ELECTRONIC GOVERNMENT MATURITY: ANTECEDENTS AND CONSEQUENCES FROM A GLOBAL PERSPECTIVE

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Summary

The last decade has witnessed a continuous growth in electronic government (e-government) research, which can be broadly classified into three streams namely, (1) evolution and development; (2) adoption and usage; and (3) impact on stakeholders. While there is a vast amount of research carried out in all the three streams, most studies tend to be micro-level studies with reference to a particular region or country. Although such studies address important aspects of academic research, they cannot possibly address the broad macro-level (i.e., cross-country level) issues that are of great interest to practitioners and policymakers.

Motivated by the fact that there is a dearth of macro-level quantitative empirical studies, and predicated by the concern that there is a lack of cumulative theoretical development in e-government research to formulate such empirical studies, I investigate the concept of e-government maturity from a global perspective in my dissertation by studying its (1) antecedents; and (2) consequences. Specifically, my dissertation has three essays, which address each of the following questions:

1. What contextual factors in a country affect its e-government maturity? And, what are the mediating activities through which the contextual factors affect e-government maturity?
2. Can the effect of one contextual factor impact the relationship of another contextual factor in a country with its e-government maturity?
3. What are the payoffs of e-government maturity in a country? And, what are the mediating activities through which the value of e-government maturity could be realized?

Adopting a multi-theoretic approach, and by making innovative use of publicly available archival data, contribution of this dissertation lies in bringing out fresh insights and opening up new avenues for future research in the field of e-government. Utilizing the Technology-Organization-Environment (TOE) theory, the first essay identifies the contextual factors (in form of ICT infrastructure, human capital and governance) affecting e-government maturity in a country. Further, by drawing from the literature on citizen engagement, this essay proposes government's willingness to implement e-participation (in form of e-information sharing, e-consultation and e-decision-making) as the mediating activities through which the contextual factors affect e-government maturity. Empirical results exhibit the roles of the contextual factors on e-government maturity, and provide indications for managing e-government maturity by leveraging the effects of the contextual factors in enhancing government's willingness to implement appropriate e-participation initiatives.

Next, by grounding the discussion in the theory of complementarities, the second essay proposes governance (in form of six dimensions namely, voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption) as a contextual factor that enables the impact of another contextual factor (i.e., ICT infrastructure) on e-government maturity in a country. Empirical findings indicate that the assumptions about ICT infrastructure and its impact on e-government maturity could be stimulated by appropriate governance dimensions.

And lastly, the third essay conceptualizes an e-government impact model as having first-order association with corruption, which in turn relates to the higher-order outcome variables of economic prosperity and environmental degradation. Empirical findings demonstrate reduction of corruption as a mediating activity through which e-government benefits (in form of enhanced economic prosperity and prevention of environmental degradation) could be realized.

Taken together, the dissertation as a whole offers a global perspective with the insights drawn from cross-country data; and the three essays together advance the limited understanding pertaining to the concept of e-government maturity in terms of its antecedents and consequences.

Chapter 1

Introduction

With the rapid proliferation of Information and Communication Technologies (ICTs), *electronic government (e-government)* has gained increased attention from governments, policymakers, practitioners and academics. It is often heralded as the new way forward for the public-sector in many countries worldwide (Dada 2006). Particularly, the advancements in ICTs have fundamentally altered the nature of public administration, to the extent that ICTs now underpin the basic functioning of most public programs and contribute to the most significant innovations in the delivery of public-sector services (Borins 2001; Holden 2003). Examples of such services include (but not limited to) tax filing, identity management (including issuance and renewal of identity cards, driving licenses and passports), application for government jobs, determination of eligibility for government benefits, obtaining of birth certificates/marriage licenses, renewal of driver licenses, application for high school grants, registering to vote, and in some cases casting of votes (Baqir and Iyer 2010).

1.1. E-Government

E-government has been defined in multiple ways in the literature (Srivastava 2011). Taking an *operational perspective*, some researchers view e-government as the use of ICTs (especially the Internet) for improving the efficiency of government systems (Koh et al. 2005). Others realizing the transformational potential of ICTs view it from a broader *perspective of system reform and government process re-engineering* (Grant and Chau 2005). A few others explain it from the *perspective of user groups* namely, citizens, businesses and government agencies (Means and Schneider 2000; Srivastava and Teo 2007a). And others

use different terminologies such as digital government or virtual state to refer to the concept of e-government (Fountain 2001). In summary, e-government can be broadly defined as "the use of ICTs to enable and improve the efficiency with which government services are provided to citizens, employees, businesses and agencies" (Carter and Bélanger 2005, p. 5). It is not merely the computerization of government system, but a belief in the ability of technology to achieve high levels of improvement in various areas of government, thus transforming the nature of public-sector and the relationships between the government and its stakeholders (Dada 2006).

1.2. E-Government Maturity

The growing interest in e-government has raised several concerns pertaining to the concept of *e-government maturity*, defined as the extent to which a government in a country has established an online presence (Singh et al. 2007; UN-Report 2012), which is the subject of investigation in this dissertation. Prior research on e-government has conceptualized maturity using an evolutionary approach, and proposed models of maturity called as *stage models* (Andersen and Henriksen 2006; Layne and Lee 2001; Siau and Long 2005). These models are useful because they act as guides for practitioners, help employees to understand the growth and maturity of e-government, and can be used as a communication tool to explain e-government to third parties (Kim and Grant 2010).

According to these models, e-government is believed to progress through a series of stages either as a function of integration and complexity or as a function of increasing levels of online activity and customer centricity. From an operational point of view, the extent to which a government develops an online presence is characterized by the features (e.g., provision of online publications, access to various government-related databases, the use of audio and video, support for non-native languages or foreign language translation, disability

access, privacy policy and security features, support for digital signatures and credit card payments, provision of automatic email updates, website personalization, etc.) implemented on its websites (UN-Report 2010; 2012). Implicitly, it represents a continuum of developmental stages from publishing information to supporting transactions, with some countries having progressed further than the others. This conceptualization of e-government maturity is focused more on the technological sophistication than political activity (Kim and Grant 2010), and in particular, e-government maturity represents the demonstrated behaviour rather than just the idea of potential to achieve e-government, which is called as *e-government readiness* (Singh et al. 2007).

1.3. United Nation's Four-Stage Model of E-Government Maturity

While several stage models have been proposed by individual researchers (e.g., Layne and Lee 2001; Moon 2002; Siau and Long 2005) and institutions such as the Gartner Group (Baum and Di Maio 2000) and the United Nations (UN) (UN-Report 2010; 2012), I adopt the UN's four-stage model of e-government maturity (or online service development) in my dissertation as it is widely acknowledged as a framework of reference for countries implementing e-government. Further, the UN's stage model of e-government maturity is a synthesized model incorporating features and aspects (in form of stages) from the previously proposed stage models of maturity and online service development. For instance, Siau and Long (2005) highlight that "a corresponding relationship is discovered between the first stage of Moon's five-stage model and the first two stages of the UN's stage model…the second stage of Moon's model and the third stage of UN's model are similar" (p. 453). The four stages of maturity as defined in the UN's stage model of e-government maturity are (1) emerging presence; (2) enhanced presence; (3) transactional presence; and (4) connected presence. Figure 1.1 depicts the UN's four-stage model of e-government maturity.

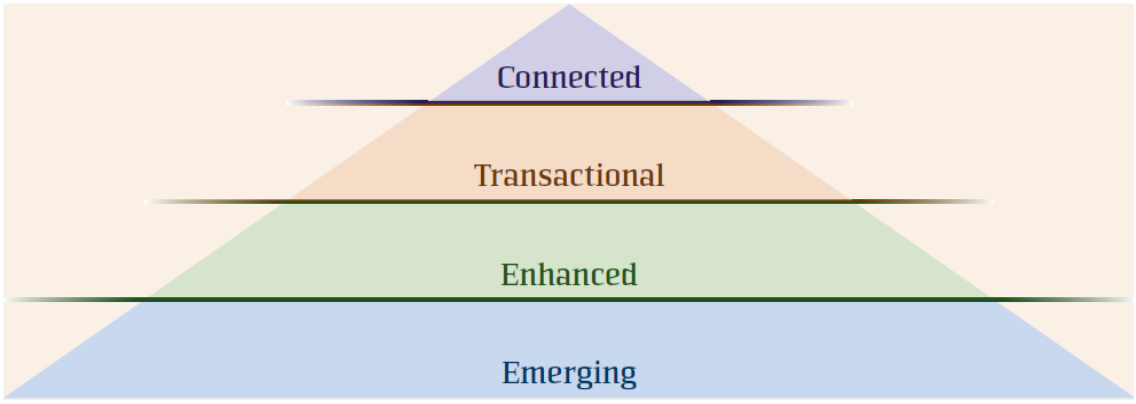

Figure 1.1: UN's Four-Stage Model of E-Government Maturity

The characteristics pertaining to each stage of maturity as described by the UN are as follows:

1. *Emerging Presence:*

In this stage, government websites are capable of providing information on public policy, governance, laws, regulations, relevant documentation and types of government services provided. They will have links to ministries, departments and other branches of government. Through this, citizens can easily obtain information on what is new in the national government and ministries and can follow links to archived information.

2. *Enhanced Presence:*

In this stage, government websites are capable of delivering enhanced one-way or simple two-way e-communication between government and citizen, such as downloadable forms for government services and applications. The sites will have audio and video capabilities and are multi-lingual, among others.

3. Transactional Presence:

In this stage, government websites are capable of engaging in two-way communication with their citizens. Usually some form of electronic authentication of the citizen's identity will be required to successfully complete the exchange. In this stage, government websites are capable of processing non-financial transactions, e.g.,

downloading and uploading forms, filing taxes online or applying for certificates, licenses and permits. They can also handle financial transactions, where money is transferred on a secure network to government.

4. Connected Presence:

In this stage, government websites are capable of changing the way governments communicate with their citizens, and e-services and e-solutions cut across the departments and ministries in a seamless manner. Further, information, data and knowledge can be transferred from government agencies through integrated applications. A country progressing high in this stage means that its government has moved from a government-centric to a citizen-centric organization, in which e-services are targeted to citizens through life cycle events and segmented groups to provide tailor-made services.

1.4. Two Key Concerns Pertaining to E-Government Maturity

To attain higher stages of maturity, governments across the globe are spending billions of dollars (Irani et al. 2007). To illustrate, a report released by Kable (a leading provider of public-sector research) indicate that the UK's central government spending on ICTs for the year 2007/2008 was £3.2 billion (and estimated to spend about £4.2 billion in 2010/2011) (Kable 2006). Similarly, Russian Federation spent around US$2.3 billion in 2006 for the informatization of its federal government bodies and other initiatives pertaining to e-government (UN-Report 2012). Another report by Pulliam (2005) mention that the United States (US) spent US$4.2 billion in 2004 (and estimated to spend about US$5.8 billion in 2009) for its e-government expenditures. A recent report released by the Office of Management and Budget indicate that the US government allocated a total of $11.75 million in 2013 for promoting transparency and accountability, and accelerating the cross-government innovation (USOMB-Report 2014). Gartner Inc.'s forecast report highlight that

the ICT-spending by different government agencies in India will increase 4.3% annually to $6.4 billion in 2014 (Gartner 2014). Yet, despite such significant investments, the failure rate of e-government projects remains high. For instance, a study by Heeks (2008) indicates that 35% of e-government initiatives are total failure whereby the initiatives were never implemented or were implemented but immediately abandoned. An identical conclusion was reached in Accenture's (2007) report in which it is documented that despite significant strides being taken by most countries in the provision of public e-services, most e-government endeavors have fallen short of their potential and failed to attain the stage of maturity. Further, a recent global study on e-government by the UN indicates that the progress of e-government growth and maturity remain uneven across many countries worldwide (UN-Report 2012). Despite numerous motivations and service targets underlying public institutions, furthering e-government and reaching the stage of maturity is a challenging task faced by government agencies in most countries. Hence, it is necessary to understand the determinants that affect e-government maturity. Further, it is also essential to understand the activities through which the determinants facilitate e-government maturity, and the factors that enables (or strengthens) the effect of such determinants on e-government maturity. Taken together, one of the main objectives **(Concern 1)** of this dissertation is *to understand the antecedents of e-government maturity.*

Concurrent with the aforementioned challenging task faced by governments worldwide, they (including policymakers, practitioners and academics) are also intrigued by the payoffs from e-government as it is widely acknowledged to provide an efficient and an effective channel for government agencies to facilitate their internal administration and to improve their external services (Siau and Long 2006). Particularly, while the growth and maturity of e-government is expected to bring in several benefits such as (1) cost reduction and efficiency gains; (2) improved quality of service delivery to its citizens and businesses;

(3) transparency, anticorruption, accountability and democratization; and (4) national and business competitiveness (Kim et al. 2009; Ndou 2004; Srivastava and Teo 2007a; Von Haldenwang 2004), studies indicate that its value is not fully realized due to "the fuzziness and diversity of the intended goals of e-government projects" (Srivastava 2011, p. 108). For instance, Chan et al. (2008) indicate that the purported benefits of e-government continue to be an elusive dream for many governments worldwide. Another study by Heeks (2008) highlight that 50% of the e-government initiatives are partial failure, in which major goals for the initiative were not attained and/or there were significant undesirable outcomes. Further, Srivastava (2011) indicate that a major dilemma faced by e-government researchers in understanding if e-government is providing the promised returns is the variable on which the impact of e-government should be measured (e.g., financial return, social returns, returns on investment, etc.). Hence, it is necessary to understand what payoffs could be actually derived from e-government maturity, and the activities through which the value of e-government maturity could be realized. Taken together, the second objective **(Concern 2)** of this dissertation is *to understand the consequences of e-government maturity.*

1.5. Review of Extant Literature

Motivated by the importance of understanding the antecedents and consequences of e-government maturity, I next review the extant literature related to the aforesaid twin concerns. I use the E-Government Reference Library (Version 9.4), prepared by Hans Jochen Scholl (University of Washington iSchool) as a starting point to select relevant articles. This reference library contains 6,148 references of predominantly English language, peer-reviewed work spanning several disciplines namely, (1) Business/Management; (2) Public Administration; (3) Political Science; (4) Computer Science; (5) Library and Information Studies; (6) E-Government; and (7) Information Systems (IS).

In particular, given that the e-government research field is more than a decade old, I examine the explanatory literature of e-government (comprising conceptual, qualitative and quantitative studies) rather than the prescriptive and descriptive literature[1] (Reece 2006), as they offer a causal understanding of the concept of interest, often supported by quantitative or/and qualitative analysis. Further, these studies provide a clearer picture of how the concept functions, how critical variables interact and how the concept ties into larger literature. Table 1.1 summarizes the review of key research on e-government. In the table, I highlight the following details: (1) concern (i.e., antecedent or consequence or both); (2) research approach (theory and methodology); (3) level of analysis (i.e., micro-level, focusing on a particular country or region; or macro-level, spanning several countries across the globe); and (4) key findings.

[1]*Prescriptive studies* are speculations about the concept of interest, which calls attention to the concept during its infancy, possibly encouraging others into the dialogue and raising questions that influence the research funding agenda. On the other hand, *descriptive studies* are benchmarking studies, practical in orientation, which offer best practices and help develop classification schemes aimed at furthering the understanding of the concept in a comprehensive manner.

Table 1.1: Review of Key Research on E-Government

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Abdallah and Fan (2012)	Antecedents	Conceptual study with the proposed framework qualitatively tested in the empirical context of Sudan	Micro	• Presents a framework for assessing e-government maturity in developing countries to facilitate decision-making regarding technical infrastructure, management, values and strategies; • By applying the framework in the empirical context of Sudan, results show that Sudan's e-government is still in its early stages and the main advancements has been made on technology readiness.
Ahn (2011)	Antecedents	Survey	Micro	• Examines the development of e-communication applications in the US municipalities; • Findings indicate that the political environment, bureaucratic structure and the nature of applications influence the likelihood of development of e-communication applications.
Ahn and Bretschneider (2011)	Consequences	Case study	Micro	• Reports an innovative e-government experiment by a local government in Seoul, South Korea; • Findings indicate that e-government applications possess political properties that can be applied effectively by the political leadership as instruments to improve control over the government bureaucracy as well as to enhance essential government accountability and transparency.
Akesson et al. (2008)	Consequences	Conceptual study	Not Applicable (NA)	• Presents a conceptual framework connecting e-government development and service orientation; • The framework is based on literature review of 27 articles, three monographs and one edited volume focusing on service orientation and e-government.
Akingbade et al. (2012)	Consequences	Case study	Micro	• Evaluates the impact of electronic land administration as an e-government policy initiative in Nigeria; • Findings suggest that it is essential to pay attention to provisions through which e-government can support the reduction of country-specific problems and promote urbanization.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Alghamdi et al. (2011)	Antecedents	Conceptual study	NA	• Proposes a framework comprising of seven dimensions of ICT readiness assessment for governments: e-government organizational ICT strategy, user access, e-government program, ICT architecture, business process and IS, ICT infrastructure, and human resource; • Framework defines the organizational requirements that are necessary for e-government to resolve the delay of ICT readiness in public-sector organizations in developing countries.
Alhyari et al. (2012)	Consequences	Case study	Micro	• Presents a case study about the use of Six-Sigma model to measure customer satisfaction and quality levels achieved in e-services that were launched by public-sector organisations in a developing country (Jordan); • Findings suggest that implementing Six-Sigma as a measurement-based strategy improves e-customer service in a newly launched e-service program.
Almutairi (2010)	Consequences	Case study	Micro	• Examines the impact of e-government on back office functions (measured in terms of IS usage) in the context of the Kuwaiti e-government project. • Findings indicate that e-government has no impact on the back office functions.
Al-Sebie and Irani (2005)	Antecedents	Conceptual study with the proposed framework qualitatively tested in the context of two government organisations	Micro	• Propose a conceptual model that identifies the importance, categorization and presentation of the strategies for overcoming technical and organizational challenges in developing a transactional e-government system.
Arpaci (2010)	Antecedents	Case study	Micro	• Identifies the technological innovation process, stakeholders of the process, sources of innovation, driving forces of innovation, and obstacles of innovation for the Turkish public-sector; • Findings indicate that external relations with stakeholders enhance the innovation process; further, legislation, lack of qualified staff, approval authority, and bureaucracy are the main obstacles of technological innovation.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Asogwa (2011)	Antecedents	Stage Model of Online Service Development; Analysis based on publicly available archival data from selected African countries.	Micro	• Studies the level of preparedness of selected African governments in using ICTs to enhance the range and quality of services provided to the citizen, and determines the extent and continuous improvement efforts of African leaders towards the attainment of connected government; • Findings indicate that many African governments have demonstrated their willingness to apply ICTs in their public administration, but a majority of them are at the emerging and enhanced stages.
Azad et al. (2010)	Antecedents	Literature on governance and institutions; Cross-sectional analysis based on publicly available archival data from 60 countries.	Macro	• Develops and tests a model of e-government development using the governance institutional climate as represented via democratic practices, transparency of private-sector corporate governance, corruption perception and the free press; • Findings indicate that the level of development of national governance institutions can explain the level of e-government development over and above economic and technical variables.
Badri and Alshare (2008)	Consequences	Survey of 1859 top executives belonging to various industries in Dubai	Micro	• Proposes and tests a model of business value of e-government; • Findings indicate that firm's information technology (IT) capabilities were positively associated with e-government use, enhanced firm intelligence generation and firm profitability.
Bakry (2004)	Antecedents	Conceptual study	NA	• Explores how the transition of e-government services (from conventional government services) happens; • Findings indicate that five elements namely, (1) strategy; (2) technology; (3) organization; (4) people; and (5) environment, are important in the transition.
Baldersheim and Øgård (2008)	Antecedents	Innovation Theory; Survey.	Micro	• Develops a model of innovation aiming at capturing typical features of local government as a setting for innovations in e-governance. • Findings indicate that motivational, enabling and predisposing factors act as determinants of e-government innovation. Also, national context was found to be a significant determinant of e-government innovation.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Banerjee and Chau (2004)	Consequences	Conceptual study with the proposed framework tested using a series of cases	Micro	• Proposes a framework for analyzing e-government convergence capability in developing countries and applies it to analyze the prospects of convergence in a few selected developing countries; • Findings indicate that the quality and range of government information and services vary significantly across the countries, attributed in some measure to the e-leadership capability of the countries.
Baqir and Iyer (2010)	Antecedents	Stage Model of Online Service Development; Comparative analysis based on publicly available archival data.	Micro	• Examines several developed and developing countries from six continents on the basis of their past and current e-government initiatives, discuss goals and objectives as well as benefits and challenges of e-government; • The countries examined include: the US and Canada (North America); the United Kingdom and Germany (Europe); India and Pakistan (Asia); Australia and New Zealand (Australia); Kenya and Nigeria (Africa); Argentina and Brazil (South America).
Basu (2004)	Antecedents	Case study	Micro	• Examine the legal and infrastructure issues related to e-governance from the perspective of developing countries; • Describes the cases of a few developing countries that have been successful in providing legal framework.
Bertot et al. (2010)	Consequences	Case study	Micro	• Explores the potential impacts of information and ICTs – e-government and social media – on cultural attitudes about transparency; • Findings indicate that e-government applications have the potential to enhance transparency.
Bigdeli and de Cesare (2011)	Antecedents	Primary data drawn from semi-structured interviews	Micro	• Examines the barriers to e-government service delivery in the empirical context of Iran; • Findings indicate that there are four barriers to e-government service delivery: (1) strategic; (2) technological; (3) policy; and (4) organizational.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Bowonder et al. (2005)	Consequences	Literature on e-governance (i.e., e-administration, e-citizens and e-services, and e-society); Case study.	Micro	• Investigates the application of ICTs in e-governance by studying a case of an e-governance initiative in a fishermen community in the union territory of Pondicherry, India; • Findings indicate that a number of benefits such as increased access to market, improved productivity, improved decision-making, and effective utilization of time by proper planning were identified after the introduction of ICTs.
Castelnovo (2013)	Consequences	Analysis based on publicly available archival data	Micro	• Evaluates the outcomes of e-government diffusion at the local-level in Italy, considering whether the implementation determined positive effects at the country-level in terms of an increase in the value generated for different stakeholders; • Findings based on the data from national and international secondary sources showed that no positive effects emerged.
Centeno et al. (2005)	Consequences	Conceptual study	NA	• Proposes a prospective view that defines e-government as a tool for better government in its broadest sense; • According to this view, e-government is placed at the core of public management modernization and reform, where technology is used as a strategic tool to modernize structures, processes, regulatory frameworks, human resources and the culture of public administrations to provide better government and increased public value.
Chan et al. (2011)	Antecedents	Resource-Based View (RBV) and Enactment Concept; Case study.	Micro	• Proposes a process model of resource enactment to theorize how organizational resources were mobilized for successful e-government implementation; • Findings indicate that environmental climate at each phase gave rise to a particular focal capability, which was developed through the symbiotic enactment of a focal resource in conjunction with other complementary resources.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Chan et al. (2008)	Antecedents	Case study	Micro	• Through an interpretive analysis of various e-government-related initiatives undertaken by the Singapore government, this study proposes a framework (comprising of four components namely, information content, ICT infrastructure, e-government infrastructure and e-government promotion) that can be used as a descriptive tool to organize and coordinate various e-government initiatives, or be used as a prescriptive structure to plan and strategize e-government implementation.
Chan and Pan (2008)	Antecedents	Stakeholder Theory; Comparative case study of two e-government systems implementation within a single government agency in Singapore.	Micro	• Examines the significance of user engagement in e-government development and implementation; • Findings indicate that (1) the engagement of salient intermediary; (2) inculcating strategic convergence of interest; (3) coalescing coercion and conviction; and (4) sustained engagement of users are essential in the development and implementation of e-government systems.
Chen et al. (2006)	Antecedents	Conceptual study	NA	• Proposes an implementation framework that identifies key factors (e.g., network access, network policy, national culture, organizational culture, governance, organizational structure, etc.) for successful e-government implementation.
Cho and Choi (2004)	Consequences	Case study	Micro	• Examines the impact of e-government on corruption by studying the adoption of an anti-corruption system called OPEN (Online Procedures ENhancement for civil application) in the Seoul Metropolitan Government; • Findings indicate that both the citizens who used the system and the city officials who were involved in managing the system had favourable opinions on its corruption control effect.
Das et al. (2009)	Antecedents	Literature on trust; Cross-sectional analysis based on publicly available archival data from 140 countries.	Macro	• Examines the impact of trust on the level of e-government; • Finding indicates that trust as measured by ethnic and religious diversity is a significant factor affecting e-government usage (after controlling for the level of economic development and other socio-economic factors).

