models, e-government development cannot be thought as a one-step project or implemented as a single project (Siau & Long 2006). For instance, as noted by UN, e-government development comprises five stages: (1) emerging presence; (2) enhanced presence; (3) interactive presence; (4) transactional presence; and (5) networked presence. The implication from this model is that e-government development is evolutionary in nature and the five stages are theoretically ascending in the level of maturity or sophistication of e-government presence online (UN-Report 2003). Given the fact that citizen engagement via e-participation is pivotal in the evolutionary process of e-government development, it is logical to presume that as government's willingness to engage its citizens in e-government processes increases, so does the level of e-government development. That is, when the government is willing to (1) offer information pertaining to policies and programs on its websites, and tools for dissemination of such information for timely access and use of public information (e-information sharing); (2) offer a choice of public policy topics online for discussion, and encourage citizens to participate in them (e-consultation); and (3) take citizens' e-inputs into account in decision-making, and provide actual feedback on the outcome of specific issues (e-decision-making), citizens, according to Ekelin (2003), become "active creators" or "feedback providers," thereby contributing information to the success of e-government development. This fact is also emphasized in a study by Tan and Pan (2003). According to them, a bureaucratic government organization can move towards anticipative and responsive practices only when it treats its citizens as "strategic value networks" in the process of e-transformation. Further, they stress that such a relationship will not only lead to "total customer satisfaction" but also create "multi-directional strategic value." Consequently, we posit:

H7: E-participation (H7a. e-information sharing; H7b. e-consultation; and H7c. e-decision-making) in a country is positively associated with its e-government development.

2.5 Mediated Effects of E-Participation

Having assembled each of the piecewise elements and relations in our research model (see Figure 1), we logically deduce one more set of hypotheses. We posit that e-participation (in form of e-information sharing, e-consultation, and e-decision-making) serves as an intervening mechanism or, at the least, partial conveyors of the effects of TOE contexts onto e-government development. That is, TOE contexts indirectly influence e-government development by raising the levels of e-information sharing, e-consultation, and e-decision-making. More formally, we therefore offer the following:

H8: TOE contexts' (H8a. ICT infrastructure; H8b. human capital; and H8c. governance) effects on e-government development are mediated by e-information sharing, e-consultation and e-decision-making.

3 RESEARCH DESIGN

To test the formulated hypotheses, we gathered archival data (for each of the main constructs) for two reasons. First, collecting large scale primary data from over hundred countries is constrained by the amount of resources and time available for conducting such research (Meso et al. 2009; Srivastava & Teo 2008; 2010). Second, archival data, as suggested by some researchers (e.g., Jarvenpaa 1991) offers several advantages namely, (1) easy reproducibility; (2) ability to generalize the results arising from larger datasets (Kiecolt & Nathan 1985); and (3) robust to the threat of common method bias (Woszczynski & Whitman 2004). Hypotheses were tested via a cross-sectional analysis of 170 countries (after omitting the missing values). Consistent with the suggestion provided by Robertson and Watson (2004) for obtaining consistent estimates, and due to the varying speed in which TOE contextual factors affects e-government development in a country (Krishnan & Teo 2012), we lagged the independent and intervening variables by a year prior to the base-year. In the following section, we describe the operationalization of study variables and our primary sources of data.

3.1   Operationalization of Constructs

The technology construct, ICT infrastructure was measured by six primary indicators: (1) PCs/1000 persons; (2) Internet users/1000 persons; (3) Telephone lines/1000 persons; (4) Online population; (5) Mobile phones/1000 persons; and (6) TVs/1000 persons. These data were taken from the International Telecommunication Union (ITU) and UN Statistics Division, supplemented by the World Bank. We computed an index as follows. First, based on the scores of the countries, a maximum and minimum value was selected for each of the six indicators. Second, the country's relative performance was measured by a value between 0 and 1 (with the higher values corresponding to the higher levels of ICT infrastructure) based on the following formulae: Indicator value = (Actual value - Minimum value) / (Maximum value - Minimum value). This index has been used in past academic studies like Krishnan and Teo (2012), and Srivastava and Teo (2010).

The organizational construct, human capital was measured by the education index (with a value running between 0 and 1, with the higher values corresponding to the higher levels of human capital), taken from the UN Development Program's Human Development Report (UNDPHD-Report 2002). This index is a composite of the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratio, with two-thirds of the weight given to adult literacy and one-third to the gross enrolment ratio. This index has been used in past academic studies like Srivastava and Teo (2008).

The environmental construct, governance was operationalized using six aggregated measures of governance (with a value running between -2.5 and 2.5, with the higher values corresponding to the better governance) originally presented in Kaufmann et al. (1999). The measures are: (1) voice and accountability; (2) political stability and absence of violence; (3) government effectiveness; (4) regulatory quality; (5) rule of law; and (6) control of corruption. These measures have since been adopted by the World Bank and employed as indices of governance quality in the world development reports (IBRD 2002). Data for these measures were taken from the World Bank, and have been used in past academic studies like Krishnan and Teo (2012), and Meso et al. (2006).

E-participation was measured on three dimensions: (1) e-information sharing; (1) e-consultation; and (3) e-decision-making. The UN assessed e-participation (values running between 0 and 1, with the higher values corresponding to the better results) by measuring the willingness of countries to engage citizens in public policy-making through the use of relevant programs (UN-Report 2003). Specifically, the questions focused on the willingness of the use of ICTs and the Internet to facilitate (1) provision of information by governments to citizens (i.e., e-information sharing); (2) interaction with stakeholders (i.e., e-consultation), where citizens can initiate debates and give feedbacks; and (3) engagement in decision-making processes (i.e., e-decision-making). The scores were obtained from the UN Global E-Government Survey Report (UN-Report 2003). This index has been used in past academic studies like Srivastava and Teo (2008).

The dependent construct, e-government development indicating the level of functional sophistication of e-government websites was measured by the web measure index, the values (running between 0 and 1, with the higher values corresponding to the higher level of e-government development) were taken from the UN Global E-government Readiness Report (UN-Report 2004). This index is based upon UN's five-stage e-government development model: (1) emerging presence; (2) enhanced presence; (3) interactive presence; (4) transactional presence; and (5) connected presence. Specifically, for countries that have established an online presence, the model defined stages of e-readiness according to a scale of progressively sophisticated citizen services (UN-Report 2004). This index has been used in past studies such as Krishnan and Teo (2012), and Srivastava and Teo (2008; 2010).

Additional control variables consisted of economic condition (in terms of GDP per capita (adjusted for purchasing power parity, PPP), the values for which were obtained from the World Bank) and regional difference (as the country-level difference across various regions of the world). Based on UN's regional groupings, we classified countries into five groups (i.e., Americas (e.g., United States); Europe (e.g., Denmark); Africa (e.g., Congo); Asia (e.g., India); and Oceania (e.g., Australia)).

4 ANALYSIS AND RESSULTS

4.1 Descriptive Statistics and Correlations

Table 1 presents the descriptive statistics and correlations for all variables in the research model. Most correlations were significant at p<0.001. In addition, as correlations were below the threshold value of 0.8, the concern for multicollinearity would be minimal (Gujarati 2003; Gujarati & Porter 2009). Nevertheless, we followed up with the collinearity tests that measure variance inflation factor (VIF). VIF assesses the effect that the other independent (and mediating) variables have on the standard error of a regression coefficient (Hair et al. 2006). The results revealed that our VIFs ranged from 1.29 to 2.16 (all tolerance levels above 0.46). As per Fox (1991), a VIF > 4.0, or a tolerance level < 0.25, may indicate the potential for multicollinearity; thus, the concern in our model appeared to be minimal.

Variable	Mean	SD	1	2	3	4	5	6	7	8
1. Economic Conditions[a]	7.64	1.61	-							
2. Regional Difference	2.72	1.16	-30	-						
3. ICT Infrastructure	0.18	0.22	74	-21	-					
4. Human Capital	0.73	0.22	59	-25	54	-				
5. Governance	-0.04	0.91	74	-28	75	47	-			
6. E-Information Sharing	0.23	0.24	58	-26	71	49	62	-		
7. E-Consultation	0.14	0.22	47	-21	61	43	52	75	-	
8. E-Decision-Making	0.14	0.19	53	-22	64	41	56	73	75	-
9. E-Government Development	0.32	0.25	65	-23	67	57	67	72	72	67

Note. [a]Log transformed variable. N=170. Decimal points are omitted for correlations. All correlations (except those underlined) are significant at p<0.001 and underlined correlations are significant at p<0.01.