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Decman et al. (2010)	Consequences	Case study	Micro	• Examines the use of ICTs in government procedures and its impact on cost-efficiency of government; this study focuses on investment in ICTs to simplify tax procedures in Slovenia; • Findings indicate that ICT expenditure is higher than cost savings for tax administration and taxpayers.
Devadoss et al. (2003)	Antecedents	Structuration Theory; Case study.	Micro	• Discusses how a government agency in Singapore developed and implemented an e-procurement system; • Findings indicate that in the initial stage of any e-government projects, having a tele-cooperation perspective would be useful as it provides a holistic view, focusing on the support of computer-mediated cooperation in a comprehensive sense.
Ebbers and van Dijk (2007)	Antecedents	Minnesota Innovation Research Program's Innovation Pathway Model; Conceptual study.	NA	• Proposes a model of resistance and support to e-government innovations; • The proposed model suggests several indicators of resistance and support to e-government innovations namely, gestation, urgency, approval, top management involvement, adaptation of innovation, organizational structure and policy, clarification, resources, and interoperability of IS
Eom (2013)	Antecedents	Literature on institutions; Case study.	Micro	• Examines the institutional arrangements for e-government development in the US and Korea; • Findings demonstrate how institutional arrangements for e-government development in terms of the concentration of authority based on differing legal frameworks and the development of diverse and powerful managerial tools for control and coordination contributed to producing different outcomes with regard to building Business Reference Models (BRM) in the two nations.
Eriksson and Goldkuhl (2013)	Antecedents	Design science case study	Micro	• Examines the preconditions for public-sector e-infrastructure development; • Findings indicate that six types of preconditions are essential for the development of the e-infrastructure: legal, economical, organizational, technical, informational and contractual.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Esteves and Joseph (2008)	Antecedents and Consequences	Conceptual study	NA	• Presents an ex-post framework for assessment of e-government projects, which contains three dimensions: (1) e-government maturity level; (2) stakeholders; and (3) assessment levels.
Evans and Yen (2005)	Consequences	Conceptual study	NA	• Presents a framework for e-government implementation and impacts. • The framework suggests that e-government implementation should meet initial citizen resistance and require development expenses; further, e-government implementation has substantial domestic and international impacts, which include cultural and social adaptation issues, trans-border data flow issues, and the potential for the development of a global digital divide.
Fagan (2006)	Antecedents	Case study	Micro	• Explores the ways in which business process management approaches can help city and civic leaders manage the significant social and technical changes that will be needed to achieve successful e-government development.
Fan (2013)	Antecedents	Literature on managerial mechanisms; Survey.	Micro	• Examines the relationship between managerial determinants and horizontal integration of Chinese municipal e-government; • Findings indicate that experience in general management, reforming authority, experience in projects, and legal regulation affects horizontal integration through the indirect effects of data integration, and business and IT integration.
Farooquie (2011)	Antecedents	Analysis based on publicly available archival data	Micro	• Investigates e-government readiness scenario in India and UAE vis-à-vis other countries in Asia; • Findings indicate that the Indian scenario of e-governance has not been up to the mark when compared with other countries in the region; the UAE, however, seemed to be performing well above the world's average; further, findings indicate that economic structure matters in its e-government readiness.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Feller et al. (2011)	Consequences	Literature on value co-creation; Case study.	Micro	• Explores how open innovation strategies can transform public administration by examining how a network of municipalities in Sweden transforms value creation and service delivery by collaborating with each other and with external parties to accelerate the creation and exploitation of innovation; • Findings indicate that open innovation typologies can (1) transform the organization of the municipalities; and (2) help them deliver high quality co-created services to citizens.
Fielden and Malcolm (2010)	Antecedents	Social Informatics Theory; Conceptual study with the proposed framework tested in the empirical context of New Zealand.	Micro	• Presents an e-readiness maturity model that indicates to what extent local governments, both urban and rural have met the national strategy guidelines; • Findings indicate that the end-users of e-government are affected by (1) inequitable infrastructure provision; and (2) a shift in emphasis and ownership of technical knowledge and skills required in gaining access to government services.
Fined (2011)	Antecedents	Literature on socio, political, economic and technological dimensions of e-government maturity; Panel data analysis.	Macro	• Examines the influence of environmental factors on e-government maturity in transition economies and developing countries (TEDC); • Findings indicate that the availability of quality human resource, technological infrastructure, innovative capacity, wealth, rule of law and transparency levels are important factors that positively impact e-government maturity in TEDC.
Flak et al. (2009)	Consequences	Conceptual study and research agenda	NA	• Acknowledges that the concept of value in relation to e-government is insufficiently discussed in the literature; • It is proposed that structured approaches to benefits realization in combination with increased focus on (public) value can be fruitful avenues for future research.
Flak and Rose (2005)	Antecedents	Stakeholder Theory; Conceptual study.	NA	• Reviews Stakeholder Theory and investigates its potential in relation to e-government; • Findings indicate that citizens are key stakeholder group for e-government implementation and their knowledge is a vital resource.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Gallego-Álvarez et al. (2010)	Antecedents	Literature on public body and political factors; Cross-sectional analysis based on publicly available archival data from 81 countries.	Macro	• Examines if the determining factors of municipal e-government are common to a worldwide municipal view; • Findings indicate that the level of improvement in e-government is strongly linked to municipalities that have a significant level of technological development.
Ganapati (2011)	Antecedents	Case study	Micro	• Analyses trends in adoption of public participation geographical information systems (PPGIS) by local governments; • Findings indicate that there exists limited use of PPGIS for the higher levels of participation such as decision-making due to institutional barriers.
Garcia-Murillo (2013)	Consequences	Agency Theory; Panel data analysis.	Macro	• Examines if the governments' web presence can help to reduce perceptions of corruption; • Findings indicate that the governments' web presence has reduced perceptions of corruption around the world.
Garcia-Sanchez (2011)	Antecedents	Cross-sectional analysis based on publicly available archival data from 189 countries	Macro	• Examines the determinants of the development of e-participatory government; • Findings indicate that conservative ideology, administration style and the pressure exerted by the interest groups are the key factors for the development of e-participatory government.
Gascó and Roy (2006)	Consequences	Case study	Micro	• Examines the impacts of e-government on administration and democracy in a multi-level governance environment (i.e., Catalonia, Spain, and Ontario, Canada); • Findings indicate that the pursuit of e-government by a state and a province is intertwined with the federalist structures.
Gauld et al. (2010)	Consequences	Case study of Australian and New Zealand government agencies	Micro	• Examines the responsiveness of e-government by doing a comparative analysis of response times to fictitious citizen e-mail requests; • Findings indicate that authorities at the local-level of government were more responsive than central government authorities, and the overall pattern was a somewhat negative one, with frequent incidence of slow or incorrect response or no response at all.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Ghapanchi et al. (2008)	Antecedents	Conceptual study	NA	• Proposes a framework (comprising of 30 key strategic factors) for successful implementation of e-government; • The framework indicates that e-government needs to be planned by a holistic view to reduce the associated risks and prevent extra wastage of time and money.
Gichoya (2005)	Antecedents	Case study	Micro	• Examines the factors affecting successful implementation of ICT projects in government in the empirical context of Kenya; • Findings indicate that its key determinants are finance, infrastructure, attitudes, coordination and strategy.
Goldkuhl (2009)	Antecedents	Literature on regulations, social actions and institutions; Case study of a Swedish e-government project.	Micro	• Explores the contrast between (1) the rhetoric and visions in e-government policy; and (2) practical problems in e-government development; further, different kinds of regulations were investigated (i.e., general administrative regulations, domain-specific regulations and e-government policies) and their roles as barriers and enablers were identified. • Findings indicate that the value balancing between different sets of regulations is seen as a key issue with regards to how to establish an e-government with a high degree of process innovation; further, this study advocates for a value balancing process characterized as a systemic approach with identifying and prioritizing basic values.
Gonzalez et al. (2007)	Antecedents	Case study	Micro	• Analyses the evolution and status of Spanish e-government and deduce a series of basic principles for its success; • Findings indicate that e-government lays emphasis on technology; however, the internal processes through which the services are offered needs careful reengineering.
Grant and Chau (2005)	Antecedents	Conceptual study with the proposed framework tested using a series of cases	Micro	• Proposes an e-government framework that allows for the identification of e-government strategic agenda and application initiatives that transcends country-specific requirements; • The proposed framework is tested by studying it in the context of e-government programs of three countries namely, the US, the UK and Malaysia.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Grimmelikhuij-Sen (2009)	Consequences	Experimental case study	Micro	• Examines how the transparency of government agencies influences its trust in forms of competence, benevolence and honesty; • Findings indicate that the relationship between the transparency and the dimensions of trust is not unequivocal; while perceptions of benevolence and honesty are affected by the level of transparency, perceptions of competence remain stable.
Grimsley and Meehan (2008)	Consequences	Literature on public value; Conceptual study with the proposed framework tested using two cases in England.	Micro	• Proposes a comprehensive framework focusing on citizens' and clients' experiences of service provision and service outcomes as contributors to public trust; • Findings indicate that trust increased in situations where people felt that an e-government service enhanced their sense of being well-informed, gave them greater personal control, and provided them with a sense of influence.
Ha (2013)	Antecedents	Secondary data obtained from academic and non-academic (government websites, annual reports, etc.) literature	Micro	• Identifies the critical success factors of e-government implementation in Singapore; • Findings indicate that for an e-government implementation to be successful, it is necessary to balance technology adoption, citizen engagement and effective public administration.
Haigh (2004)	Consequences	Literature on IS and environmental sustainability; Case study.	Micro	• Examines the ecological impacts of e-government; • Findings indicate that e-government innovations export resource consumption; further, the economic growth enabled by e-government could erode eco-efficiencies; additionally, the study found a measurement gap, leaving organizations handicapped in their decision-making by the inability to account for dissimilar ecological impacts without difficulty.
Haigh and Griffiths (2008)	Consequences	Literature on IS and environmental sustainability; Case study.	Micro	• Examines the impact of e-government on environmental sustainability outcomes in three Australian cases; • Four strategic layers pertaining to e-government were analyzed, and the findings indicate that positive environmental outcomes could be sought in high-level e-government strategies.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Heeks (2002)	Antecedents	Conceptual study with the proposed framework tested using an African case	Micro	• Proposes a framework which indicates that stakeholders must be sensitised to the large gaps that often exists between project design and African public-sector reality.
Hin and Subramaniam (2005)	Antecedents	Secondary data obtained from academic and non-academic (government websites, annual reports, etc.) literature	Micro	• Examines Singapore's e-government implementation policies, and suggests critical factors for successful e-government implementation; • Factors include both demand side (e.g., public awareness and the willingness of citizens to adopt e-services) and supply side (e.g., vision, strategies, leadership commitment, the extent to which government agencies collaborate and work with each other, technical infrastructure, and resources) determinants.
Huang (2007)	Antecedents	Political and technological theories, e-government stage model and literature; Case analysis.	Micro	• Presents a comprehensive analysis of the US counties' adoption of e-government and the functions of the websites; • Findings indicate that the US counties' e-government adoption is associated with socioeconomic factors; the functionalities of the US county e-government portals are significantly related to six socioeconomic factors: (1) population, % change; (2) language other than English spoken at home; (3) home ownership rate; (4) median value of housing units; (5) median household income; and (6) federal funds and grants.
Ifinedo and Singh (2011)	Antecedents	Contingency Theory and RBV; Panel data analysis.	Macro	• Examines the determinants of e-government maturity in the Transition Economies of Central and Eastern Europe (TEECE); • Findings indicate that technological infrastructure, rule of law and human capital development are its significant determinants.
Jaeger (2002)	Antecedents	Literature on constitutional principles and federalism; Case study.	Micro	• Examines how constitutional principles, specifically the doctrines of federalism and the separation of powers, relate to e-government policies and practices; • Findings indicate that the move toward e-government, emphasizing the simplification of access to and the horizontal and vertical integration of government information and services, must be considered with regard to the doctrines of federalism and the separation of powers.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Joia (2008)	Consequences	Intellectual Capital Theory; Case study.	Micro	• Examines the impact of government-to-government (G2G) endeavors on intellectual capital of a public agency (in Brazil) in terms of human capital, organizational capital, external capital and innovation capital; • Findings indicate that significant associations exist between the G2G endeavors and all forms of intellectual capital.
Karunasena and Deng (2012)	Consequences	Case study	Micro	• Identifies the critical factors for evaluating the public value of e-government in Sri Lanka from the perspective of the delivery of public services and the efficiency of public organizations; • Findings indicate that (1) the delivery of quality services; (2) user-orientation of information and services; (3) efficiency and responsiveness of public organizations; and (4) contributions of public organizations to the environmental sustainability are the critical factors for evaluating the public value.
Karunasena et al. (2011)	Consequences	Conceptual study with the proposed framework tested using Sri Lankan e-government initiative	Micro	• Develops a conceptual framework for evaluating the public value of e-government (in Sri Lanka) in terms of four dimensions namely, (1) delivery of public services; (2) achievement of outcomes; (3) development of trust; and (4) effectiveness of public organizations; • Findings indicate that the public value of e-government in Sri Lanka is unsatisfactory in all the dimensions; lack of e-services, security threat to public information in public organizations, low adoption of ICTs in government and low uptake of available e-government initiatives are the key reasons for its poor performance.
Ke and Wei (2004)	Antecedents	Case study	Micro	• Describes how Singapore managed to get most of its public-sector services online; • Findings indicate that Singapore received essential support from the government to improve its ICT as well as online governing; it achieved rapid progress in providing services through the Internet based on its integrated e-government strategy.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Kibsi et al. (2001)	Consequences	Conceptual study with the proposed framework tested in the case of TradeNet	Micro	• Presents a model which highlights that e-government system implementation can improve and enhance the service delivery; • This argument is illustrated through the case of TradeNet (an electronic data interchange network for trade administration), a system for dealing with licenses to do business.
Kim and Grant (2010)	Antecedents	Intellectual Capital Management Model and Capability Maturity Model Integration; Conceptual study.	NA	• Proposes a framework for assessing the maturity level of e-government, which is composed of four input areas (human capital, structural capital, relational capital and IT investment) and five maturity stages (web presence, interaction, transaction, integration and continuous improvement); • The framework outlines how to define and assess key attributes of e-government activities and provides a balanced view between input factors (resources) and results (maturity stages).
Kim et al. (2009)	Consequences	Institutional Theory; Case study.	Micro	• Documents and evaluates the development of an anti-corruption system called OPEN in the Seoul Metropolitan Government; • Findings show that in implementing OPEN, the regulatory dimension was most effective, and strong leadership (as in many IS implementations) was crucial to its success.
Koh et al. (2006)	Antecedents	Conceptual study	NA	• Examines how IT, strategic planning processes and people interact in an emerging e-government environment; • Findings indicate that the government agencies must evaluate how strategic e-government plans are developed, communicated and integrated into the work environment; further, the study highlights that without the proper understanding of the importance of e-government initiatives, employees do not place high value on e-government initiatives.
Koh et al. (2005)	Antecedents	Stage Theory of IS; Action research incorporating a series of interviews, focus groups and a web-based survey.	Micro	• Through an in-depth case study with the leadership and employees of the City of Denton (Texas), this research explicates the evolutionary path and highlights key enablers (i.e., technological, organizational, cultural and political factors) that facilitate the progression.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Kottemann (2009)	Antecedents	Cross-sectional analysis based on publicly available archival data	Macro	• Examines the effects of technological readiness, institutional readiness and fiscal readiness on the extent of online government services availability across countries; • Findings indicate that significant effects are found in a path model with direct effects of technological readiness and institutional readiness on e-government, and indirect effects of fiscal readiness on e-government mediated through technological readiness.
Kottemann (2011)	Antecedents	Cross-sectional analysis based on publicly available archival data	Macro	• Examines whether synergy between technological infrastructure and institutional efficacy is a key enabler of national e-government initiatives; • Findings indicate that synergy between technological infrastructure and institutional efficacy is a key enabler of national e-government initiatives.
Kovačić (2005)	Antecedents	Hofstede's Model of National Culture; Cross-sectional analysis based on publicly available archival data from 95 countries.	Macro	• Examines whether the differences in the worldwide e-government levels could be explained by cultural variables; • Findings indicate that national cultural indicators have a moderate impact on the e-government levels; within four dimensions, individualism and power distance were the significant variables that explain differences in e-government.
Lakka et al. (2013)	Antecedents	Socio-Economic Theory; Panel data analysis.	Macro	• Identifies the factors contributing to e-government growth; • Findings indicate that countries with advanced technologies, education, technological openness, and effective governance and regulation have higher e-government growth.
Lee et al. (2005)	Antecedents	Case study	Micro	• Presents a cross-national comparison of current e-government practices among the leading countries namely, the US, the European Union and some advanced ICT countries in Asia; • Findings indicate that e-government practices mirror each country's ICT diffusion and government efforts toward political reform.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Li (2003)	Antecedents	Survey and interviews	Micro	• Explores the development of e-government in the public-sector agency in Scotland; • Identifies key issues that need to be addressed if e-government has to fulfill its potential and transform the way public-sector organizations manage their activities and interact with the customers and citizens.
Liao and Jeng (2005)	Antecedents	Conceptual study	NA	• Presents a model for e-government maturity that describes four progressive stages: informational e-government, transactional e-government, process integrated e-government and service integrated e-government; • Identifies integration challenges, which includes the need for common multi-agency objectives, citizen relationship management, collaborative process design, IT systems integration and usability engineering.
Lio et al. (2011)	Consequences	Agency Theory; Panel data analysis.	Macro	• Examines the impact of the Internet adoption on corruption; • Findings indicate that while causality running from the Internet adoption to corruption reduction can be established, the causality between the Internet adoption and corruption is bi-directional; the estimation results showed that the effects of the Internet adoption on corruption reduction were statistically significant but not too substantial.
Liou (2008)	Consequences	Conceptual study	NA	• Examines the impact of e-government development on China's administrative reform; • Based on the e-government development issues and the Chinese administrative problems, the study analyzes opportunities and challenges associated with the e-government development.
Ma et al. (2005)	Consequences	Case study	Micro	• Examines the linkage between e-government initiatives and economic development in China; • Findings indicate that e-government initiatives act as vehicles that support economic development through an increasingly transparent and decentralized administration.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Macueve (2008)	Consequences	Case study	Micro	• Examines the linkage between e-government initiatives and its ability to offer good governance; • Though a case of the Land Management Information System in Mozambique, findings indicate that there exists a big gap between the discourse and practice of e-government for good governance in the context of developing countries.
Mahmood (2004)	Consequences	Agency Theory; Case study.	Micro	• Examines the impact of e-government on corruption; • Findings indicate that ICTs has the potential to reduce corruption when adequately used to alter the principal–agent–client relationship in the public-sector–citizen interface through e-government.
Manoharan (2013)	Antecedents	Survey of county administrators	Micro	• Studies the determinants of county e-government in the US; • Findings indicate that institutional, contextual and socioeconomic factors determine the adoption of e-government.
Maureen Brown (2007)	Consequences	Literature on technological innovation (in specific, Models of Maturation and Adaptation); International City/County Management Association (ICMA) surveys.	Micro	• Examines the utility of maturational models in understanding the achievement of e-government benefits; • Findings indicate that although a maturational model may be helpful for describing aggregate efforts, it is less useful in understanding the potential for individual gains; further, it was found that rapid advances, nonlinear activities and permeable boundaries were important determinants of achieving the benefits of technological innovation.
McNeal et al. (2003)	Antecedents	Literature on innovation and diffusion; Secondary data analysis.	Micro	• Examines why some states in the US have embraced digital government more extensively than others; • Findings indicate that e-government implementation is driven by legislative professionalism and, to a lesser extent, state professional networks, rather than citizen demand.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Melitski et al. (2005)	Antecedents	Stage Model of E-Government Development; Secondary data analysis	Macro	• Evaluates the practice of digital government in large municipalities worldwide; • The study (utilizing 92 measures) assesses 84 cities from around the world; findings indicate that Seoul, Hong Kong, Singapore, New York and Shanghai are the top five large cities for providing digital government opportunities to citizens online; further, there are differences in the digital government capabilities among the 30 developed nations belonging to the Organization for Economic Cooperation and Development (OECD) and lesser developed (non-OECD) nations.
Miyata (2011)	Consequences	Case study	Micro	• Examines the impact of e-government development in the context of least developed countries; • Through a case of the vehicle registration service in Bhutan, findings indicate that e-government initiatives have the ability to offer good governance and improved service quality.
Moon (2002)	Antecedents and Consequences	E-Government Framework; Survey of 1471 respondents.	Micro	• Examines the state of municipal e-government implementation, and assesses its perceptual effectiveness; • Findings indicate that while e-government has been adopted by many municipal governments, it has not obtained many of the expected outcomes (cost savings, downsizing, etc.) that the rhetoric of e-government has promised. • Findings also suggest that there are some widely shared barriers (lack of financial, technical and personnel capacities) and legal issues (such as privacy) to the progress of municipal e-government, and also indicate that city size and manager-council government were positively associated with the adoption of a municipal website as well as its longevity.
Nabafu and Maiga (2012)	Antecedents	Case study	Micro	• Proposes a model of success factors for implementing local e-government in transitioning country, Uganda; • The model identifies key factors namely, financial resource mobilization, ICT infrastructure, training, sensitization, trust and social political factors for successful implementation.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Nengomasha et al. (2010)	Antecedents	Case study	Micro	• Discusses the problems associated with the failure of e-government in African and other developing countries; • Findings indicate that inadequate data systems, underdeveloped legislative, institutional and human capacity including leadership, inadequate technological infrastructure and poor records management as the causes for failure (in Namibia).
Norris and Moon (2005)	Antecedents and Consequences	Literature on IT applications in public administration; Longitudinal examination using data from two nationwide surveys.	Micro	• Examines the local government adoption of e-government, website sophistication, perceived impacts of e-government and barriers to the adoption and sophistication of e-government; • Findings indicate that e-government adoption at the grassroots is progressing rapidly (if measured solely by deployment of websites); however, the movement toward integrated and transactional e-government is progressing slowly.
O'Donnell et al. (2003)	Antecedents	Case study	Micro	• Explores the issues to be addressed in using e-government effectively to transform public-sector organisations in Ireland; • Through the cases of Revenue Online Service and Integrated Service Centers, findings indicate the need for addressing two key issues for successful transformation: (1) need for understanding and support by senior management; and (2) the willingness and ability to adopt new ways of working.
Olphert and Damodaran (2007)	Antecedents	Socio-Technical Systems Theory; Conceptual study.	NA	• Analyzes citizen engagement initiatives and presents an extension of Mumford's ideas about the participation process; • Findings indicate that e-government development is currently characterized by a technocentric approach with minimal engagement of citizens, and stress the need for adoption of a sociotechnical, participatory approach to obtain the benefits.
Omar (2011)	Antecedents	Cross-sectional analysis based on publicly available archival data	Macro	• Explores the relationship of national culture values and practice to e-government readiness; • Findings indicate that gender egalitarianism, institutional collectivism, performance orientation and uncertainty avoidance values were found to be the key determinants of e-Government readiness.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Palanisamy (2004)	Antecedents	Conceptual study	NA	• Examines the issues and challenges in e-governance development; • Issues in e-governance development are: e-governance trends, e-governance evolution, e-governance usage, e-governance websites, e-government services, connectivity, e-governance readiness, citizen participation, e-governance technology, change management and funding; • Challenges in e-governance development are: trust building in e-governance, ICT management, and privacy and security.
Ray (2011)	Antecedents	Survey	Micro	• Examines the barriers to e-government implementation in developing country context, India; • Findings indicate that e-government failures are due to the lack of proactive user engagement in system development and deployment processes; further, the study adds that central to e-government success and failure is the amount of change between 'where we are now' and 'where the e-government project wants to get the organization/country.'
Rose (2005)	Antecedents and Consequences	Conceptual study	NA	• Proposes a global diffusion model of e-governance; • Model suggests that laggards have the potential to catch up with leaders; further, e-government development is influenced by the degree of modern resources; and the diffusion of the Internet promotes government efficiency and the virtual linkage of disparate public agencies, reduces corruption, and increases bureaucratization.
Rose and Grant (2010)	Antecedents	Conceptual study	NA	• Proposes a conceptual framework that contributes to the theoretical understanding of e-government initiative planning and implementation; • The proposed model serves as a guide for dealing with the issues that impact the probability of success of e-government programs.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Sagsan and Yildiz (2010)	Antecedents	Case study and archival data analysis	Micro	• Examines e-government development in the Turkish Republic of Northern Cyprus; • Findings indicate that (1) e-government applications are still in their infancy; (2) there is a lack of an adequate IT infrastructure, qualified IT personnel, and meaningful and useful content on government websites; (3) digital divide hinders e-government development; and (4) a new organizational structure that can plan and coordinate e-government implementation has to be established.
Sarikas and Weerakkody (2007)	Antecedents	Case study	Micro	• Explores the challenges that a local government in the UK faces when implementing fully integrated electronic public services; • Findings indicate that the issues of technical, political and organizational origin are of equal importance when implementing fully integrated electronic public services.
Schwester (2009)	Antecedents	ICMA survey	Micro	• Studies what the differences are between municipalities that have comprehensive e-government platforms and those that do not, and to what extent do certain barriers explain such differences. • Findings indicate that e-government adoption is a function of financial, technical and human resources; municipalities with higher operating budgets, more full-time IT staff and technical resources are more likely to implement a comprehensive e-government platform; political support is also key and fairly robust determinant of municipal e-government adoption.
Seng et al. (2010)	Antecedents	Grid and Group Cultural Theory of Mary Douglas; Case study.	Micro	• Proposes a framework that examines cultural barriers and enablers that impedes or facilitates e-government implementation in Malaysia; • Findings indicate that cultural cosmologies can have both enabling and constraining characteristics and that cultural pluralism in the enabling forms of hierarchism, egalitarianism and individualism is essential for the successful implementation and operation of e-government services.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Shackleton et al. (2004)	Antecedents	Case study	Micro	• Studies the factors impacting e-government maturity in a local government agency in Australia; • Findings indicate that resistance to radical organizational change is a key factor affecting the growth and maturity of e-government.
Shanab and Harb (2013)	Antecedents	Cross-sectional analysis based on publicly available archival data	Macro	• Examines the linkage between human rights and e-government readiness in a country; • Findings indicate a significant positive association between e-government readiness and human rights.
Sharifi and Zarei (2004)	Antecedents	Conceptual study with the proposed framework tested in the empirical context of Iran	Micro	• Proposes a tailored model for e-government implementation in Iran; • The model is mainly based on Iran's government structure and complexities.
Siau and Long (2006)	Antecedents	Growth Theory and Regional Development Theory; Cross-sectional analysis based on publicly available archival data from 173 countries.	Macro	• Investigates the factors explaining e-government development; • Findings indicate that significant differences in e-government development exist between countries with respect to income level, development status and region.
Siau and Long (2009)	Antecedents	Growth Theory and Human Capital Theory; Cross-sectional analysis based on publicly available archival data from 160 countries.	Macro	• Investigates the factors affecting e-government development; • Findings indicate that when the higher are the levels of ICT and human development, the higher will be the level of e-government development.
Singh et al. (2007)	Antecedents	Cross-sectional analysis based on publicly available archival data from 178 countries	Macro	• Investigates the prevalence of affluent countries using a model in which GDP and e-government maturity relationship is mediated by ICT infrastructure, human capital and governance; • Findings indicate that most of the positive influence of GDP on e-government maturity occurs through ICT infrastructure.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Srivastava (2011)	Consequences	Conceptual study	NA	• Develops a framework for future research on e-government impact; • The model delineates three government areas (i.e., policymaking, program administration and compliance) and five citizen areas (i.e., financial, political, social, ideological and stewardship) where e-government may create an impact. • The framework indicates that the impact in these areas is created because of two major value-generating mechanisms: enhancements in efficiency and enhancements in effectiveness; further, the impact is created at different levels of analyses: local, state and central governments.
Srivastava and Teo (2007a)	Consequences	IT impact literature; Cross-sectional analysis based on publicly available archival data from 99 countries.	Macro	• Examines the relationship of e-government development with the first-order government process efficiency parameters (resource spending efficiency and administrative process efficiency), and subsequently examines the association of them with the two second-order dimensions of national performance (reduction of social divide and business competitiveness); • Findings indicate a significant association of e-government development with both the first-order government efficiency parameters; further analysis revealed significant relationships of government efficiency parameters with the dimensions of national performance.
Srivastava and Teo (2007b)	Antecedents	Technology-Organization-Environment (TOE) Theory; Cross-sectional analysis based on publicly available archival data from 115 countries.	Macro	• Examines the facilitators of e-government development in a country; • Findings highlight the significance of national technological (ICT infrastructure) and organizational (human capital) contexts for e-government development; findings also show that national environment (institutional and macroeconomic) is not a significant facilitator for e-government development.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Srivastava and Teo (2008)	Consequences	RBV; Cross-sectional analysis based on publicly available archival data from 113 countries.	Macro	• Examines the relationships of e-government development and e-participation with national business competitiveness, and the moderating roles of human capital, public institutions and macro-economy on them; • Findings highlight a strong association of e-government development as well as e-participation with national business competitiveness; further, while human capital and public institutions positively moderated the relationship of e-government development with national business competitiveness, macro-economy marginally moderated the relationship in the negative direction; also, the relationship between e-participation and national business competitiveness was positively moderated only by human capital.
Srivastava and Teo (2010)	Antecedents and Consequences	TOE Theory and IT impact literature; Cross-sectional analysis based on publicly available archival data from 113 countries.	Macro	• Examines the facilitators of e-government and e-business development in a country and their impact on national economic performance; • Findings indicate that ICT infrastructure is important for both e-government and e-business; further, human capital emerged as a significant facilitator for e-government but not for e-business, whereas institutional framework and macro-economy appeared to be the key enablers for e-business, but not for e-government; findings also demonstrate the significant and intertwined roles of e-government and e-business in enhancing the national economic performance.
Sun et al. (2006)	Consequences	Survey	Micro	• Examines the effectiveness of an e-government initiative (i.e., e-official-document system) deployed in Pingdong county in Taiwan; • Findings indicate that the e-official-document system has a positive impact on user satisfaction, individual performance and the performance of subordinate agencies.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Taipale (2013)	Antecedents	Survey	Micro	• Examines the effect of socio-demographic, economic and geographical factors on the relationship between the time spent on the Internet and e-government services use; • Findings indicate that gender and income moderate the link between the time spent on the Internet and e-government service use; further, education, children, income and the size of the place of residence also have major effects on the use of the government's e-services.
Tan and Pan (2003)	Antecedents	Stakeholder Theory and the literature on Customer Relationship Management (CRM); Case study.	Micro	• Examines the concept of managing e-transformation by performing an in-depth investigation of an e-government initiative; • The process model delineates how an organization in the public-sector adapts to the dynamic customer relations brought about by e-transformation and identifies the governing factors for successful organization and stakeholder relations.
Teicher and Dow (2002)	Antecedents	Analysis of archival reports and survey of Australian public managers	Micro	• Provides an account on the nature and extent of e-government in Australia at the three levels of government, and examines some of the major obstacles to the realization of the potential of e-government; • Findings indicate that in Australia, the implementation of e-government is still largely focused at the information-only level with its spread being uneven (particularly in rural and remote areas); results also indicate that the increasing popularity of portals is paradoxical with a proliferation of portals at each level of government rather than a single point of entry.
Teo and Koh (2010)	Antecedents	Stage Model of Online Service Development; Case study.	Micro	• Examines a successful information management project called the Online Business Licensing Service that aims to streamline the various licenses (managed by different agencies) required to operate businesses in Singapore; • Findings suggest that multi-agency projects are inherently more complex than single agency projects, and greater attention is needed to align stakeholders' interests and encourage involvement in the project.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Thompson et al. (2005)	Consequences	Literature on business value of e-government; Survey of 100 small firms in three states of the US (Maryland, New York and Washington).	Micro	• Proposes and tests a model of business value of e-government to small firms; • Two dimensions of e-government use (search-oriented and transaction-oriented) were measured and the effects of three types of e-government benefits on small firms' profitability were tested; findings indicate that small firms' IT capabilities were positively associated with the use of e-government services; search-oriented use of e-government was positively related to enhanced intelligence generation, new business development and time savings; and, the relationship between e-government use and profitability was mediated by firms' intelligence generation.
Valdes et al. (2011)	Antecedents	Conceptual study with the proposed framework tested in the empirical context of Chile	Micro	• Proposes a model named E-Government Maturity Model, which integrates the assessment of technological, organizational, operational and human capital capabilities using a multi-dimensional, holistic and evolutionary approach; • The model is field tested by expert public officials from several government agencies, and applied to a selection of 30 public agencies in Chile, generating the first formal measurements, assessments and rankings of their readiness for e-government.
Van Veenstra and Janssen (2012)	Consequences	Literature on public value management (PVM); Case study.	Micro	• Investigates a T-government effort in the Netherlands to find whether it realizes the objectives of PVM; • Findings indicate that T-government does not achieve the objectives of PVM; rather, T-government is found to be concerned with setting up governance among the different parties in a network to allow for collaboration.
Van Veenstra et al. (2010)	Antecedents	Organization and Structuration Theories; Case study.	Micro	• Investigates e-government induced change; • Findings indicate that the aspects of organizational structure changes when implementing e-government, which are actually affected by human action within its social structure.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Von Haldenwang (2004)	Antecedents	Conceptual study	NA	• Examines the concept of e-government development and proposes a conceptual framework for successful e-government development; • The framework highlights the importance of educated and trained citizens and sound institutional base as the major enablers for e-government development.
Weerakkody et al. (2009)	Antecedents	Case study	Micro	• Examines e-government implementation in Sri Lanka based on the lessons from the UK; • Findings indicate that e-government initiatives in developing countries can be effectively implemented if experiences acquired by developed countries are shared proficiently.
Weerakkody et al. (2012)	Antecedents	Case study	Micro	• Examines the strategies adopted by the UK and Slovakia in the context of e-government implementation; • Findings indicate that the perspectives on e-government vision, strategy, focus and related organizational change influence the implementation and diffusion of e-government in developed and transition economies in Europe.
Welch and Pandey (2007)	Consequences	Analysis based on data obtained from the National Administrative Studies Project (Phase II)	Micro	• Examines the interaction between bureaucratic red tape and intranet usage in state human service agencies; • Findings indicate that intranet usage is associated with reduction in red tape (i.e., technology push).
West (2004)	Consequences	Survey	Micro	• Assesses the consequences of e-government for service delivery, democratic responsiveness and public attitudes; • Findings indicate that the e-government revolution has fallen short of its potential to transform service delivery and public trust in government.
Yang et al. (2009)	Consequences	Survey	Micro	• Examines the linkage between e-government development and local tourism; • Findings indicate that the development of the application of e-government promotes local tourism for small and local cities and counties throughout the US.