Table 1.   Descriptive statistics and correlations.

4.2 Hypotheses Testing

Since the research model has more than one mediator, we followed Preacher and Hayes (2008) method for testing multiple-mediator models. This method examines the total and direct effects of the independent variable on the dependent variable, and the indirect effects through the mediators. It also specifies and contrasts the indirect effects of multiple mediators. In addition, the method can include more than one independent variable, each of which can be tested in a separate model. In each model, we chose one of the independent variables as the primary independent variable to be examined, and treated the others as covariates for that test.

As per Preacher and Hayes' suggestions, we elected the bootstrapping strategy for the tests. Bootstrapping is a nonparametric resample procedure that does not impose the assumption of normality of the sampling distribution. It involves repeatedly sampling from the dataset and estimating the indirect effects of mediators in each resampled dataset. Based on repeated samplings, an empirical approximation of the indirect effects can be estimated and used to construct confidence intervals (CIs) for the indirect effects. Preacher and Hayes, consistent with prior research (Williams & MacKinnon 2008), have argued that bootstrapping is in general superior to the multivariate product-of-coefficient strategy (i.e., the Sobel test) in small to moderate samples. Their results suggested that the bias-corrected BC bootstrap performs best in terms of both statistical power and Type I error rate.

We examine the total and direct effects of the independent variable on the dependent variable, the difference between which is the indirect effect of the independent variable on the dependent variable through mediators. The analysis also yields an estimation of the indirect effect of each mediator. In addition, the BC bootstrap will generate a 95% CI for each mediator. If the interval for a mediator does not contain zero, it means the indirect effect of this mediator is significantly different from zero. In addition, a contrast between two mediators shows how their indirect effects can be distinguished in terms of magnitude. Figure 1 shows the regression results.
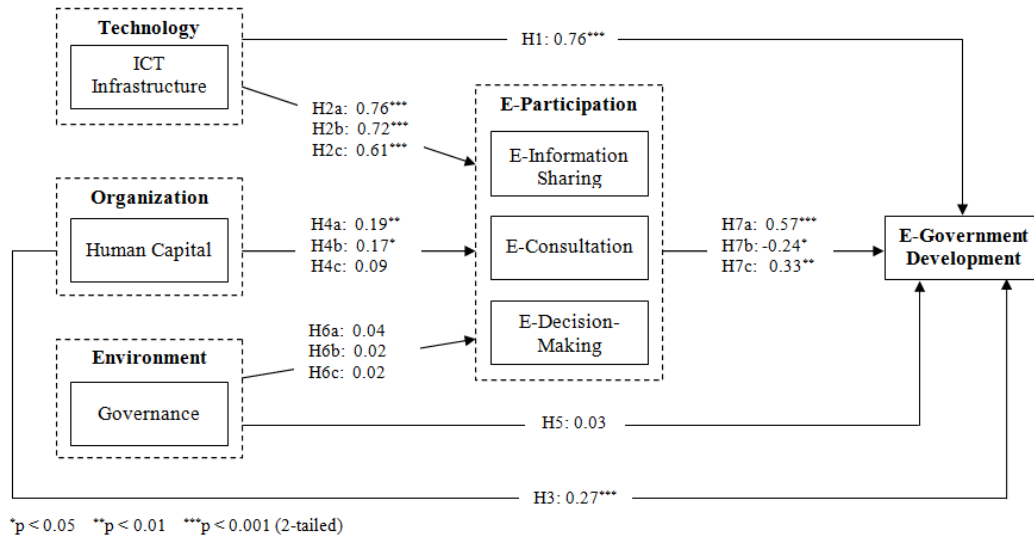
Figure 1.   *Summary of regression results.*

As shown, the results revealed that the paths from ICT infrastructure to e-government development (β=0.76, p<0.001) and from human capital to e-government development (β=0.27, p<0.001) were significant. Hence, H1 and H3 were supported. As the path from governance to e-government development (β=0.03, n.s.) was not significant, H5 was not supported. Results also revealed that the paths from ICT infrastructure to e-information sharing (β=0.76, p<0.001), e-consulting (β=0.72, p<0.001) and e-decision-making (β=0.61, p<0.001) were all significant. This confirmed H2a, H2b, and H2c. Similarly, while the paths from human capital to e-information sharing (β=0.19, p<0.01) and e-consulting (β=0.17, p<0.05) were significant, the path concerning e-decision-making was not significant (β=0.09, n.s.). Hence, H4a and H4b were supported and H4c was not supported. Further, the paths from governance to e-information sharing (β=0.04, n.s.), e-consulting (β=0.02, n.s.) and e-decision-making (β=0.02, n.s.) were not significant. Hence, H6a, H6b, and H6c were not supported. Lastly, the paths from e-information sharing (β=0.57, p<0.001), e-consultation (β=-0.24, p<0.05), and e-decision-making (β=0.33, p<0.01) to e-government development were all significant. However, while the direction of the relationships of e-information sharing and e-decision-making with e-government development was consistent with our initial prediction, the direction of the relationship between e-consultation and e-government development was contrary to our initial prediction. Hence, H7a and H7c were supported and H7b was not supported.

Table 2 presents the mediation results. First, model 1 was examined, in which ICT infrastructure was the independent variable with human capital and governance treated as covariates. Results indicated that ICT infrastructure had a significant total effect on e-government development. When the mediators e-information sharing, e-consultation, and e-decision-making were introduced, the direct effect of ICT infrastructure on e-government development remained significant. This meant that e-information sharing, e-consultation, and e-decision-making partially mediated the impact of ICT infrastructure on e-government development. Further, the difference between the total and direct effects was the total indirect effect as mediated through e-information sharing, e-consultation, and e-decision-making, with a point estimate of 0.4680 and a 95% BC bootstrap CI of 0.2888 to 0.6848. Since the CI did not contained zero, the total indirect effect was different from zero. An examination of the specific indirect effects indicated that e-information sharing, e-consultation, and e-decision-making were mediators as their 95% CIs did not contain zero. The point estimate of the indirect impact through e-information sharing and e-consultation were 0.4376 and -0.1735 respectively, and of that through e-decision-making was 0.2039. Examination of the pairwise contrasts of the indirect effects (i.e., C1, C2, and C3 in model 1 of Table 2) showed that (1) the specific indirect effect through e-information sharing was larger than the specific indirect effect through e-consultation, with a BC 95% CI of 0.2640 to 1.0617; and (2) the specific indirect effect through e-consultation was larger than

the specific indirect effect through e-decision-making, with a BC 95% CI of -0.8093 to -0.0831. Further, the contrast between e-information sharing and e-decision-making had a 95% CI of -0.0653 to 0.5382, indicating that the indirect effect of e-information sharing and e-decision-making did not differed significantly, despite the fact that one was significantly different from zero and the other was not. Such "apparent paradoxes," according to Preacher and Hayes (2008) would occur "when one of the specific indirect effects involved in the contrast is not sufficiently far from zero" (p. 886). In sum, H8a was supported.