Authors	Concern	Theory/Methodology	Level of Analysis	Key Findings
Yang and Rho (2007)	Consequences	Secondary data and government reports	Micro	• Evaluates the impact of e-government on service accessibility, efficiency, economy, effectiveness and other end-outcomes; • Findings indicate that although some e-government programs have demonstrated efficiency and economy gains, many are still struggling to make a business case; effectiveness and other end-outcomes are even more difficult to achieve.
Ya Ni and Ho (2005)	Antecedents	Case study	Micro	• Discusses the challenges of implementing e-government services; • Findings indicate that sound business plan, revenue streams, incremental logics in technology decisions and effective management of the expectations and power balance facilitate e-government implementation.
Yu (2008)	Antecedents	Theory of Human Agency; Conceptual study.	NA	• Formulates a model of governmental process to discuss the problems in transforming government into a digital organization; • The model suggests that while the advancements in IT facilitate the coordination, public agents will face structural uncertainty when they consider adopting new technology.
Yun and Opheim (2010)	Antecedents	Survey	Micro	• Examines the determinants of diffusion of e-government in the American states; • Findings indicate that executive power, leadership and professional networks affect e-government diffusion.
Zaied et al. (2007)	Antecedents	Survey	Micro	• Presents an e-readiness assessment model to examine the perceptions towards ICT environment in public organisations in Kuwait; • Findings indicate that human skills, infrastructure and connectivity are the essential conditions for its e-readiness.
Zhao (2013)	Antecedents	Hofstede's Model of National Culture; Cross-sectional analysis based on publicly available archival data from 84 countries.	Macro	• Examines whether national culture has an impact on e-government development; • Findings indicate that individualism, power distance and long-term orientation are significantly correlated with e-government development.

1.5.1. Summary of the Literature Review

A total of 138 research articles (related to the aforementioned concerns) spanning several research disciplines were identified. Of 138 research articles, while 88 articles (64%) focused on the concern of antecedents, 45 (33%) of them focused on the concern of consequences. Remaining 5 articles (3%) focused on both antecedents and consequences. While it is evident from the above review that a great deal of research has been conducted, following facts are interesting and noteworthy.

First, of 88 articles that focused on antecedents, 56 (64%) of them were micro in orientation. That is, they addressed the concern of antecedents with reference to a particular country or region. For instance, a study by Shackleton et al. (2004) examined the factors impacting e-government maturity in the context of a local government agency in Australia. Further, only 18 out of 88 articles (20%) were macro in orientation offering a global or a cross-country perspective. For instance, a study by Zhao (2013) investigated the impact of national culture on e-government development at the cross-country level spanning 84 countries. Likewise, of 45 articles that focused on the concern of consequences, 35 (78%) of them were again micro in orientation, and only 4 articles (8%) were macro in orientation. For instance, a study by Thompson et al. (2005) examined the consequences of e-government development to small firms in three states of the US namely, Maryland, New York and Washington. Alternatively, a study by Srivastava and Teo (2007a) investigated the relationship of e-government development with the government process efficiency parameters and national performance spanning 99 countries.

Second, of 138 research articles included in the review, a vast majority of them were either conceptual in nature or case studies. That is, while 56 articles (41%) were case studies (micro in orientation), 22 articles (16%) were conceptual in nature. Within the 56 case study articles, 32 were on the concern of antecedents (e.g., Tan and Pan 2003) and 24 articles were

on the concern of consequences (e.g., Ahn and Bretschneider 2011). Also, within the 22 conceptual studies, 14 were on antecedents (e.g., Alghamdi et al. 2011), 6 were on consequences (e.g., Srivastava 2011) and 2 were on both (e.g., Esteves and Joseph 2008). In addition, the review indicates that 9 other studies (within the total 138 articles) were also conceptual studies with the proposed frameworks or models empirically tested using a single case study or a series of cases (e.g., Valdes et al. 2011). Although both conceptual and case studies address important aspects of academic research with conceptual studies laying theoretical foundations for future empirical exploration, and case studies capturing the richness of context in which the researched object is embedded; they both cannot possibly address the broad macro-level issues pertaining to e-government (Srivastava and Teo 2008; 2010). Taken together, it is evident that there is a *dearth of macro-level quantitative empirical studies offering a global perspective of e-government maturity in terms of its antecedents and consequences.*

Macro-level studies are important for two key reasons: *first,* cross-country level studies offering a global perspective not only provides policy implications (Dewan et al. 2010) but also renders new and insightful ideas in the fields of practice (Singh et al. 2007); and *second,* they are helpful in identifying and understanding the aggregate patters of e-government (UN-Report 2012). Though the need for conducting macro-level quantitative empirical studies is largely stressed in past literature (e.g., Siau and Long 2006; Srivastava and Teo 2010), researchers (with few exceptions) often ignored or overlooked them for two reasons. *First,* there is a lack of cumulative theoretical development in e-government research to develop an empirical study addressing macro-level issues (Heeks and Bailur 2007). The review (see Table 1.1) also indicates that most articles lack strong theoretical foundations. Of 138 sampled articles, only 55 (39%) grounded their discussions in theory. *Second,* collecting large scale primary data (spanning several countries) to empirically test the formulated

research model offering a global perspective is constrained by the amount of resources and time available for conducting such research (Srivastava and Teo 2008). Predicated by these two concerns, I adopt a multi-theoretic approach and make innovative use of publicly available archival data in my dissertation to study the following two broad research questions (RQ):

RQ.I: *What are the antecedents of e-government maturity in a country?*

RQ.II: *What are the consequences of e-government maturity in a country?*

1.6. Structure of the Dissertation

This dissertation is structured as five connected themed but three separate essays associated with two key concerns of e-government maturity namely, (1) antecedents; and (2) consequences. As shown in Table 1.2, while the first three **themes (I, II and III)** are associated with the antecedents of e-government maturity in a country **(Concern 1)**, the last two **themes (IV and V)** are related to its consequences **(Concern 2)**. The three essays have separate theoretical underpinnings and implications contributing to the emerging body of knowledge in the field of e-government research and practice. All the three essays have same levels of analyses (i.e., cross-country level), and the dissertation as a whole offers a global perspective with the insights drawn from cross-country data.

Table 1.2: Summary of Themes and Related Questions Addressed in this Dissertation

Essay	Themes	Concerns	Questions Addressed
1	I	Antecedents	What contextual factors in a country affect its e-government maturity?
	II	Antecedents	What are the mediating activities through which the contextual factors in a country affect its e-government maturity?
2	III	Antecedents	Can the effect of one contextual factor impact the relationship of another contextual factor in a country with its e-government maturity?
3	IV	Consequences	What are the payoffs of e-government maturity in a country?
	V	Consequences	What are the mediating activities through which the value of e-government maturity could be realized?

The *first essay* titled "Contextual Factors, Government's Willingness to Implement E-Participation, and E-Government Maturity: Testing a Multiple-Mediation Model," utilizes the TOE theory to identify the TOE contextual factors in a country namely, ICT infrastructure, human capital and governance affecting its e-government maturity **(Theme I).** Further, by drawing from the literature on citizen engagement, this essay propose government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-making as the mediating activities through which the TOE contextual factors in a country affects its e-government maturity **(Theme II).** A multiple-mediation model is formulated and empirically tested using archival data from 183 countries.

The *second essay* titled "Does Governance Matter? Investigating the Moderating Effects of Governance on ICT Infrastructure and E-Government Maturity," draws from the theory of complementarities and propose governance (in form of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption) as a contextual factor that enables the impact of the other contextual factor (i.e., ICT infrastructure) in a country on its e-government maturity **(Theme III)**. The research model is then empirically tested utilizing archival data from 174 countries.

The *third essay* titled "Examining the Relationship of E-Government Maturity with Corruption, Economic Prosperity and Environmental Degradation" conceptualizes an e-government impact model as having first-order association with corruption **(Theme V)**, which in turn relates to the higher-order outcome variables of economic prosperity and environmental degradation **(Theme IV).** This essay proposes reduction of corruption as a mediating activity through which e-government benefits (in form of enhanced economic prosperity and prevention of environmental degradation) could be realized. The research model is then empirically tested using archival data from 103 countries.

Each essay in this dissertation is self-contained in terms of literature review, hypotheses development, and implications for research and practice. The essays together contribute to the emerging body of knowledge in the field of e-government research and practice. The research hypotheses for all the three essays are summarized in Table 1.3. Further, Tables 1.4, 1.5 and 1.6 presents the research questions, methods and variables, and key findings for Essays 1, 2 and 3 respectively.

Table 1.3: Three Essays at a Glance: Summary of Research Hypotheses

Essay	Hypotheses
1	**Direct Effects:** **H1.1:** ICT infrastructure in a country is positively associated with its e-government maturity. **H1.2:** ICT infrastructure in a country is positively associated with its government's willingness to implement (a) e-information sharing; (b) e-consultation; and (c) e-decision-making. **H1.3:** Human capital in a country is positively associated with its e-government maturity. **H1.4:** Human capital in a country is positively associated with its government's willingness to implement (a) e-information sharing; (b) e-consultation; and (c) e-decision-making. **H1.5:** Governance in a country is positively associated with its e-government maturity. **H1.6:** Governance in a country is positively associated with its government's willingness to implement (a) e-information sharing; (b) e-consultation; and (c) e-decision-making. **H1.7:** Government's willingness to implement e-participation (a: e-information sharing; b: e-consultation; and c: e-decision-making) in a country is positively associated with its e-government maturity. **Mediated Effects (H1.8):** TOE contexts' (a: ICT infrastructure; b: human capital; and c: governance) effects on e-government maturity are partially mediated by government's willingness to implement e-information sharing, e-consultation and e-decision-making.
2	**Moderated Effects:** **H2.1:** Voice and accountability positively moderates the relationship between ICT infrastructure and e-government maturity in a country. **H2.2:** Political stability positively moderates the relationship between ICT infrastructure and e-government maturity in a country. **H2.3:** Government effectiveness positively moderates the relationship between ICT infrastructure and e-government maturity in a country. **H2.4:** Regulatory quality positively moderates the relationship between ICT infrastructure and e-government maturity in a country. **H2.5:** Rule of law positively moderates the relationship between ICT infrastructure and e-government maturity in a country. **H2.6:** Control of corruption positively moderates the relationship between ICT infrastructure and e-government maturity in a country.
3	**Direct Effects:** **H3.1:** E-government maturity in a country is negatively associated with its corruption. **H3.2:** E-government maturity in a country is positively associated with its economic prosperity. **H3.3:** E-government maturity in a country is negatively associated with its environmental degradation. **H3.4:** Corruption in a country is negatively associated with its economic prosperity. **H3.5:** Corruption in a country is positively associated with its environmental degradation. **Mediated Effects (H3.6):** The relationships of e-government maturity with its (a) economic prosperity and (b) environmental degradation are partially mediated by its corruption.

Table 1.4: Essay 1 at a Glance: Research Questions, Variables, Statistical Methods and Main Findings

Research Questions	Variables and Methods	Main Findings
Contextual Factors, Government's Willingness to Implement E-Participation, and E-Government Maturity: Testing a Multiple-Mediation Model		
RQ1.1: What TOE contextual factors facilitate government's willingness to implement e-participation in a country and its e-government maturity? **RQ1.2:** What is the relationship between government's willingness to implement e-participation in a country and its e-government maturity? **RQ1.3:** How does government's willingness to implement e-participation in a country mediate the effects of its TOE contextual factors on e-government maturity?	**Dependent Variable:** 1. E-government maturity (Source: UN E-Government Survey Reports) **Independent Variables:** 1. ICT infrastructure (Source: UN E-Government Survey Reports) 2. Human capital (Source: UN E-Government Survey Reports) 3. Governance (Source: World Bank's Worldwide Governance Indicators database) **Mediating Variables:** 1. Government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-making (Source: UN E-Government Survey Reports) **Control Variables:** 1. Economic condition of a nation (Source: World Bank's World Development Indicators database) 2. Regional difference (Source: UN's Classification) **Statistical Method:** 1. Preacher and Hayes (2008) method for assessing and comparing indirect effects (using INDIRECT macro)	1. While ICT infrastructure and human capital were positively associated with government's willingness to implement e-participation in a country and its e-government maturity, governance had little impact on them. 2. Government's willingness to implement e-participation in a country had significant associations with its e-government maturity. Specifically, of three dimensions of e-participation, government's willingness to implement e-information sharing and e-decision-making were positively associated with e-government maturity, and its willingness to implement e-consultation was negatively associated. 3. While government's willingness to implement e-information sharing, e-consultation and e-decision-making partially mediated the influences of ICT infrastructure and human capital on e-government maturity, the relationship between the levels of governance and e-government maturity was not mediated by government's willingness to implement e-participation.

Table 1.5: Essay 2 at a Glance: Research Questions, Variables, Statistical Methods and Main Findings

Research Questions	Variables and Methods	Main Findings
Does Governance Matter? Investigating the Moderating Effects of Governance on ICT Infrastructure and E-Government Maturity		
RQ2: Can the effect of one contextual factor (i.e., governance in form of its six dimensions namely, (1) voice and accountability; (2) political stability; (3) government effectiveness; (4) regulatory quality; (5) rule of law; and (6) control of corruption) impact the relationship of another contextual factor (i.e., ICT infrastructure) in a country with its e-government maturity?	**Dependent Variable:** 1. E-government maturity (Source: UN E-Government Survey Reports) **Independent Variable:** 1. ICT infrastructure (Source: UN E-Government Survey Reports) **Moderating Variables:** 1. Governance dimensions in form of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption (Source: World Bank's Worldwide Governance Indicators database) **Control Variables:** 1. Economic condition of a nation (Source: World Bank's World Development Indicators database) 2. Human capital (Source: UN E-Government Survey Reports) 3. Regional difference (Source: UN's Classification) **Statistical Method:** 1. Moderated multiple regression	1. Political stability, government effectiveness, rule of law and control of corruption moderated the relationship of ICT infrastructure and e-government maturity positively. 2. Voice and accountability moderated the relationship of ICT infrastructure and e-government maturity negatively. 3. The relationship of ICT infrastructure and e-government maturity was not contingent on regulatory quality.

Table 1.6: Essay 3 at a Glance: Research Questions, Variables, Statistical Methods and Main Findings

Research Questions	Variables and Methods	Main Findings
Examining the Relationship of E-Government Maturity with Corruption, Economic Prosperity and Environmental Degradation		
RQ3: How is e-government maturity in a country related with its corruption, economic prosperity and environmental degradation?	**Dependent Variables:** 1. Economic prosperity (Source: World Bank's World Development Indicators database) 2. Environmental degradation (Source: World Bank's World Development Indicators database) **Independent Variable:** 1. E-government maturity (Source: UN E-Government Survey Reports) **Mediating Variable:** 1. Corruption (Source: Transparency International's Corruption Perception Index Reports) **Control Variables:** 1. Exports (as a % of total GDP) (Source: World Bank's World Development Indicators database) 2. Manufacturing (as a % of total GDP) (Source: World Bank's World Development Indicators database) 3. Urban population (as a % of total population) (Source: World Bank's World Development Indicators database) 4. Population aged 15 to 64 (in %) (Source: World Bank's World Development Indicators database) 5. Regional difference (Source: UN's Classification) **Statistical Methods:** 1. Partial Least Squares (PLS) 2. Preacher and Hayes (2008) method for assessing and comparing indirect effects (using INDIRECT macro)	1. E-government maturity in a country was negatively associated with its corruption. Further, corruption in a country was negatively associated with its economic prosperity and positively associated with its environmental degradation. 2. While e-government maturity in a country was not significantly associated with its economic prosperity and environmental degradation, findings indicated that its value could be realized indirectly via its impacts on corruption.

Chapter 2

Essay 1: Contextual Factors, Government's Willingness to Implement E-Participation, and E-Government Maturity: Testing a Multiple-Mediation Model

Abstract

In this essay, utilizing the Technology-Organization-Environment (TOE) theory and the literature on citizen engagement, I formulated a multiple-mediation model examining (1) the TOE contextual factors affecting government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-making in a country and its e-government maturity; and (2) the mediating role of government's willingness to implement e-participation in a country on the relationships between its TOE contextual factors and e-government maturity. Specifically, I hypothesized that information and communication technology (ICT) infrastructure (representing the Technology context), human capital (representing the Organization context) and governance (representing the Environment context) has both direct and indirect relationships with e-government maturity through the mediating roles of government's willingness to implement e-participation. Based on archival data from 183 countries, results showed that while ICT infrastructure and human capital were positively associated with government's willingness to implement e-participation and e-government maturity, governance was not significantly associated with them. Also, government's willingness to implement e-participation had significant associations with its e-government maturity. Specifically, of three dimensions of e-participation, government's willingness to implement e-information sharing and e-decision-making were positively

associated with e-government maturity, and its willingness to implement e-consultation was negatively associated. Further, government's willingness to implement e-information sharing, e-consultation and e-decision-making partially mediated the influences of ICT infrastructure and human capital on e-government maturity. Results also indicated that the relationship of governance with e-government maturity was not mediated by government's willingness to implement e-participation. Findings contribute to the theoretical discourse on e-government by highlighting the roles of the TOE contextual factors on government's willingness to implement e-participation and e-government maturity, and provide indications for practice in managing e-government maturity by (1) enhancing government's willingness to implement appropriate e-participation initiatives; and (2) leveraging the effects of the TOE contextual factors on government's willingness to implement e-participation and e-government maturity.

2.1. Introduction

E-government maturity represents the extent to which a government in a country has established an online presence (Singh et al. 2007; UN-Report 2012). Maturity of e-government in a country is expected to bring in several benefits such as (1) cost reduction and efficiency gains; (2) improved quality of service delivery to its citizens and businesses; (3) transparency, anticorruption, accountability and democratization; and (4) national and business competitiveness (Kim et al. 2009; Ndou 2004; Srivastava and Teo 2007a; Von Haldenwang 2004). With the objective of achieving the aforementioned benefits and to further the growth and maturity of e-government, governments across the globe are spending a massive amount of resources. To illustrate, in 2006, Russian Federation spent around US$2.3 billion for the informatization of its federal government bodies and other initiatives pertaining to e-government (UN-Report 2012). Likewise, a report by Pulliam (2005) mention that the United States (US) spent US$4.2 billion in 2004 (and estimated to spend about

US$5.8 billion in 2009) for its e-government expenditures. A recent report released by the Office of Management and Budget indicate that the US government allocated a total of $11.75 million in 2013 for promoting transparency and accountability, and accelerating the cross-government innovation (USOMB-Report 2014). Gartner Inc.'s forecast report highlight that the ICT-spending by different government agencies in India will increase 4.3% annually to $6.4 billion in 2014 (Gartner 2014). Yet, despite such significant investments, the failure rate of e-government projects remains high. For instance, a study by Heeks (2008) indicates that 35% of e-government initiatives are total failure whereby the initiatives were never implemented or were implemented but immediately abandoned. An identical conclusion was reached in Accenture's (2007) report on e-government in which it is documented that despite significant strides being taken by most countries in the provision of public e-services, most e-government endeavors have fallen short of their potential. Further, a recent global study by the United Nations (UN) indicates that the progress of e-government growth and maturity remain uneven across many countries worldwide (UN-Report 2012).

Despite numerous motivations and service targets underlying public institutions, furthering e-government and reaching the stage of maturity is a challenging task faced by government agencies in most countries. Motivated by this challenge faced by majority of governments worldwide, several studies of qualitative nature consisting of detailed case studies of successful e-government projects have been undertaken by researchers to uncover the factors affecting e-government growth and maturity. For instance, Devadoss et al. (2002) analyzed the development of a government e-procurement application using a model based on the structuration theory, and developed a classification of factors involved in e-government initiatives. Ke and Wei (2004) traced the development of a single ministry's e-government efforts to highlight how the critical success factors evolved as the ministry went through different stages of reform. Chen et al. (2009) utilizing the perspectives of modularity

and societal learning, demonstrated how localized e-government efforts in Shanghai (China) may be implemented throughout the tiers of the municipal government, and presented an e-government model that can be diffused to other parts of the country. Similarly, Chan et al. (2011) utilizing resource enactment perspective developed a model on how organizational resources could be mobilized for successful e-government implementation. In sum, while such studies are particularly valuable to those who undertake similar initiatives, they do not attempt to assess the comparative success of different governments in realizing the potential of e-government. To that end, the major purpose of this study is to identify contextual factors affecting e-government maturity in a country. Consequently, this study will not only offer several policy implications but also will be helpful in identifying and understanding aggregate patterns of e-government that might shed new ideas in the fields of practice.

The success and institutionalization of an e-government initiative in a country is contingent upon citizen engagement, a key to its growth and maturity (Chan and Pan 2008). Olphert and Damodaran (2007) indicate that the uptake of e-government services are disappointing in the relative view of its maturity and the significant amounts invested in their growth and development, and propose citizen engagement as a key to overcome such a situation. 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 (Phang and Kankanhalli 2008), which can principally be understood as ICT and the Internet mediated interaction between the civil society sphere and the formal politics sphere, and between the civil society sphere and the administration sphere (Sæbø et al. 2008). Consequently, it is the total sum of (1) the government programs to encourage participation from its citizens, representing the *supply-side* with governments as the focal point; and (2) the willingness of the citizens to participate

in decision- and policy-making processes, representing the *demand-side* with citizens as the focus of concern (UN-Report 2008). Objectives of citizen engagement include informing citizens, generating support among citizens, utilizing citizens' input in decision-making and probing for citizens' needs (Phang and Kankanhalli 2008). Governments achieve these objectives through three means namely, (1) e-information sharing; (2) e-consultation; and (3) e-decision-making (UN-Report 2008). While governments' willingness to implement e-information sharing is concerned with the willingness of governments to offer tools (e.g., web forums, e-mail lists, newsgroups and chat rooms) for dissemination of information (e.g., list of elected officials, policies and programs, and point of contact) on their websites for timely access and use by citizens, governments' willingness to implement e-consultation is concerned with the willingness of governments' in providing tools for citizens to set their own agenda for the debate, appointing officials who can communicate directly with them (via websites), and maintaining an archive of their discussions. And, governments' willingness to implement e-decision-making is related to governments' willingness in indicating that it will take its citizens' e-inputs into account in decision-making process, and informing them on what decisions have been taken.

Emerging research on e-participation can be broadly classified into three streams. First, descriptive and anecdotal studies, while offering benchmarks for practitioners to access and evaluate their practices pertaining to e-participation, provide little value to theory (e.g., Norris and Reddick 2013). Second, studies that focuses on the demand-side of e-participation (i.e., citizens' perspective) rather than the supply-side (i.e., governments' perspective) with reference to a particular geographical region. For instance, a study by Colombo (2010) uncover the factors in the impulse of citizen participation experiences in public decision-making at the local-level with the specific focus on Catalonia, one of the Spanish and European Union geographical area. A third stream is the case studies that are micro in

orientation (e.g., Chan and Pan 2008; Olphert and Damodaran 2007), and studies that are conceptual in nature (e.g., Phang and Kankanhalli 2008; Sæbø et al. 2008). In sum, while these studies address important aspects of academic research, they cannot possibly address the broad macro-level issues pertaining to e-participation. Therefore, it is evident that there is a dearth of macro-level quantitative empirical studies examining e-participation from the supply-side (i.e., government) perspective. Motivated by this, I focus on the government-to-citizen (G2C) aspect of e-participation in this study, and adopt the definition as defined by the UN: the willingness of a government to use ICT tools for the 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 2010).

Although e-participation is widely acknowledged to play a pivotal role in growth and maturity of e-government (Chan and Pan 2008) by serving as a mechanism to manage the development of e-government services (Olphert and Damodaran 2007), a study conducted by the UN indicate that government's willingness to implement e-participation is still in a nascent state indicating disconnectedness between government and its citizens (UN-Report 2010). Another recent study conducted by the UN highlight that the progress pertaining to government's willingness to implement e-participation in a country is uneven and mostly limited only to a handful of developed economies, and its full potential remains grossly underutilized for the majority of countries (UN-Report 2012). Hence, to understand what facilitates countries across globe to attain varying levels of government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-making, it is essential to identify the contextual factors associated with them.