Total Effect of IV on DV		Direct Effect of IV on DV		Indirect Effects				
Coefficient	T-value	Coefficient	T-value			Point Estimate	BC 95% CI Lower	BC 95% CI Upper
Model 1: ICT Infrastructure as IV								
0.7655***	6.3298	0.2975**	2.9203		Total	0.4680	0.2888	0.6848
				Mediators	E-Info-Share	0.4376	0.2213	0.7081
					E-Consult	-0.1735	-0.4263	-0.0165
					E-Deci-Make	0.2039	0.0372	0.4500
				Contrast	C1	0.6110	0.2640	1.0617
					C2	0.2336	-0.0653	0.5382
					C3	-0.3774	-0.8093	-0.0831
Model 2: Human Capital as IV								
0.2734***	4.0264	0.1737**	3.2837		Total	0.0997	0.0137	0.1929
				Mediators	E-Info-Share	0.1089	0.0304	0.2129
					E-Consult	-0.0417	-0.1182	-0.0033
					E-Deci-Make	0.0326	0.0030	0.1027
				Contrast	C1	0.1506	0.0438	0.3049
					C2	0.0763	0.0033	0.1807
					C3	-0.0743	-0.2054	-0.0120
Model 3: Governance as IV								
0.0315	1.0794	0.0079	0.3550		Total	0.0236	-0.0130	0.0623
				Mediators	E-Info-Share	0.0219	-0.0074	0.0607
					E-Consult	-0.0045	-0.0318	0.0074
					E-Deci-Make	0.0062	-0.0106	0.0388
				Contrast	C1	0.0264	-0.0132	0.0855
					C2	0.0157	-0.0066	0.0450
					C3	-0.0106	-0.0640	0.0184

Note.
N=170. 5000 bootstrap samples. R^2=79% (Adjusted R^2=78%). IV: Independent Variable; DV: Dependent Variable; BC: Bias-Corrected Bootstrap; CI: Confidence Interval. **$p < 0.01$; ***$p < 0.001$ (2-tailed). 'Total' is the total relation between independent variable and dependent variable without the consideration of other variables. 'Contrast' indicates if the indirect effects could be distinguished in terms of magnitude. C1: E-Information Sharing (E-Info-Share) vs. E-Consultation (E-Consult). C2: E-Information Sharing vs. E-Decision-Making (E-Deci-Make). C3: E-Consultation vs. E-Decision-Making.

Table 2.   Summary of the tests of mediation effects.

Second, model 2 was examined, in which human capital was the independent variable with ICT infrastructure and governance treated as covariates. The results pertaining to human capital were similar to that of ICT infrastructure. Thus, H8b was supported. Next, model 3 was examined, in which governance was the independent variable with ICT infrastructure and human capital treated as covariates. As shown in the table, governance did not have a significant total effect on e-government development. While some researchers (e.g., Baron & Kenny 1986) suggested that a significant total effect of the independent variable on the dependent variable is a prerequisite for testing the mediating effects, others (e.g., Collins et al. 1998; MacKinnon 2000; Shrout & Bolger 2002) argued that this is not necessary for mediation to occur. Thus, we continued to examine the mediating effects of e-

information sharing, e-consultation, and e-decision-making. However, as shown in Table 2 (model 3), the total indirect effects were not significant, with a point estimate of 0.0236 and a 95% BC CI of -0.0130 to 0.0623. Examination of the specific indirect effects showed that neither of the e-participation variables were mediators, since their 95% CIs contained zero. Hence, H8c was not supported. Finally, the control variables, economic conditions (β=-0.003, n.s.) and regional differences (β=0.003, n.s.) were not significantly associated with e-government development.

5   DISCUSSION

Our findings raise several issues that deserve mention. First, the level of ICT infrastructure in a country significantly contributed to its e-participation and e-government development. Within e-participation, the effect of ICT infrastructure was positively associated with all the three dimensions of e-participation namely, e-information sharing, e-consultation, and e-decision-making. Further, the relationship between ICT infrastructure and e-government development was partially mediated by all the three dimensions of e-participation. Thus, the availability of robust, reliable and sound ICT infrastructure will not only facilitate the development of online public services (Shareef et al. 2011; Siau & Long 2009; Srivastava & Teo 2010) but also enhance the willingness of governments to engage its citizenry in e-government process. Second, human capital in a country was positively associated with its e-participation and e-government development. Within e-participation, while the effect of human capital facilitated e-information sharing and e-consultation, there was no relationship between human capital and e-decision-making. Further, the effect of human capital was stronger in e-information sharing than in e-consultation. While our study did not come to the expected conclusions with respect to the influence of human capital in a country on the dimensions of e-participation, given its positive associations, we suggest that stimulating the evolution of human consciousness and emergence of mentally self-conscious individuals in a country via education and training will ensure the development e-government systems and enhancement of e-participation for promoting citizen engagement. Third, our results indicated that governance in a country had little impact on e-government development and on all the dimensions of e-participation. Our results indicated that the technological and organizational contexts in the form of ICT infrastructure and human capital respectively were pivotal for e-government development and e-participation, compared to the environmental context, governance. Though several past studies (e.g., Moon 2002; Norris & Moon 2005; Srivastava & Teo 2010; Von Haldenwong 2004; West 2004) had suggested governance as a significant determinant and contributor to e-government development, our study did not elicit a similar result. While few studies (e.g., Singh et al. 2007) indicated a negative impact of governance on e-government development, our observation of positive relationships (though not statistically significant) of governance with e-participation and e-government development is refreshing as they are informative. Hence, it is gratifying that our findings are in the same direction as past studies (e.g., Moon 2002; Norris & Moon 2005, Srivastava & Teo 2010; Von Haldenwang 2004; West 2004).

Finally, turning to the relationship between e-participation and e-government development, our results indicated that of the three e-participation dimensions, e-information sharing and e-decision-making were positively associated with e-government development, and e-consultation was negatively associated. Further, between e-information-sharing and e-decision-making, the former had a stronger positive association with e-government development than the latter. One possible reason for variations in results may be due to the relative differences in perceived threats (e.g., implementation delays) associated with deployment of various e-participation initiatives. For instance, among the three kinds of e-participation initiatives, e-information sharing, concerned with sharing of information (on policies, programs, laws, mandates and other briefs on key public issues of interest) is easier for governments to deploy and hence, may not delay the process of e-government development. Therefore, governments will be more willing to share information and offer tools (e.g., web forums) for timely access and use of public information. On the other hand, e-consultation, though is viewed as a policy instrument that is intended to enhance citizen participation in policy-making (Whyte & Macintosh 2002), not only requires mature use of ICTs towards partnership between government and citizens (UN-Report 2005)

but may also introduce considerable delays in e-government process because such initiatives are concerned with convincing the citizens (a difficult task that may take longer time) who initiate debates and give feedbacks in policy-making and agenda setting. As a result, government agencies (though are customer-centric) may become less willing to (1) offer choice of public policy topics online for discussion; and (2) encourage citizens to participate in such discussions. However, this trend may not be true in the context of e-information sharing and e-decision-making. For instance, when citizens are willing to know the list of elected officials, laws and regulations, and other information of public interest, they always prefer to use governmental websites rather than the private blogs or forums. This may be due to the fact that citizens often trust their government and e-government websites (Teo et al. 2008-2009) when it comes to the need for accurate, relevant and timely information. Understanding this, governments will be more willing to offer appropriate information on their websites and tools for dissemination of such information. In a similar vein, when citizens wanted to partner with their governments for participatory and deliberative decision-making on public policy, they do so via appropriate official channels rather than privately-hosted online channels (e.g. Facebook and blogs). Realising this, governments will be more willing to support e-decision making by mature use of ICTs.

6 IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

Our study makes several contributions to theory and practice. To theory, we extend and enrich the TOE theory in three ways. First, via theoretical synthesis, we combine the attributes of the TOE theory with the citizen engagement perspective to study the phenomenon of e-government development. Second, while the TOE theory has served as a useful theoretical lens for understanding innovation adoption in firms, our study is one among the few studies to extend its theoretical arguments in the global context and to explore its usefulness at the macro-level. Third, while most studies applying the TOE theory have used primary survey data for analyses, our study is among the few studies to demonstrate its applicability by making an innovative use of publicly available archival data. In sum, this study heeds the call of researchers (e.g., Baker 2011) to extend and enrich TOE theory via approaches such as theoretical synthesis.

Our study also contributes to research on e-government in three ways. First, while much research has been carried out in all three streams of e-government research (i.e., evolution and development, adoption and implementation, and impact on stakeholders), most of them addressed research questions that are "micro" in orientation. That is, there is a paucity of research investigating the determinants of e-government development from a global perspective (Siau & Long 2009). Realizing the need for conducting cross-country quantitative empirical research, our study identified the contextual factors facilitating e-government development in a country. Second, by drawing from citizen engagement perspective, our study has strived to further our understanding as to why differing levels of e-government development among countries continues to prevail. Specifically, our findings suggest that the willingness of government (and its agencies) in a country to deploy e-participation initiatives will serve as a "mechanism" through which the maturity and level of sophistication of e-government projects could be managed. Third, by a deeper analysis of the mechanism of e-participation based on its dimensions (i.e., e-information sharing, e-consultation, and e-decision-making), our study emphasize that the willingness of governments to deploy e-participation initiatives varies based on the nature and purpose of the e-participation activity, which in turn, facilitates e-government development.