In this study, utilizing the TOE theory (Tornatzky and Fleischer 1990) as a guiding theoretical lens, I first identify the TOE contextual factors affecting government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-

making in a country and its e-government maturity. Further, by drawing from the citizen engagement literature, I theorize the direct effects of government's willingness to implement e-information sharing, e-consultation and e-decision-making on e-government maturity, and the mediating effects of government's willingness to implement e-information sharing, e-consultation and e-decision-making on the relationships between the TOE contextual factors and e-government maturity. Although some research has been done to examine the factors affecting e-participation and e-government at cross-country level, this study is unique and different from extant studies in two particular aspects. First, while extant studies (e.g., Alghamdi et al. 2011; Asogwa 2011; Farooquie 2011; Kovačić 2005) focused on e-government in terms of readiness (i.e., potential of a country to achieve e-government), I center upon maturity, which indicates the demonstrated behaviour of e-government. Second, while relatively little is known about e-participation (in terms of its determinants from the supply-side perspective), to my knowledge, no studies have attempted to study different dimensions of e-participation from the government perspective, and their relationships with the TOE contextual factors and e-government maturity. Specifically, this essay aims at addressing three distinct but related research questions (RQs):

RQ1.1: *What TOE contextual factors facilitate government's willingness to implement e-participation in a country and its e-government maturity?*

RQ1.2: *What is the relationship between government's willingness to implement e-participation in a country and its e-government maturity?*

RQ1.3: *How does government's willingness to implement e-participation in a country mediate the effects of its TOE contextual factors on e-government maturity?*

The rest of this essay is organized as follows. First, using the TOE theory, I explain the contexts associated with government's willingness to implement e-participation (in form of e-information sharing, e-consultation and e-decision-making) and e-government maturity.

Next, by drawing from citizen engagement literature, I hypothesize the mediation effects of government's willingness to implement e-information sharing, e-consultation and e-decision-making between the TOE contextual factors and e-government maturity relationships. Thereafter, using archival data from 183 countries (see Appendix A for the list of countries), I test the hypothesized model. Finally, the essay ends with a section on implications and conclusions emerging out of this study.

2.2. Literature Review and Hypotheses

2.2.1. The Technology-Organization-Environment Theory

I use the theoretical framework proposed by Tornatzky and Fleischer (1990), shown in Figure 2.1, as the foundation for studying the aforementioned research questions.

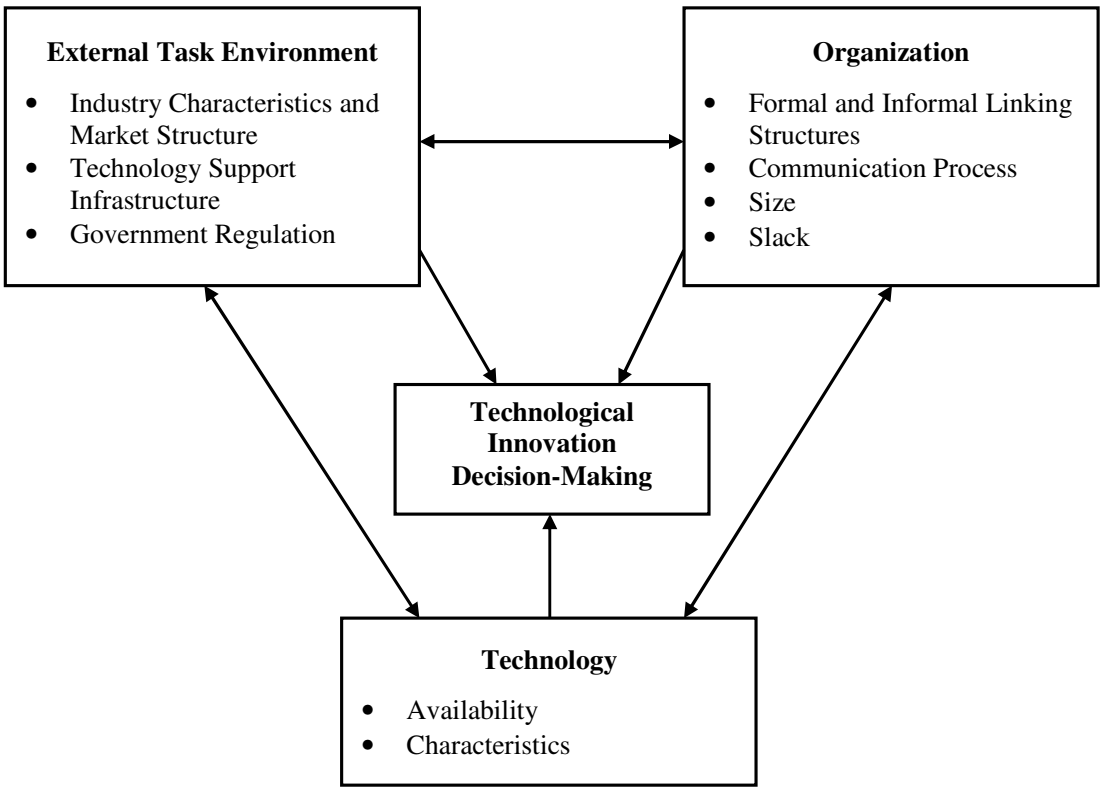

Figure 2.1: The Technology-Organization-Environment Theoretical Framework

According to them, innovation adoption or technology deployment in a firm is influenced by three inter-related contexts: (1) technology context; (2) organization context; and (3) environment context. *Technology context* refers to characteristics of the technologies available for potential adoption by the organization, and the current state of technology such as equipment owned by the organization and methods currently in use. *Organization context* refers to the characteristics and resources of the firm. That is, it depicts the organizational structure, the presence of innovation enabling processes such as informal communication and strategic behaviour of top management, quality of human resource, firm size and amount of slack resources of the organization. *Environment context* explains the environmental conditions such as market structure and characteristics, the external support available for adopting new technologies and government regulations. In summary, technology, organization and environment contexts present "both constraints and opportunities for technological innovation" (Tornatzky and Fleischer 1990, p. 154).

Extant research has demonstrated that the TOE theory has broad applicability and possesses explanatory power across a number of technological, industrial, national and cultural contexts (Baker 2011). Cahill et al. (1990) indicate that the TOE theory is a useful starting point for understanding the technology, organization and environment factors affecting the adoption process of technological innovations. In a meta-analysis of research on information technology and system (IT/S) implementation, Premkumar (2003) found consistent empirical support for the TOE theory although specific factors examined within the three TOE contexts varied across different studies. IS studies have utilized the TOE theory in different empirical settings and research contexts such as e-procurement, e-business, enterprise resource planning (ERP), electronic data interchange (EDI), etc. (see Table 2.1). These studies indicate that the dependent construct in the TOE theory (i.e.,

technological innovation) can be enlarged to include elements such as organizational performance and national (or business) competitiveness (e.g., Srivastava and Teo 2010).

Table 2.1: Key Studies in IS Literature Utilizing the TOE Theory

Authors	Research Domain	Key Factors of TOE Contexts
Chang et al. (2007)	E-signature adoption	User involvement, Adequate resources, Hospital size, Internal need, Vendor support, Government policy, Security protection
Gibbs and Kraemer (2004)	E-commerce use	Technology resources, Perceived benefits, Lack of organizational compatibility, Financial resources, Firm size, External pressure, Government promotion, Legislation barriers
Kuan and Chau (2001)	EDI adoption	Perceived direct benefits, Perceived financial cost, Perceived technological competence, Perceived industry pressure, Perceived government pressure
Lin and Lin (2008)	E-business diffusion	IS infrastructure, IS expertise, Competitive pressure, Organizational compatibility, Expected benefits of e-business, Trading partner readiness
Mishra et al. (2007)	Internet use in procurement	Procurement process digitization, Diversity of organizational procurement knowledge, Suppliers' sales-process digitization, Organizational perceptions of technological uncertainty, Organizational perceptions of volume uncertainty
Pan and Jang (2008)	ERP adoption	IT infrastructure, Technology readiness, Perceived barriers, Competitive pressure, Regulatory policy, Firm size, Production and operations improvement, Enhancement of products and services
Pudjianto et al. (2011)	E-government assimilation	ICT Infrastructure, ICT expertise, Top management support, Organizational compatibility, extent of coordination, Regulatory environment, Competition environment
Srivastava and Teo (2010)	E-government development and business competitiveness	ICT infrastructure, Human capital, Public institutions, Macro economy
Teo et al. (2006)	E-procurement adoption	Perceived direct benefits, Indirect benefits, Perceived costs, Firm size, Top management support, Information sharing culture, Business partner influence
Yang et al. (2013)	Healthcare IS adoption	Awareness type, Trigger type, Organizational mandate, Project team role, Champion type, Resource contribution, Vendor alignment, Pilot outcome assessment
Zhu and Kraemer (2005)	E-business assimilation	Technology competence, Size, International scope, Financial commitment, Competitive pressure, Regulatory support
Zhu et al. (2006)	E-business assimilation	Technology readiness, Technology integration, Size, Global scope, Managerial obstacles, Competition intensity, Regulatory environment

Although the TOE theory has been adopted and applied in various contexts, it has not been extensively used in the domain of e-government, particularly in the area of e

government maturity. Two key studies in IS literature utilizing the TOE theory in the domain of e-government are Srivastava and Teo (2010), and Pudjianto et al. (2011). While Srivastava and Teo (2010) established the usefulness of the TOE theory in the global context (or cross-country level setting), Pudjianto et al. (2011) used it in the regional setting, specific to the context of Indonesia. The reasons for utilizing the TOE theory for studying the concept of e-government maturity in this study are twofold. First, the TOE theory provides three inter-related contexts (or categories of factors) than a single context that might provide a greater explanatory power for understanding the growth and maturity of e-government in a country. Second, as e-government maturity cannot be thought as a one-step project (Layne and Lee 2001), and as its growth and maturity requires ICT infrastructure, human skill and knowledge, and institutional arrangements and governance mechanisms that could be explained through the TOE contexts respectively, I believe that the TOE theory offers a comprehensive view of contexts necessary to explain the concept of e-government maturity. Despite its advantages, the TOE theory is often criticized for its inability to provide the theoretical rationale to establish associations (Mishra et al. 2007). To overcome this, 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 concept (e.g., innovation adoption). For instance, Mishra et al. (2007) combined the TOE theory with the Resource Based View (RBV) of a firm to examine the antecedents and consequences of the Internet use in the context of procurement in the US manufacturing firms. Similarly, Srivastava and Teo (2010) combined the TOE theory with the IT impact literature to examine the country-level facilitators and the impact of e-government and e-business on national competitiveness. As individual theories lack the breadth of variables in the TOE theory, and its simple yet elegant taxonomy (Mishra et al. 2007), I extend and enrich the TOE theory by (1) combining it with the citizen

engagement perspective and e-government 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 the extensive review of academic (e.g., Siau and Long 2009; Singh et al. 2007; Srivastava and Teo 2008; 2010) and practitioner literature (e.g., UN-Report 2010; 2012) on e-government, I identify three factors that might affect government's willingness to implement e-participation in a country and its e-government maturity: (1) ICT (or information) infrastructure; (2) human capital; and (3) governance. As shown in Table 2.2, these three factors correspond to the three contexts defined in the TOE theory. ICT infrastructure is the gradual convergence of broadcasting content, telecommunications and computing (Tapscott 1996). Human capital refers to the knowledge, skills and abilities embodied in people (here, citizens) (Coff 2002). And, governance is defined as the traditions and institutions by which authority in a country is exercised (Kaufmann et al. 1999).

Table 2.2: TOE Contexts, Corresponding Constructs and its Definitions

Context	Corresponding Construct	Definition	Reference from the IS Literature
Technology	ICT Infrastructure	Gradual convergence of broadcasting content, telecommunications, and computing (Tapscott 1996).	Koh et al. (2005); Siau and Long (2009); Singh et al. (2007); Srivastava and Teo (2010)
Organization	Human Capital	Knowledge, skills, and abilities embodied in people (here, citizens) (Coff 2002).	Burn and Robins (2003); Singh et al. (2007); Siau and Long (2009)
Environment	Governance	Traditions and institutions by which authority in a country is exercised (Kaufmann et al. 1999).	Madon et al. (2007); Srivastava and Teo (2010)

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 that the trends in government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-making is closely linked to

online public service delivery (UN-Report 2010), I believe that ICT infrastructure and governance will also alleviate the supply of e-participation in a country, and human capital will induce the demand for e-participation. Taken together, including both supply and demand factors in the research model enables to estimate the relative contributions of these factors towards attaining varying levels of government's willingness to implement e-participation in a country and its e-government maturity. The diagrammatic representation of the research model with hypotheses indicated is shown in Figure 2.2. In the next section of this essay, I derive and explain each hypothesis.

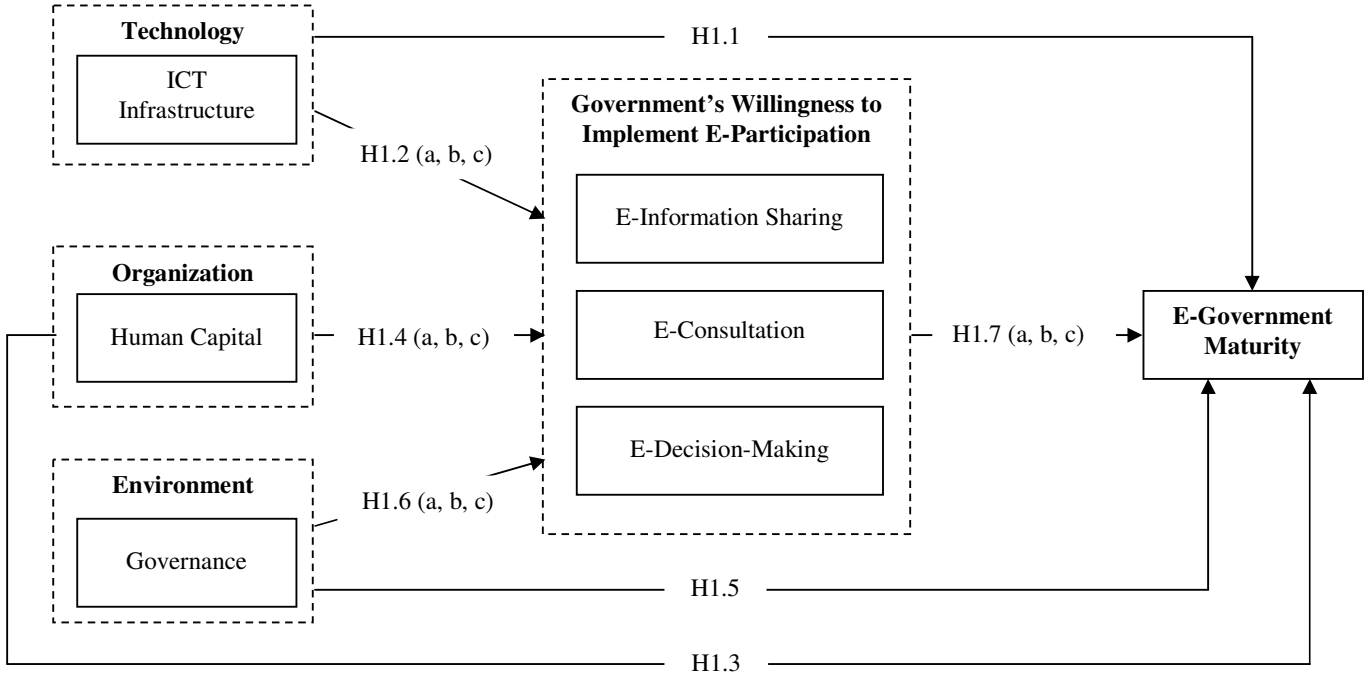

Figure 2.2: Research Model of Essay 1

2.2.2. Hypotheses Development

2.2.2.1. Relating ICT Infrastructure to E-Government Maturity and Government's Willingness to Implement E-Participation

According to the 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, I argue that ICT infrastructure can contribute towards the growth and maturity of e-government systems as e-government needs to utilize the information infrastructure to deliver online public services (Siau and Long 2009). In a similar vein, Srivastava and Teo (2010) stress that government and its agencies can fulfill 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) emphasize that e-government is characterized by extensive use of ICTs that stimulates the growth and maturity of e-government. Koh et al. (2005) and Singh et al. (2007) highlight that reaching the stage of e-government maturity will remain an unrealized dream in the absence of sound and reliable ICT infrastructure. Extant literature on public administration (e.g., Bellamy and Tylor 1998; Heeks 1999) also highlight the pivotal role of ICTs in the delivery of public e-services. Hence, I posit:

H1.1: *ICT infrastructure in a country is positively associated with its e-government maturity.*

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 policymaking (Van Dijk 2000). For governments to be more willing to implement e-information sharing, e-consultation and e-decision-making initiatives, robust ICT infrastructure that allows citizens access to decision makers is required (UN-Report 2010; 2012). OECD (1997) highlight that information infrastructure facilitates greater citizens'

participation in the government process. Meso et al. (2009) indicate that the availability of ICTs (1) allows greater access by the population to government services; (2) facilitates public participation in policymaking 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 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, government's willingness to offer tools for participation 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, I propose:

H1.2: *ICT infrastructure in a country is positively associated with its government's willingness to implement (H1.2a) e-information sharing; (H1.2b) e-consultation; and (H1.2c) e-decision-making.*

2.2.2.2. Relating Human Capital to E-Government Maturity and Government's Willingness to Implement 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) stress the critical role of human capital in growth and development of individuals and nations. Specifically, Schultz argues 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. Alike human capital theory, the new growth theory also supports the notion of 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). In their study about

organizations, Bogaert et al. (1994) highlighted that human resource is perhaps the most important resource for organizational development. Studies on e-government have highlighted the need for developing certain national resources for facilitating e-government development, growth and maturity. A study by Flak and Rose (2005) indicate that citizens is one of the important stakeholder groups for successfully implementing e-government initiatives, and their knowledge is a valuable resource for e-governments to attain the stage of maturity. Another study by Burn and Robins (2003) argue that human factors in form of learning and knowledge capabilities facilitate the growth of e-government. Further, Singh et al. (2007) establishes that human capital is a significant determinant of e-government maturity in a country, and Srivastava and Teo (2010) finds that human capital (in terms of education and training) in a country is positively associated with the level of its e-government. Therefore, I propose:

H1.3: *Human capital in a country is positively associated with its e-government maturity.*

Drawing from the 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, establishes the expectations of citizens to be directly involved in designing government programs and services (UN-Report 2010). That is, at various stages of policy process, from elections to policy planning and implementation, citizens are becoming increasingly involved (Phang and 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' willingness to (1) increase e-information sharing; (2) enhance e-consultation; and (3) support e-decision-making. That is, when citizens possess appropriate skills and abilities, they will not only able to participate, but will also create a different relationship with their respective governments, characterized by

enhanced effectiveness (UN-Report 2012). Consequently, governments will be more willing to offer channels and implement tools for participation. Hence, I posit:

H1.4: *Human capital in a country is positively associated with its government's willingness to implement (H1.4a) e-information sharing; (H1.4b) e-consultation; and (H1.4c) e-decision-making.*

2.2.2.3. Relating Governance to E-Government Maturity and Government's Willingness to Implement 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) establish that effective implementation of government-based IS for the provision of services is impacted by the macro-level policymaking organs; thereby shaping the type of system that eventually gets implemented. Moon (2002) finds that institutional factors significantly contributed to the adoption of e-government among municipalities. Norris and Moon (2005) indicate that the level of adoption and sophistication of e-government systems are correlated with the presence of well-developed institutional factors. A study by West (2004) highlights the importance of institutional arrangements and governance mechanisms in ensuring e-government growth and maturity. Similarly, McNeal et al. (2003) establish that legislative professionalism and professional networks are associated with extensive use of e-government. Recently, Srivastava and Teo (2010) find that public institutions (in association with macro-economic stability) in a country is positively associated with the maturity of its e-government. As effective governance assures an environment conducive to ICT-led investments (Meso et al. 2006), I posit:

H1.5: *Governance in a country is positively associated with its e-government maturity.*

Governance entails public debate and open, participatory decision-making. According to Chadwick and May's (2003) model of governance in e-government implementation, 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). Also, 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, I propose:

H1.6: *Governance in a country is positively associated with its government's willingness to implement (H1.6a) e-information sharing; (H1.6b) e-consultation; and (H1.6c) e-decision-making.*

2.2.2.4. Relating Government's Willingness to Implement E-Participation in a Country to its E-Government Maturity

According to the e-government stage models, growth and maturity of e-government cannot be thought as a one-step project or implemented as a single project (Siau and Long 2006). The implication from the stage models of e-government development is that the growth and maturity of e-government is evolutionary in nature and the stages (of growth) are theoretically ascending in the level of maturity or sophistication of e-government (UN-Report 2010). Given that citizen engagement via e-participation is pivotal in the evolutionary process of e-government maturity, 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 maturity in a country. That is, when the government is willing to implement e-participation initiatives, citizens become active creators or feedback providers, thereby contributing information to the success of e-government (Ekelin 2003). This presumption is in line with a study conducted 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, I posit:

H1.7: *Government's willingness to implement e-participation (H1.7a: e-information sharing; H1.7b: e-consultation; and H1.7c: e-decision-making) in a country is positively associated with its e-government maturity.*

2.2.2.5. Mediated Effects of Government's Willingness to Implement E-Participation

Having assembled each of the piecewise elements and relations in the research model depicted in Figure 2.2, I logically deduce one more set of hypotheses. I posit that government's willingness to implement 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 the TOE contexts onto e-government maturity. That is, the TOE contexts indirectly influence e-government maturity by raising the levels of government's willingness to implement e-information sharing, e-consultation and e-decision-making. More formally, I therefore offer the following:

H1.8: *TOE contexts' (H1.8a: ICT infrastructure; H1.8b: human capital; and H1.8c: governance) effects on e-government maturity are partially mediated by government's willingness to implement e-information sharing, e-consultation and e-decision-making.*

A summary of the direct and mediation effect hypotheses pertaining to this essay is presented in Table 2.3.