From a practical standpoint, our study makes two important contributions, especially for governments and policy makers. First, by identifying the antecedents of e-participation and e-government development in a country, our study not only helps them to understand why differing levels of e-participation and e-government development continues to prevail but also shows directions to increase government agencies' willingness towards deployment of appropriate e-participation initiatives, which in turn will lead to e-government development in a country. Second, our study suggests that not all e-participation initiatives may lead to e-government development. Specifically, our results indicated that while e-information sharing and e-decision-making were positively associated with e-government

development, e-consultation was negatively related. Hence, governments and policy makers should make concerted efforts for not only managing e-government development in the nation but also should be willing to implement relevant e-participation initiatives and constantly encourage citizens to make use of such initiatives. Consequently, our study provides a basis to policy makers in the public sector to garner support for e-participation initiatives in managing e-government development.

This study has three major limitations. First, we used archival data obtained from different sources. While primary data might have given us a better control over the definition of variables, it is less feasible for a small group of researchers to undertake a large scale cross-country data collection given the limited amount of resources and time. However, considering the fact that the data have been collected by reputable and authorized organizations and the indices have been formulated using suitable statistical procedures to ensure the reliability and validity, relying on these secondary sources provides a cost-effective way for conducting our study. Second, while e-participation scores for later years (e.g., 2010) are available, we intentionally used the scores from the UN Global E-Government Survey Report published in 2003 as the reports published in later years offered only an aggregate score for e-participation rather than scores for individual dimension within e-participation. However, considering the fact that e-participation is still in a "nascent state" (UN-Report 2010), we believe that the concern for direction and strength of the relationship among variables (due to the usage of e-participation data from earlier report) would be minimal. Third, we analyzed data only from the countries commonly available in all the primary sources. For instance, we could not include countries like Afghanistan, Cuba, Hong Kong, Taiwan, and so on as these countries were not commonly available in all the data sources. However, given that we have only seven main variables and sample size as 170, discarding few countries may not make a significant difference in the results. Further, bootstrapping approach to mediation with a sample size of 100 and above will detect fairly small R-square values (10%-15%) with up to 10 independent variables and a significance level of 0.05 (Hair et al. 2006). Despite these potential limitations, our study is one among the few studies with macro-level orientation striving to address the knowledge gaps described in the earlier sections of this paper.

Future research may focus on several directions. First, while our study has mainly focused on the antecedents of e-government development, future studies may consider examining its consequences (i.e., payoffs). Further, researchers may also consider studying both antecedents and consequences jointly by integrating them cohesively in a unified theoretical framework (e.g., Srivatsava & Teo 2010). Second, given the differences in relationships between the dimensions of e-participation and e-government development, future researchers may also test how the relationships are affected by introducing several contingency variables such as public institutions and macro-economy (e.g., Krishnan & Teo 2012; Srivatsava & Teo 2008). Third, future studies may also consider extending TOE theory by combining it with other theoretical perspectives such as RBV of the firm and testing them in public sector setting (i.e., in the context of e-government development). We believe that such extensions will have important implications for both theory as well as practice.

7   CONCLUSION

In conclusion, despite an extensive recognition on the importance of e-participation and e-government development in a nation as a predictor of its business competitiveness and economic performance, both research and practitioner communities knows relatively little with regards to managing e-government development. As an initial step to be taken towards raising awareness for the pivotal role of e-participation in managing e-government development, we have constructed and validated a theoretical model (specifically, a multiple mediation model) that examined the effects of the TOE contextual factors on e-participation and e-government development. In addition, we reasoned and demonstrated empirically the relationships of different dimensions of e-participation on e-government development, and the mediating role of e-participation variables on the relationships between TOE contextual factors and e-government development.

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