Table 2.3: Summary of Hypotheses of Essay 1

Hypotheses	Description
Direct Effects	
H1.1	ICT infrastructure in a country is positively associated with its e-government maturity.
H1.2 (a, b, c)	ICT infrastructure in a country is positively associated with its government's willingness to implement (a) e-information sharing; (b) e-consultation; and (c) e-decision-making.
H1.3	Human capital in a country is positively associated with its e-government maturity.
H1.4 (a, b, c)	Human capital in a country is positively associated with its government's willingness to implement (a) e-information sharing; (b) e-consultation; and (c) e-decision-making.
H1.5	Governance in a country is positively associated with its e-government maturity.
H1.6 (a, b, c)	Governance in a country is positively associated with its government's willingness to implement (a) e-information sharing; (b) e-consultation; and (c) e-decision-making.
H1.7 (a, b, c)	Government's willingness to implement e-participation (a: e-information sharing; b: e-consultation; and c: e-decision-making) in a country is positively associated with its e-government maturity.
Mediated Effects	
H1.8 (a, b, c)	TOE contexts' (a: ICT infrastructure; b: human capital; and c: governance) effects on e-government maturity are partially mediated by government's willingness to implement e-information sharing, e-consultation and e-decision-making.

2.3. Research Design

To test the formulated hypotheses, I 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 and Teo 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 and Nathan 1985); and (3) robust to the threat of common method bias (Woszczynski and Whitman 2004). Hypotheses were tested via a cross-sectional analysis of 183 countries (after omitting the missing values) for a period of 2010 and 2012. According to Hair et al. (2006),

50 is the minimum number required to avoid degrees of freedom and efficiency problems. Further, as average scores (of two year datasets) provide more accurate and stable estimates than single year datasets (Wiggins and Ruefli 2005); I used a cross-section for the period 2010 and 2012. The concept of using average scores over single year datasets is consistent with what has been done in previous cross-country level studies from strategy literature (e.g., Brouthers et al. 2008; Habib and Zurawicki 2001; Voyer and Beamish 2004). The primary sources of data were the UN E-Government Survey Reports (UN-Report 2010; 2012), the World Bank's Worldwide Governance Indicators database 2013 (WGI-Database 2013), and the World Bank's World Development Indicators database 2013 (WDI-Database 2013). In the following section of this essay, I describe the operationalization of study variables.

2.3.1. Operationalization of Constructs

2.3.1.1. Dependent Variable

For this study, the dependent variable is *e-government maturity*, which reflects the demonstrated behaviour of e-government in a country. It was measured using the online service index, which assess the extent to which a government has established an online presence (UN-Report 2010; 2012). The scores for this index were obtained from the UN E-government Survey Reports (UN-Report 2010; 2012), and was based upon the UN's four stage model of e-government maturity. The four stages were: (1) emerging presence; (2) enhanced presence; (3) transactional presence; and (4) connected presence. Countries were coded in consonance with what they provide online and the stage of e-government maturity they were presently in. Hence, as a country migrated upwards through various stages, it was ranked higher in the index. To arrive at a set of the online service index values, the UN assessed each country's national website, including the national central portal and e-services portal, as well as the websites of the related ministries of education, labor, social services,

health, finance and environment as applicable (UN-Report 2010; 2012). The values for this index ranged between 0 and 1, with the higher values corresponding to the higher level of e-government maturity. The value for a given country was equal to the total number of points scored by that country less the lowest score for any country divided by the range of values for all countries in the survey (UN-Report 2010; 2012). This index has been used in past studies such as Siau and Long (2006, 2009), and Srivastava and Teo (2007a, 2008, 2010).

2.3.1.2. Independent Variables

The technology variable, *ICT infrastructure* was measured using the telecommunications infrastructure index. This index taken from the UN E-government Survey Reports (UN-Report 2010; 2012) was a composite of five primary indicators: (1) number of personal computers per 100 persons; (2) number of Internet users per 100 persons; (3) number of telephone lines per 100 persons; (4) number of mobile cellular subscription per 100 persons; and (5) number of fixed broadband subscribers per 100 persons. For computing this index, the UN followed three steps. First, based on the scores of the indicators (for countries), a maximum and minimum value was selected for each of the five indicators. Second, the country's relative performance (for each indicator) was measured by a value between 0 and 1 based on the formulae: Indicator value = (Actual value - Minimum value) / (Maximum value - Minimum value). Third, the telecommunications infrastructure index was constructed as a composite measure based on the formulae: Telecommunications Infrastructure Index = Average (personal computer index + Internet user index + telephone line index + mobile subscription index + fixed broadband index). The values for this index ranged between 0 and 1, with the higher values corresponding to the higher levels of ICT infrastructure. This index has been used in past academic studies like Siau and Long (2009), Singh et al. (2007), and Srivastava and Teo (2010).

The organization variable, *human capital* was measured using the human capital index with a value running between 0 and 1 (with the higher values corresponding to the higher levels of human capital). This index taken from the UN E-government Survey Reports (UN-Report 2010; 2012) was a composite of the adult literacy rate and the gross enrolment ratio. While adult literacy rate was the percentage of people aged 15 years and above who can, with understanding, both read and write a short simple statement on their everyday life; gross enrolment ratio was the total number of students enrolled at the primary, secondary and tertiary level, irrespective of age, as a percentage of the population of school age for that level. This index has been used in past academic studies like Siau and Long (2009), Singh et al. (2007), and Srivastava and Teo (2008, 2010).

The environment variable, *governance* was measured using the governance index, which was a composite of six measures originally presented in Kaufmann et al. (1999). The measures were: (1) voice and accountability; (2) political stability; (3) government effectiveness; (4) regulatory quality; (5) rule of law; and (6) control of corruption. The values ranged between -2.5 and 2.5, with the higher values corresponding to the better governance. The research team led by Kaufmann followed a three-step procedure to construct the aggregated measure of governance: (1) assigning data from individual sources to aggregate indicator; (2) preliminary rescaling of the individual source data to run from 0 to 1; and (3) using an unobserved components model (a statistical tool) to make the 0-1 rescaled data comparable across sources, and then to construct a weighted average of the data from each source for each country. Data for this index was taken from the World Bank's Worldwide Governance Indicators Database (WGI-Database 2013), and was for the period 2010 and 2012. This index has been used in studies such as Meso et al. (2006) and Singh et al. (2007).

2.3.1.3. Mediating Variables

The mediating variables, *government's willingness to implement e-participation* were measured on three dimensions: (1) *e-information sharing*; (2) *e-consultation*; and (3) *e-decision-making*. UN assessed government's willingness to implement e-information sharing by measuring the willingness of government in a country in offering tools (e.g., web forums, e-mail lists, newsgroups and chat rooms) for dissemination of information (e.g., list of elected officials, policies and programs, and point of contact) on their websites for timely access and use by citizens. Likewise, government's willingness to implement e-consultation was assessed by measuring the willingness of government in a country in providing tools for citizens to set their own agenda for the debate, appointing officials who can communicate directly with them (via websites), and maintaining an archive of their discussions. And, government's willingness to implement e-decision-making was assessed by measuring the willingness of government in a country in indicating that it will take its citizens' e-inputs into account in decision-making, and providing actual feedback on the outcome of specific issues.

Finally, three indices pertaining to government's willingness to implement e-information sharing, e-consultation and e-decision-making were computed by taking each of their total score values for a given country subtracting the lowest total score for any country in the survey and dividing by the range of total score values for all countries. The scores for these indices were taken from the UN E-government Survey Reports (UN-Report 2010; 2012), and their values ranged between 0 and 1, with the higher values corresponding to the better results. While individual indices of government's willingness to implement e-participation were not used in past studies, the composite index of government's willingness to implement e-participation has been used in studies such as Srivastava and Teo (2008).

2.3.1.4. Control Variables

Additional control variables consisted of *economic condition of a nation* and *regional difference*. I selected these two control variables, since they were both consistent with prior macro-level studies on e-government (e.g., Siau and Long 2006; Singh et al. 2007), and also makes logical sense in the regression model. The first control variable, economic conditions of a nation depends both on the value of nation's products and services, measured by the prices they can command in open markets, and also on the efficiency with which they are produced (Porter 2006). Hence, consistent with extant studies (e.g., Srivastava and Teo 2010), I used Porter's productivity paradigm for operationalizing economic condition of a nation in terms of its GDP per capita (adjusted for purchasing power parity, PPP), the values for which were obtained from the World Bank's World Development Indicators database 2013 (WDI-Database 2013). Alike the main variables, I used average of 2010 and 2012 scores for this control variable. The other control variable, regional difference was operationalized as the country-level difference across various regions of the world. Specifically, based on the UN's regional groupings, I coded 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)).

2.4. Analysis and Results

2.4.1. Descriptive Statistics and Correlations

Table 2.4 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 and Porter 2009). Nevertheless, I 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 the VIFs ranged from 1.27 to 3.51 (all tolerance levels above 0.28). As per Fox (1991), a VIF>4.0, or a tolerance level<0.25, may indicate the potential for multicollinearity; thus, the concern in the model appeared to be minimal.

Table 2.4: Descriptive Statistics and Correlations of Essay 1

Variable	M	SD	1	2	3	4	5	6	7	8
1. Econ Cond[a]	7.79	1.61	-							
2. Reg Diff	2.71	1.17	-0.27	-						
3. ICT Infra	0.19	0.22	0.52	-0.21	-					
4. Hum Cap	0.74	0.25	0.44	-0.25	0.36	-				
5. Gov	-0.09	0.90	0.52	-0.27	0.52	0.36	-			
6. GWI E-Info	0.23	0.24	0.45	-0.24	0.47	0.35	0.43	-		
7. GWI E-Cons	0.15	0.23	0.37	-0.21	0.42	0.27	0.31	0.41	-	
8. GWI E-Deci	0.14	0.20	0.32	-0.22	0.44	0.29	0.36	0.39	0.40	-
9. E-Gov Mat	0.35	0.24	0.27	-0.21	0.47	0.56	0.44	0.42	0.44	0.54

Note: [a]Log transformed variable; N=183; M: Mean; SD: Standard Deviation; Econ Cond: Economic Condition of a Nation; Reg Diff: Regional Difference; ICT Infra: ICT Infrastructure; Hum Cap: Human Capital; GWI E-Info: Government's Willingness to Implement E-Information Sharing; GWI E-Cons: Government's Willingness to Implement E-Consultation; GWI E-Deci: Government's Willingness to Implement E-Decision-Making; E-Gov Mat: E-Government Maturity; All correlations (except underlined) were significant at p<0.001 and underlined correlations were significant at p<0.01.

2.4.2. Procedures Followed by the Reporting Agencies to Enhance the Reliability and Validity of Data

While the measures I used in this study were used by prior studies, it is worthy to note that the reporting agencies followed rigorous procedures for ensuring the reliability and validity of the data. For instance, while computing the online service index and when forming indices pertaining to government's willingness to implement e-participation, the UN's assessment involved identification of the national and ministerial websites by its research team following a uniform set of guidelines (e.g., using a variety of search engines to locate the most relevant site when no responses were received from the Member States). Researchers were instructed and trained to scrutinize the websites very closely. The national sites were tested for a minimal level of web content accessibility as described in the Web

Content Accessibility Guidelines of the World Wide Web Consortium. The research team was fully equipped to handle the official languages of the UN. Further, translators provided assistance as necessary. And, a web-based information management system was used for managing the survey effort and tracking results. To ensure that the websites were rated with maximum objectivity and accuracy, the second-level quality assurance group validated the data received from the primary research team. This resulted in adjustment of scores for a number of countries (UN-Report 2010; 2012).

Similarly, the research team led by Kaufmann for computing the governance index not only followed a three-step procedure described above (see section on 'Operationalization of Constructs') but also used multiple sources to gather the data, which included surveys of (1) households and firms; (2) commercial business information providers; (3) non-governmental organizations; and (4) public-sector organization (Kaufmann et al. 2010). In summary, I used the data directly from these reports as the data collecting agencies are trustworthy and followed stringent guidelines for ensuring its reliability and validity.

2.4.3. Hypotheses Testing

Given the importance of the mediating effects in the research model, it is necessary to conduct a systematic analysis exploring these effects. Since the research model has more than one mediator, this study refers to the method that Preacher and Hayes (2008) recommended for testing multiple-mediator models. Preacher and Hayes' 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 Preacher and Hayes' method can include more than one independent variable, each of which can be tested in a separate model. In each model, I 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, I elected the bootstrapping strategy for the tests. Bootstrapping is a non-parametric 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 the repeated samplings, an empirical approximation of the indirect effects can be estimated and used to construct confidence intervals (CIs) for the indirect effects. In this study, I used the bias-corrected (BC) bootstrap as Preacher and Hayes recommended. Preacher and Hayes, consistent with prior research (e.g., Williams and MacKinnon 2008), argue 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 BC bootstrap performs best in terms of both statistical power and Type I error rate.

A Preacher and Hayes analysis includes an examination of 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 2.3 shows the regression results.

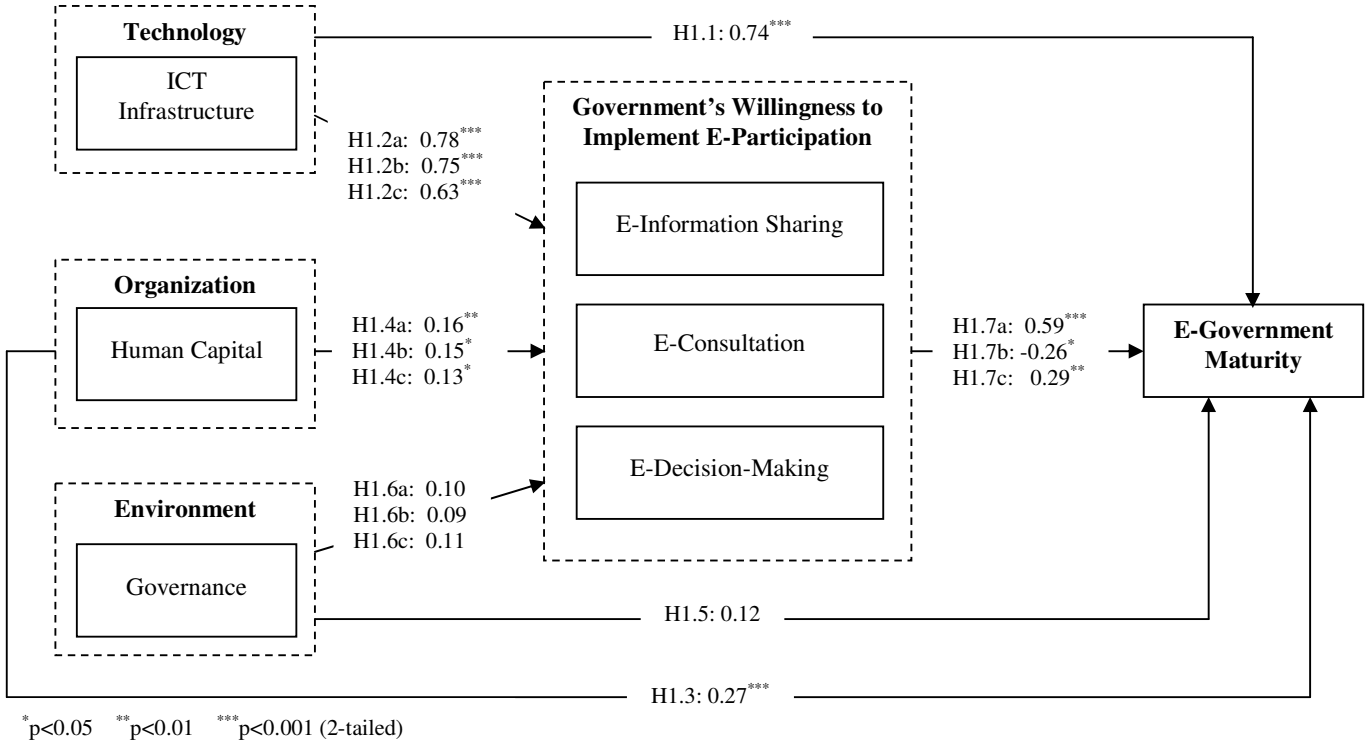

Figure 2.3: Regression Results of Essay 1

As shown in Figure 2.3, the results revealed that the paths from ICT infrastructure to e-government maturity (β=0.74, $p<0.001$) and from human capital to e-government maturity (β=0.27, $p<0.001$) were significant. Hence, hypotheses H1.1 and H1.3 were supported. As the path from governance to e-government maturity (β=0.12, n.s.) was not significant, hypothesis H1.5 was not supported. Results also revealed that the paths from ICT infrastructure to government's willingness to implement e-information sharing (β=0.78, $p<0.001$), government's willingness to implement e-consulting (β=0.75, $p<0.001$) and government's willingness to implement e-decision-making (β=0.63, $p<0.001$) were all significant. This confirmed the hypotheses H1.2a, H1.2b and H1.2c. Similarly, the paths from human capital to government's willingness to implement e-information sharing (β=0.16, $p<0.01$), government's willingness to implement e-consulting (β=0.15, $p<0.05$) and government's willingness to implement e-decision-making (β=0.13, $p<0.05$) were all significant, thereby confirming the hypotheses H1.4a, H1.4b and H1.4c. Further, the paths from governance to government's willingness to implement e-information sharing (β=0.10, n.s.), government's willingness to implement e-consulting (β=0.09, n.s.) and government's willingness to implement e-decision-making (β=0.11, n.s.) were not significant. Hence, hypotheses H1.6a, H1.6b and H1.6c were not supported.

Lastly, the paths from government's willingness to implement e-information sharing (β=0.59, $p<0.001$), government's willingness to implement e-consultation (β=-0.26, $p<0.05$) and government's willingness to implement e-decision-making (β=0.29, $p<0.01$) to e-government maturity were all significant. However, while the direction of the relationships of government's willingness to implement e-information sharing and e-decision-making with e-government maturity was consistent with the initial prediction, the direction of the relationship between government's willingness to implement e-consultation and e-government maturity was contrary to the initial prediction. Hence, H7a and H7c were

supported, and H7b was not supported. While unexpected, this finding is interesting and will be discussed in greater detail in the next section. Finally, among the two control variables, while economic conditions (β=0.19, $p<0.05$) was significantly associated with e-government maturity, regional difference (β=0.002, n.s.) was not significantly associated with it.

Table 2.5 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 along with economic condition and regional difference. As shown in Table 2.5, ICT infrastructure had a significant total effect on e-government maturity. When the mediators government's willingness to implement e-information sharing, e-consultation and e-decision-making were introduced, the direct effect of ICT infrastructure on e-government maturity remained significant. This meant that government's willingness to implement e-information sharing, e-consultation and e-decision-making partially mediated the impact of ICT infrastructure on e-government maturity. Furthermore, the difference between the total and direct effects was the total indirect effect as mediated through government's willingness to implement e-information sharing, e-consultation and e-decision-making, with a point estimate of 0.4989 and a 95% BC bootstrap CI of 0.3437 to 0.6785. Since the CI did not contained zero, the total indirect effect was different from zero. An examination of the specific indirect effects indicated that government's willingness to implement 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 government's willingness to implement e-information sharing and government's willingness to implement e-consultation were 0.4961 and -0.1803 respectively, and of that through government's willingness to implement e-decision-making was 0.1807. Examination of the pairwise contrasts of the indirect effects (i.e., C1, C2 and C3 in Model 1 of Table 2.5) showed that (1) the specific indirect effect through government's willingness to implement e-information sharing was

larger than the specific indirect effect through government's willingness to implement e-consultation, with a BC 95% CI of 0.3283 to 1.1497; (2) the specific indirect effect through government's willingness to implement e-information sharing was larger than the specific indirect effect through government's willingness to implement e-decision-making, with a BC 95% CI of 0.0224 to 0.6515; and (3) the specific indirect effect through government's willingness to implement e-consultation was larger than the specific indirect effect through government's willingness to implement e-decision-making, with a BC 95% CI of -0.7439 to -0.0349. In sum, hypothesis H1.8a was supported.

Second, Model 2 was examined, in which human capital was the independent variable with ICT infrastructure and governance treated as covariates along with economic condition and regional difference. As shown in Table 2.5, human capital had a significant total effect on e-government maturity. When the mediators government's willingness to implement e-information sharing, e-consultation and e-decision-making were introduced, the direct effect of human capital on e-government maturity remained significant. This meant that government's willingness to implement e-information sharing, e-consultation and e-decision-making partially mediated the impact of human capital on e-government maturity. Furthermore, the difference between the total and direct effects was the total indirect effect as mediated through government's willingness to implement e-information sharing, e-consultation and e-decision-making, with a point estimate of 0.0869 and a 95% BC CI of 0.0284 to 0.1544. Since the CI did not contained zero, the total indirect effect was different from zero. An examination of the specific indirect effects indicated that government's willingness to implement 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 government's willingness to implement e-information sharing and government's willingness to implement e-consultation were 0.0934 and -0.0299 respectively, and of that

through government's willingness to implement e-decision-making was 0.0229. Examination of the pairwise contrasts of the indirect effects (i.e., C1, C2 and C3 in Model 2 of Table 2.5) showed that (1) the specific indirect effect through government's willingness to implement e-information sharing was larger than the specific indirect effect through government's willingness to implement e-consultation, with a BC 95% CI of 0.0481 to 0.2442; (2) the specific indirect effect through government's willingness to implement e-information sharing was larger than the specific indirect effect through government's willingness to implement e-decision-making, with a BC 95% CI of 0.0134 to 0.1516; and (3) the specific indirect effect through government's willingness to implement e-consultation was larger than the specific indirect effect through government's willingness to implement e-decision-making, with a BC 95% CI of -0.1326 to -0.0049. Thus, hypothesis H1.8b was supported.

Next, Model 3 was examined, in which governance was the independent variable with ICT infrastructure and human capital treated as covariates along with economic condition and regional difference. As shown in Table 2.5, governance did not have a significant total effect on e-government maturity. While some researchers (e.g., Baron and 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 and Bolger 2002) argued that this is not necessary for mediation to occur. Thus, I continued to examine the mediating effects of government's willingness to implement e-information sharing, e-consultation and e-decision-making. However, as shown in Table 2.5 (Model 3), the total indirect effects were not significant, with a point estimate of 0.0252 and a 95% BC CI of -0.0018 to 0.0569. Examination of the specific indirect effects showed that neither of the government's willingness to implement e-participation variables were mediators, since their 95% CIs contained zero. Hence, hypothesis H1.8c was not supported.

Finally, the R^2 value of the overall model including and excluding the control variables was 77% (Adjusted R^2=76%) and 64% (Adjusted R^2=63%) respectively.

Table 2.5: Summary of Tests of Mediation Effects of Essay 1

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	**Upper**
Model 1: ICT Infrastructure as IV								
0.7402***	6.9501	0.2817**	2.8791	Total		0.4989	0.3437	0.6785
				Mediators	E-Info	0.4961	0.2708	0.7604
					E-Cons	-0.1803	-0.4220	-0.0065
					E-Deci	0.1807	0.0089	0.3761
				Contrast	C1	0.6753	0.3283	1.1497
					C2	0.3146	0.0224	0.6515
					C3	-0.3611	-0.7439	-0.0349
Model 2: Human Capital as IV								
0.2764***	4.6759	0.1612**	3.5037	Total		0.0869	0.0284	0.1544
				Mediators	E-Info	0.0934	0.0354	0.1770
					E-Cons	-0.0299	-0.0769	-0.0009
					E-Deci	0.0229	0.0008	0.0668
				Contrast	C1	0.1236	0.0481	0.2442
					C2	0.0709	0.0134	0.1516
					C3	-0.0528	-0.1326	-0.0049
Model 3: Governance as IV								
0.1201	1.7849	0.0559	0.3735	Total		0.0252	-0.0018	0.0569
				Mediators	E-Info	0.0229	-0.0009	0.0541
					E-Cons	-0.0032	-0.0217	0.0059
					E-Deci	0.0054	-0.0041	0.0299
				Contrast	C1	0.0259	-0.0051	0.0719
					C2	0.0181	-0.0003	0.0457
					C3	-0.0083	-0.0456	0.0105

Note: N=183; 5000 bootstrap samples; R^2=77% (Adjusted R^2=76%); 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; E-Info, E-Cons and E-Desi: Government's Willingness to Implement E-Information Sharing, E-Consultation and E-Decision-Making; C1: Government's Willingness to Implement E-Information Sharing vs. Government's Willingness to Implement E-Consultation; C2: Government's Willingness to Implement E-Information Sharing vs. Government's Willingness to Implement E-Decision-Making; C3: Government's Willingness to Implement E-Consultation vs. Government's Willingness to Implement E-Decision-Making.

A summary of the direct and mediation effect hypotheses tests is presented in Table 2.6.

Table 2.6: Summary of Hypotheses Tests of Essay 1

Hypotheses	Description	Result
Direct Effects		
H1.1	ICT infrastructure in a country is positively associated with its e-government maturity.	Supported
H1.2a	ICT infrastructure in a country is positively associated with its government's willingness to implement-information sharing.	Supported
H1.2b	ICT infrastructure in a country is positively associated with its government's willingness to implement e-consultation.	Supported
H1.2c	ICT infrastructure in a country is positively associated with its government's willingness to implement e-decision-making.	Supported
H1.3	Human capital in a country is positively associated with its e-government maturity.	Supported
H1.4a	Human capital in a country is positively associated with its government's willingness to implement e-information sharing.	Supported
H1.4b	Human capital in a country is positively associated with its government's willingness to implement e-consultation.	Supported
H1.4c	Human capital in a country is positively associated with its government's willingness to implement e-decision-making.	Supported
H1.5	Governance in a country is positively associated with its e-government maturity.	Not Supported
H1.6a	Governance in a country is positively associated with its government's willingness to implement e-information sharing.	Not Supported
H1.6b	Governance in a country is positively associated with its government's willingness to implement e-consultation.	Not Supported
H1.6c	Governance in a country is positively associated with its government's willingness to implement e-decision-making.	Not Supported
H1.7a	Government's willingness to implement e-information sharing in a country is positively associated with its e-government maturity.	Supported
H1.7b	Government's willingness to implement e-consultation in a country is positively associated with its e-government maturity.	Not Supported
H1.7b	Government's willingness to implement e-decision-making in a country is positively associated with its e-government maturity.	Supported
Mediated Effects		
H1.8a	ICT infrastructure's effect on e-government maturity is partially mediated by government's willingness to implement e-participation.	Supported
H1.8b	Human capital's effect on e-government maturity is partially mediated by government's willingness to implement e-participation.	Supported
H1.8c	Governance's effect on e-government maturity is partially mediated by government's willingness to implement e-participation.	Not Supported

2.4.4. Post Hoc Analysis

Findings based on above analysis indicate that the technology and organization contexts in the form of ICT infrastructure and human capital respectively were pivotal for e-government maturity and government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-making, compared to the environment context, governance. As explained in the section on 'Operationalization of Constructs,' ICT infrastructure and human capital are composite variables comprising of several dimensions or indicators. That is, while ICT infrastructure is a composite of five primary indicators namely, (1) number of *personal computers* per 100 persons; (2) number of *Internet users* per 100 persons; (3) number of *telephone lines* per 100 persons; (4) number of *mobile cellular subscriptions* per 100 persons; and (5) number of *fixed broadband subscribers* per 100 persons, human capital is a composite of two indicators namely, (1) adult literacy rate; and (2) gross enrolment ratio. Table 2.7 describes the individual dimensions of ICT infrastructure and human capital as defined by the UN.

Table 2.7: Description on Dimensions of ICT Infrastructure and Human Capital

Dimension	Description
ICT Infrastructure	
Personal Computers	• This indicator refers to self-contained computers designed to be used by a single individual. • Personal computers per 100 persons is calculated by dividing the number of personal computers by the total population and then multiplying by 100.
Internet Users	• This indicator refers to people with access to the worldwide network. • Internet users per 100 persons is calculated by dividing the number of Internet users by the total population and then multiplying by 100.
Telephone Lines	• This indicator refers to telephone lines connecting a subscriber's terminal equipment to the public switched telephone network. • Telephone lines per 100 inhabitants is calculated by dividing the number of telephone lines by the total population and then multiplying by 100.
Mobile Cellular Subscriptions	• This indicator refers to subscriptions of portable telephones to a public mobile telephone service using cellular technology, which provides access to the public switched telephone network. It includes both postpaid and prepaid subscriptions. • Mobile cellular subscriptions per 100 inhabitants is calculated by dividing the number of mobile cellular subscriptions by the total population and then multiplying by 100.

Dimension	Description
Fixed Broadband Subscribers	• This indicator refers to entities (e.g., businesses and individuals) subscribing to paid high-speed access to the public Internet (a TCP/IP connection). • Fixed broadband subscribers per 100 inhabitants is calculated by dividing the number of fixed broadband subscribers by the total population and then multiplying by 100.
Human Capital	
Adult literacy rate	This indicator refers to the percentage of people aged 15 years and above who can, with understanding, both read and write a short simple statement on their everyday life.
Gross enrolment ratio	This indicator refers to the total number of students enrolled at the primary, secondary and tertiary level, irrespective of age, as a percentage of the population of school age for that level.

How these individual dimensions of ICT infrastructure and human capital are related to government's willingness to implement e-participation and e-government maturity? By looking at the relationships of individual dimensions of ICT infrastructure and human capital with government's willingness to implement e-participation and e-government maturity, this post hoc analysis helps in understanding the concept of e-government maturity in a greater depth. The results of post hoc analysis are shown in Table 2.8.

Table 2.8: Summary of Post Hoc Analysis Results of Essay 1

Variable (Context)	Dimensions (or Indicators)	β-Coefficient and Significance			
		E-Gov Mat	Government's Willingness to Implement		
			E-Info	E-Cons	E-Desi
ICT Infrastructure (Technology)	Personal Computers	0.77^{***}	0.78^{***}	0.75^{***}	0.73^{***}
	Internet Users	0.72^{***}	0.71^{***}	0.69^{***}	0.71^{***}
	Telephone Lines	0.54^{***}	0.52^{***}	0.48^{**}	0.50^{***}
	Mobile Cellular Subscriptions	0.69^{***}	0.63^{***}	0.59^{***}	0.59^{***}
	Fixed Broadband Subscribers	0.67^{***}	0.68^{***}	0.63^{***}	0.64^{***}
Human Capital (Organization)	Adult Literacy Rate	0.34^{**}	0.18^{*}	0.16^{*}	0.15^{*}
	Gross Enrolment Ratio	0.26^{*}	0.15^{*}	0.14^{+}	0.14^{+}

Note: N=183; R^2=76% (Adjusted R^2=75%); E-Gov Mat: E-Government Maturity; E-Info: E-Information Sharing; E-Cons: E-Consultation; E-Desi: E-Decision-Making; $^{+}p<0.1$ $^{*}p<0.05$ $^{**}p<0.01$ $^{***}p<0.001$ (2-tailed).

As shown in Table 2.8, among the five dimensions of ICT infrastructure, the dimension of personal computers (β=0.77, p<0.001) had the strongest effect on e-government maturity followed by the dimensions of Internet users (β=0.72, p<0.001), mobile cellular subscriptions (β=0.69, p<0.001), fixed broadband subscribers (β=0.67, p<0.001) and telephone lines (β=0.54, p<0.001). Turning to the relationships between the individual dimensions of ICT Infrastructure and government's willingness to implement e-participation, personal computers had the strongest effect with e-information sharing (β=0.78, p<0.001), e-consultation (β=0.75, p<0.001) and e-decision-making (β=0.73, p<0.001). Followed by the dimension of personal computers, the dimension of Internet users had the stronger association with government's willingness to implement e-information sharing (β=0.71, p<0.001), e-consultation (β=0.69, p<0.001) and e-decision-making (β=0.71, p<0.001).

Within the dimensions of human capital, adult literacy rate (in comparison with gross enrolment ratio) had stronger effects on e-government maturity (β=0.34, p<0.01) and government's willingness to implement e-information sharing (β=0.18, p<0.05), e-consultation (β=0.16, p<0.05) and e-decision-making (β=0.15, p<0.05). Also, while gross enrolment ratio was significantly associated with e-government maturity (β=0.26, p<0.01) and government's willingness to implement e-information sharing (β=0.15, p<0.05), its effect on government's willingness to implement e-consultation (β=0.14, p<0.1) and e-decision-making (β=0.14, p<0.1) was only marginally significant.

Alike the main analysis, post hoc analysis also indicated that the paths from governance to e-government maturity (β=0.13, n.s.) and to government's willingness to implement e-information sharing (β=0.11, n.s.), e-consulting (β=0.08, n.s.) and e-decision-making (β=0.11, n.s.) were not significant. Also, while the relationships of government's willingness to implement e-information sharing (β=0.56, p<0.001) and e-decision-making (β=0.27, p<0.01) with e-government maturity were significant in the positive direction, the

relationship of government's willingness to implement e-consultation (β=-0.25, p<0.05) with e-government maturity was significant in the negative direction. Further, among the two control variables, while economic conditions (β=0.21, p<0.05) was significantly associated with e-government maturity, regional difference (β=0.004, n.s.) was not significantly associated with it. The R^2 value of the overall model (tested with the individual dimensions for ICT infrastructure and human capital) including and excluding the control variables was 79% (Adjusted R^2=78%) and 65% (Adjusted R^2=64%) respectively.

2.5. Discussion

Findings from this study raise several issues that deserve mention. First, the level of ICT infrastructure significantly contributed to government's willingness to implement e-participation in a country and its e-government maturity. Within e-participation, the effect of ICT infrastructure was positively associated with government's willingness to implement e-information sharing, e-consultation and e-decision-making. Further, the relationship between the levels of ICT infrastructure and e-government maturity was partially mediated by government's willingness to implement e-information sharing, e-consultation and e-decision-making. Post hoc analysis indicated that within ICT infrastructure, all its dimensions significantly contributed to the maturity of e-government in a country and its government's willingness to implement e-participation. Specifically, the dimensions of personal computers and the Internet users in comparison with telephone lines, mobile cellular subscriptions and fixed broadband subscribers had stronger effects on government's willingness to implement e-participation in a country and its e-government maturity. Thus, the availability of robust, reliable and sound ICT infrastructure will not only facilitate the growth and maturity of online public services (Shareef et al. 2011; Siau and Long 2009; Srivastava and Teo 2010) but also enhance the willingness of governments to engage its citizenry in e-government

process. Hence, this result suggests that when a country's investment in ICT infrastructure increases (1) its e-government should be able to reach the stage of maturity; and (2) it should be more willing to encourage its citizens to be active in promoting deliberative, participatory decision-making in public policy matters by implementing appropriate tools for participation.

Second, human capital was positively associated with government's willingness to implement e-participation in a country and its e-government maturity. Within e-participation, the effect of human capital was positively associated with government's willingness to implement e-information sharing, e-consultation and e-decision-making. Further, the effect of human capital was stronger in government's willingness to implement e-information sharing than in government's willingness to implement e-consultation and e-decision-making. Mediation results indicated that the relationship between the levels of human capital and e-government maturity was partially mediated by government's willingness to implement e-information sharing, e-consultation and e-decision-making. Post hoc analysis indicated that within human capital, both the dimensions significantly contributed to government's willingness to implement e-participation in a country and its e-government maturity. Specifically, the dimension of adult literacy rate in comparison with gross enrolment ratio exhibited stronger effects on them. This finding is in line with the human capital theory, which indicates that the investment in human capital generates returns in future (Lewis 1955; Schultz 1961). Therefore, investments in human capital will ensure the growth and maturity of e-government systems and enhancement of government's willingness to implement e-participation for promoting citizen engagement.

Third, results indicated that governance in a country had little impact on e-government maturity and government's willingness to implement e-participation. While strong positive correlations (see Table 2.4) of governance with e-government maturity and government's willingness to implement e-participation variables suggested strong positive

associations between them, the results indicated that the technology and organization contexts in the form of ICT infrastructure and human capital respectively were pivotal for e-government maturity and government's willingness to implement e-participation, compared to the environment context, governance. Further, mediation results indicated that the relationship between the levels of governance and e-government maturity was not mediated by government's willingness to implement e-participation. Though several past studies (e.g., Moon 2002; Norris and Moon 2005; Srivastava and Teo 2010; Von Haldenwang 2004; West 2004) had suggested governance as a significant determinant and contributor to e-government development, this study did not elicit a similar result. While it is gratifying that the findings (though not statistically significant) are in the same direction as past studies, it is necessary to do an in-depth analysis of governance (i.e., by looking individually at the six different dimensions of governance namely, voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption) to leverage its benefits in the context of e-government (refer to Essay 2 for an in-depth analysis of governance in relation to e-government maturity).

Finally, turning to the relationship between government's willingness to implement e-participation in a country and its e-government maturity, results indicated that of the three e-participation dimensions, government's willingness to implement e-information sharing and e-decision-making were positively associated with e-government maturity, and government's willingness to implement e-consultation was negatively associated. Further, between government's willingness to implement e-information-sharing and e-decision-making, the former had a stronger positive association with e-government maturity than the latter. One possible reason for variations in results may be due to the relative differences in their purpose. That is, as citizens set their own agenda for the debates in e-consultation (UN-Report 2010; 2012), it is likely that there might be often competing and multiple topics for

discussion that impede governability (Malik and Wagle 2002) because of which the growth and maturity of e-government gets jeopardized. Further, handling such agendas might require governments to invest in a lot of resources (e.g., appointing appropriate officials or representatives to communicate directly with the citizens for providing feedbacks on the debates they initiate (UN-Report 2010)). Predicated by these concerns, governments may be less willing to implement e-consultation though it is viewed as a policy instrument that is intended to enhance citizen participation in policymaking (Whyte and Macintosh 2002).

However, this trend may not be true in the context of government's willingness to implement 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 reason that citizens often trust their government and e-government websites (Teo et al. 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). Realizing this, governments will be more willing to implement e-decision-making by mature use of ICTs. In sum, results suggest that governments will be willing only to implement appropriate e-participation initiatives that do not jeopardize the e-government maturity process. In line with these differences pertaining to government's willingness in implementing different dimensions of e-participation in a country, future research might consider testing how their relationships with e-government maturity are affected by introducing several contingency variables such as public institutions and macro-economy (e.g., Srivastava and Teo 2008).

2.6. Implications

This essay makes some important contributions which have implications for both research and practice.

2.6.1. Implications for Research

This study extends and enriches the TOE theory in three ways. First, via theoretical synthesis, this study combines the attributes of the TOE theory with the citizen engagement perspective to understand the concept of government's willingness to implement e-participation in a country and its e-government maturity. Second, while the TOE theory has served as a useful theoretical lens for understanding innovation adoption in firms, this study is one among the few studies to extend its theoretical arguments in the global context and explore its usefulness at the macro-level. Specifically, by identifying the contextual factors in form of ICT infrastructure, human capital and governance (corresponding to the technology, organization and environment contexts respectively) affecting government's willingness to implement e-participation in a country and its e-government maturity, this study shows that the TOE theory is a useful theoretical lens for studying such a global concept. Third, while most studies utilizing the TOE theory as their guiding theoretical lens have used primary survey data for analyses, this study is among the few studies to demonstrate its applicability by making an innovative use of publicly available archival data. In sum, this study gives heed to the calls from researchers (e.g., Baker 2011) to extend and enrich TOE theory via approaches such as theoretical synthesis.

This study also contributes to research on e-government and e-participation in three ways. First, while extant studies (e.g., Alghamdi et al. 2011; Asogwa 2011; Farooquie 2011; Kovačić 2005) focused on e-government in terms of readiness (i.e., potential of a country to achieve e-government), this study is one among the few studies to center upon maturity, which indicates the demonstrated behaviour of e-government. Second, while most extant

studies on e-participation looked into the demand-side aspect of e-participation (e.g., Colombo 2010), this study, different from them offered a supply-side view (i.e., government perspective) of e-participation. Specifically, by drawing from the citizen engagement perspective, this study has constructed a multiple-mediation model, which (1) strives to further the understanding as to why differing levels of e-government maturity among countries continues to prevail; and (2) emphasizes that government's willingness implement e-participation in a country serve as a mediating activity through which the growth and maturity of e-government projects could be achieved. Third, by a deeper analysis of supply-side perspective of e-participation based on its dimensions (i.e., e-information sharing, e-consultation and e-decision-making), this study indicates that the willingness of a government to implement e-participation initiatives in a country varies based on its dimensions, which in turn affect e-government maturity.

2.6.2. Implications for Practice

From a practical standpoint, this study offers several important insights for practitioners and policy managers. First, by identifying the determinants of e-government maturity, this study not only helps them to understand why differing levels of growth and maturity of e-government continues to prevail but also shows directions for attaining the stage of maturity. Specifically, the findings from this study suggest that through investments in technological and human capabilities, it might be possible for a country to move up the ladder of e-government maturity. In other words, ICT infrastructure and human capital in a country rather than its governance are essential conditions for e-government to attain the stage of maturity. Second, by identifying the facilitators of supply-side perspective of e-participation, this study helps practitioners by showing directions to enhance governments' willingness towards the deployment of e-participation initiatives. Specifically, ICT

infrastructure and human capital in a country over its governance are the critical determinants for enhancing governments' willingness to implement or deploy tools for participation.

Third, findings from this study indicate that government's willingness to implement e-participation in a country plays a significant role in affecting its e-government maturity. Specifically, while government willingness to implement e-information sharing and e-decision-making positively contributes to e-government maturity, its willingness to deploy e-consultation negatively affects the growth and maturity of e-government in a country. These findings suggest to practitioners that while e-consultation is viewed as policy instrument that is intended to enhance citizen participation in policymaking, it is vital for them to realize that it might jeopardize e-government from reaching the stage of maturity. Thus, this study suggests that e-consultation is a double-edged sword. In sum, for a country's e-government to attain the stage of maturity, findings from this study imply that concerted efforts should be made by (1) investing in ICT infrastructure and human capital; and (2) enhancing government's willingness to implement appropriate e-participation initiatives.

2.7. Conclusion

In conclusion, despite an extensive recognition on citizen engagement (through e-participation) and e-government, both research and practitioner communities know relatively little from the global (or cross-country) perspective with regards to the (1) supply-side view of e-participation in a country; and (2) growth and maturity of its e-government. As an initial step to be taken towards raising awareness for the pivotal role of government's willingness to implement e-participation in a country for managing its e-government maturity, I have constructed and validated a theoretical model (specifically, a multiple-mediation model) that examined the effects of the TOE contextual factors on government's willingness to implement e-participation in a country and its e-government maturity. In addition, I reasoned

and demonstrated empirically the relationships of different dimensions of e-participation (from the government perspective) in form e-information sharing, e-consultation and e-decision-making in a country on its e-government maturity, and the mediating role of government's willingness to implement e-participation on the relationships between the TOE contextual factors and e-government maturity. Findings from this study contribute to the theoretical discourse on e-government by highlighting the roles of the TOE contextual factors on government's willingness to implement e-participation in a country and its e-government maturity, and provide indications for practice in managing e-government maturity by (1) enhancing government's willingness to implement appropriate e-participation initiatives; and (2) leveraging the effects of the TOE contextual factors on government's willingness to implement e-participation in a country and its e-government maturity.

Chapter 3

Essay 2: Does Governance Matter?

Investigating the Moderating Effects of Governance on ICT Infrastructure and E-Government Maturity[2]

Abstract

In this essay, utilizing the theory of complementarities, I examined the role of governance on the relationship between information and communication technology (ICT) infrastructure in a country and its e-government maturity. Specifically, I construed governance as consisting of six dimensions namely, voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption; and hypothesized that these governance dimensions complements the effect of ICT infrastructure on e-government maturity. Based on the archival data from 174 countries, results provided support for the hypothesized model. That is, while political stability, government effectiveness, rule of law and control of corruption moderated the relationship of ICT infrastructure and e-government maturity positively, voice and accountability moderated the relationship negatively. Further, the relationship between ICT infrastructure and e-government maturity was not contingent on regulatory quality. Findings from this study contribute to the theoretical discourse on e-government by identifying the differential roles of governance dimensions, and provide indications for practice in managing e-government

[2]An abridged version of this essay has been published in "Journal of the American Society for Information Science and Technology." The full citation is: Krishnan, S., and Teo, T. S. H. 2012, "Moderating Effects of Governance on Information Infrastructure and E-Government Development," *Journal of the American Society for Information Science and Technology* (63:10), pp. 1929-1946.

maturity by enhancing appropriate governance dimensions, thereby leveraging the effect of ICT infrastructure on e-government maturity.

3.1. Introduction

Findings pertaining to e-government maturity, defined as the extent to which a government in a country has established an online presence (Singh et al. 2007; UN-Report 2012), from Essay 1 are twofold. *First,* among the three contextual factors namely, ICT infrastructure, human capital and governance, ICT infrastructure was found to be the strongest predictor of e-government maturity. The implication from this result is that the availability of robust, reliable and sound ICT infrastructure facilitates the growth and maturity of online public services. This finding is consistent with prior studies on e-government. For instance, Srivastava and Teo (2010) indicate that "ICT infrastructure is vital for e-government…if there is poor (ICT) infrastructure, growth and maturity of e-government is greatly inhibited" (p. 247). Another study by Siau and Long (2009) highlight that "ICT plays an essential role in the growth and development of e-government…e-government needs to utilize all kinds of information and computer technology in order to deliver government information and services to the public" (p. 101). Further, Singh et al. (2007) establish that the maturity of e-government in a country depends on the state of ICT infrastructure, because such infrastructure limits the proportion of the citizenry that can be served by e-government services. Taken together, while it is widely acknowledged that the presence of sound and reliable ICT infrastructure in a country as a contextual factor is an enabling environment for its e-government maturity (UN-Report 2008), studies (e.g., Srivastava and Teo 2008) indicate that ICT infrastructure might have a greater impact on e-government maturity in the presence of certain other contextual factors, and calls for research to key out such factors. Motivated

by this, the main objective of this study is to identify the contextual factors that might enable the impact of ICT infrastructure on e-government maturity.

Second, governance as another contextual factor was found to have no significant effects on e-government maturity. Though past studies (e.g., Moon 2002; Norris and Moon 2005; Srivastava and Teo 2010; Von Haldenwang 2004; West 2004) suggest governance as a significant contributor to e-government growth and maturity, Essay 1 did not elicit a similar result. Although it is gratifying that this finding (while not statistically significant) was in the same direction as the aforementioned past studies, one reason for the variation in results might be because "national-level governance is increasingly limited to the narrow confines of e-government" (Meso et al. 2009, p. 54). Hence, to leverage the benefits of governance in the context of e-government, it necessary to do an in-depth analysis by construing governance as consisting of six dimensions: (1) voice and accountability; (2) political stability; (2) government effectiveness; (4) regulatory quality; (5) rule of law; and (6) control of corruption (Kauffmann et al. 1999).

As "good governance has the potential to contribute to the transformation of the public-sector, resulting in greater cost savings, enhanced efficiency and reduced administrative burden" (UN-Report 2008, p. 8), and as governance institutions and mechanisms are central to the growth and development of public-sector technological innovations in both developed and developing countries worldwide (Meso et al. 2006), it is logical to presume that governance as a contextual factor could enable (or complement) the impact of another contextual factor, ICT infrastructure on e-government maturity. That is, the aforementioned governance dimensions might positively moderate the positive effect of ICT infrastructure on e-government maturity. This presumption is in line with the Weill's (1991) concept of conversion effectiveness, where it is claimed that governance strongly influences how resources (here, ICT infrastructure) are effectively converted into productivity measures

(here, e-government maturity). In specific, this essay aims at answering the following research question (RQ):

> ***RQ2:*** *Can the effect of one contextual factor (i.e., governance in form of its six dimensions namely, (1) voice and accountability; (2) political stability; (3) government effectiveness; (4) regulatory quality; (5) rule of law; and (6) control of corruption) impact the relationship of another contextual factor (i.e., ICT infrastructure) in a country with its e-government maturity?*

While the complementary role of governance has seldom received attention in the global context (Meso et al. 2006), the role of governance is well illustrated in organizational productivity research (e.g., Soh and Markus 1995; Weill 1991). Further, previous research in information sciences (e.g., Morgan and Cong 2003) and development studies (e.g., Jessop 1998; Meso et al. 2006) has connected technology with governance. In addition, most studies examining the influence of governance on e-government have been undertaken via a qualitative approach (e.g., Madon et al. 2007). Unlike them, in this study, by drawing from the theory of complementarities (Grant 1996; Teece 1986), I seek to identify if indeed there is a quantitative merit in the moderating roles of governance dimensions on the positive relationship between ICT infrastructure and e-government maturity. While the insights I obtain in this study do not substitute the deep insights obtained from a qualitative assessment of the combined impacts of ICT infrastructure and governance within the narrow confines of a single case-study or a handful of comparative case studies, I believe that they will shed light on our understanding of the contributions of governance at the cross-country level by providing a macro-perspective of its complementary effects on ICT infrastructure and e-government maturity relationship.

The rest of this essay is organized as follows. First, using the theory of complementarities as the guiding theoretical lens, I explicate the significance of governance

as a complementary asset on the relationship between ICT infrastructure and e-government maturity. Thereafter, using archival data from 174 countries (see Appendix B for the list of countries), I test the hypothesized model. Lastly, I discuss the findings and their contributions to the knowledge base in e-government research and practice.

3.2. Literature Review and Hypotheses

3.2.1. Existing Perspectives on ICT Infrastructure

ICT (or information) infrastructure is the gradual convergence of broadcasting content, telecommunications and computing (Tapscott 1996). In organizational sense, it is envisioned as encompassing "all computerized networks, applications and services that citizens can use to access, create, disseminate and utilize digital information" (Selwyn and Brown 2000, p. 662). The impact of ICT infrastructure on the growth and maturity of e-government in a country can be explained by drawing arguments from the neoclassical and new growth theories, economic theories originally developed to understand the determinants of actual growth, differences in growth rates over time and space, and policies for raising growth rates (Siau and Long 2009). According to these 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, it is logical to presume that ICT infrastructure in a country can contribute towards the development of e-government projects as e-government maturity needs to utilize ICTs for delivery of public services (Siau and Long 2009). This is also stressed by Srivastava and Teo (2010). According to them, government and its agencies can fulfill their duties (that are related to the daily activities of citizens and businesses in a nation) effectively using e-government systems only when they are connected with the citizens and businesses, which indeed is possible only when a sound ICT infrastructure is in place. Warkentin et al. (2002) emphasize that e-government is

characterized by the extensive use of ICTs that stimulates the growth and maturity of e-government. Koh et al. (2005) and Singh et al. (2007) establish that e-government maturity will remain an unrealized dream in the absence of sound and reliable information infrastructure. Extant literature on public administration (e.g., Bellamy and Tylor 1998; Heeks 1999) also highlight the pivotal role of ICTs in the delivery of public services. Table 3.1 presents a sample list of studies connecting ICT infrastructure and e-government.

Table 3.1: Key Studies Linking ICT Infrastructure and E-Government

Authors	Findings
Koh et al. (2005)	Growth and development of e-government will remain an unrealized dream in the absence of sound and reliable ICT infrastructure.
Siau and Long (2009)	The higher the level of ICT in a country, the more mature is its e-government.
Singh et al. (2007)	The better ICT infrastructure of affluent nations puts them at an advantage with respect to the maturity of e-government.
Srivastava and Teo (2010)	ICT infrastructure is vital for the development of e-government. If there is poor infrastructure, development of e-government is greatly inhibited.
Warkentin et al. (2002)	E-government is characterized by the extensive use of ICTs that stimulate its development, growth and maturity.

As I have already hypothesized and tested the effect of ICT infrastructure (as a contextual factor) on e-government maturity in Essay 1, I now focus my efforts on explaining the criticality of the other contextual factor, governance in the context of e-government.

3.2.2. Existing Perspectives on Governance

Governance refers to the collection of processes and institutions that creates the conditions for ordered rule and collective action (Jessop 1998; Kazancigil 1998). Rhodes (1996) pp. 652-653) state that governance signifies "a change in the meaning of government, referring to a new process of governing; or a changed condition of ordered rule; or the new method by which society is governed." Governance connotes either of two things (Larmour 1995). The first is *effective government,* which refers to the performance of a government as judged by conventional economic parameters such economic growth, poverty and living

standards. The second connotation of governance relates to the *freedoms* accruing to citizens owing to their government's actions. In this context, governance is seen as fostering democracy, legitimacy of public offices and institutions, limits to state power, and transparency in government operations.

According to Kauffmann et al. (1999), governance includes (1) the process by which governments are selected, monitored and replaced; (2) the capacity of the government to effectively formulate and implement sound policies; and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them. Kauffmann et al. (1999) proposed six different but interrelated dimensions of governance: (1) voice and accountability; (2) political stability; (2) government effectiveness: (4) regulatory quality; (5) rule of law; and (6) control of corruption. These dimensions have since been adopted by the World Bank and employed as indices of governance quality in the world development reports (e.g., IBRD 2002). Table 3.2 presents the description of governance dimensions.

Table 3.2: Governance Dimensions and its Description

Dimension	Description
Voice and accountability	Captures the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
Political stability	Measures the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism.
Government effectiveness	Captures the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Regulatory quality	Captures the ability of the government to formulate and implement sound policies and regulations that permit and promote development.
Rule of law	Captures the extent to which agents have confidence in and abide by the rules of society, and in particular, the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Control of corruption	Captures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

As noted by Meso et al. (2009), the concept of governance is gaining increasing focus as a national-level construct owing to the rapidly growing domain of e-government. According to Chadwick and May (2003), there are three models of governance evident in the contemporary e-government implementations. First, in the *managerial model*, governance is seen as providing the citizenry with pertinent information services in an open, transparent and timely fashion. Second, in the *consultative model*, governance is comprehended as (1) receiving feedback and opinions from the general public in successful manner; and (2) using the opinions in policymaking process to inform and/or influence future governmental actions. And finally, in the *participatory model*, governance is perceived as open communications (i.e., voicing of one's concerns), where the opinions are not necessarily directed only to government but to all players within the governance communications space. Extant research has connected governance with several issues pertaining to e-government such as implementation, adoption, growth and maturity, etc. For instance, Huang (2007) indicate that e-government is essentially the embedding of digital technology in the thoroughly social process of governing a country. Likewise, Reddick (2004) highlight that e-government demands government transparency as it requires business rules to be codified. Madon et al. (2007) establish that effective implementation of government-based information systems (IS) for the provision of services is impacted by the macro-level policymaking organs; thereby shaping the type of system that eventually gets implemented. Moon (2002) finds that institutional factors significantly contribute to the adoption of e-government among municipalities. Norris and Moon (2005) indicate that the level of adoption and sophistication of e-government systems are correlated with the presence of well-developed institutional factors. A study by West (2004) highlights the importance of institutional arrangements and governance mechanisms in ensuring e-government growth and maturity. Similarly, McNeal et al. (2003) establish that legislative professionalism and professional networks are

associated with the extensive use of e-government. Tolbert and Mossberger (2006) indicate that when governments are unstable or do not enjoy the widespread mandate of the people, it is unlikely that e-government services would progress beyond basic information publishing. Recently, Srivastava and Teo (2010) established that public institutions in a country is positively associated with the maturity of its e-government. Table 3.3 presents a sample list of studies connecting governance and e-government.

Table 3.3: Key Studies Linking Governance and E-Government

Authors	Findings
Huang (2007)	E-government is essentially the embedding of digital technology in the thoroughly social process of governing a country.
Madon et al. (2007)	Effective implementation of government-based IS for the provision of services is impacted by the macro-level policymaking organs.
McNeal et al. (2003)	Legislative professionalism and professional networks are associated with extensive use of e-government.
Moon (2002)	Institutional factors significantly contribute to the adoption of e-government among municipalities.
Norris and Moon (2005)	The level of adoption and sophistication of e-government systems are correlated with the presence of well-developed institutional factors.
Reddick (2004)	E-government demands government transparency as it requires business rules to be codified.
Srivastava and Teo (2010)	Public institutions in a country is positively associated with the maturity of its e-government.
Tolbert and Mossberger (2006)	When governments are unstable, it is unlikely that e-government services would progress beyond basic information publishing.
West (2004)	Institutional arrangements and governance mechanisms in a country ensures the growth and maturity of its e-government.

In sum, there are strong reasons from past literature to believe that governance in a country as a contextual factor significantly contributes to the growth and maturity of its e-government. Further, as "good governance has the potential to contribute to the transformation of the public-sector, resulting in greater cost savings, enhanced efficiency and reduced administrative burden" (UN-Report 2008, p. 8), and as governance institutions and mechanisms are central to the growth and development of public-sector technological innovations in both developed and developing countries worldwide (Meso et al. 2006), I propose governance (in form of the aforementioned dimensions) as a contextual factor that

could complement the effect of another contextual factor, ICT infrastructure on e-government maturity. In the ensuing section, drawing from the theory of complementarities, I outline the theoretical rationale pertaining to the complementary role of governance dimensions on the relationship between ICT infrastructure and e-government maturity.

3.2.3. Theory of Complementarities

The resource based view (RBV) of a firm is an influential framework within the field of strategic management that positions firms as specific collection of resources and capabilities that can be deployed to achieve competitive advantage over their competitors (Barney 1991). It suggests that differences in firm performance are primarily the result of resource heterogeneity across firms. That is, firms that are able to accumulate resources and capabilities which are rare, valuable, non-substitutable and imperfectly imitable will achieve an advantage over competitors (Barney 1991; Wade and Hulland 2004). Firm resources are defined as tangible and intangible assets and competencies owned or controlled by the firm that can be used to conceive and implement competitive strategies (Jarvenpaa and Leidner 1998). Capabilities refer to a firm's capacity to deploy resources using organizational processes (Amit and Schoemaker 1993).

Researchers have noted the contribution of new applications and combinations of existing resources to competitive advantage (Grant 1996). Teece (1986) introduced the concept of complementarities (or complementary assets), which are resources or capabilities that allow firms to capture the profits associated with a strategy, technology or innovation. He suggested that for commercializing the design for a new product in a profitable way, a firm needs access to complementary manufacturing and distribution facilities on favorable terms. Even if other firms can imitate the new product, they will not be able to gain competitive advantage from this imitation if they do not have access to the necessary complementary

assets. In the RBV literature, complementarities have been conceptualized in two different ways (Ravichandran and Lertwongsatien 2005). First, according to the *resource co-presence view* (or interaction perspective), firm resources are considered complementary when the presence of one resource enhances the value of another resource. That is, a resource produces greater returns if certain other resources are present than it would produce by itself. Second, the *resource channeling view* argues that complementarities arise when resources and capabilities are used in mutually reinforcing manner. This is based on how resources are channelized and utilized in a firm.

While the concept of complementarities were originally proposed to study a firm-level concept (Teece 1986), several researchers has extended its core arguments to different levels (e.g., country-level) and established its usefulness in various empirical settings. For instance, Srivastava and Teo (2008), extending the complementarity perspective, established that e-government development in a country in association with national complementary assets such as human capital, public institutions and macro-economic conditions has the potential to enhance its business competitiveness. Consistent with them, in this study, I propose the aforementioned six dimensions of governance as complementarities that will affect the relationship of ICT infrastructure with e-government maturity as governance is "a viable explanation for differences in the ways countries exploit ICT (or information) infrastructures" (Meso et al. 2009, p.53); and have the potential to contribute to the transformation of the public-sector, resulting in greater cost savings, enhanced efficiency and reduced administrative burden (UN-Report 2008); and can leverage the effect of ICT infrastructure on national development efforts including ICT-led developments (Meso et al. 2006). The diagrammatic representation of the research model with hypotheses indicated is presented in Figure 3.1.

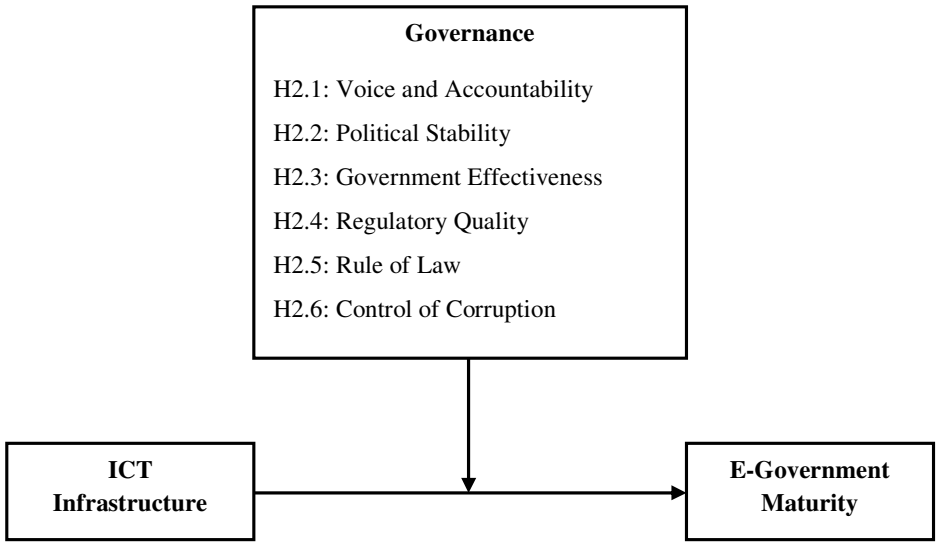

Figure 3.1: Research Model of Essay 2

An application of the concept of governance dimensions as complementarities can explain why only some countries are able to attain high levels of e-government maturity from ICT infrastructure investments. In this study, complementarities can be defined as assets that are required to attain high levels of e-government maturity from ICT infrastructure. If the investment of ICT infrastructure requires good governance, only countries that possess such governance will be able to attain high levels of e-government maturity from investing in such infrastructures. That is, governance will moderate the relationship between ICT infrastructure and e-government maturity. This argument is in line with what Weill (1991) termed as conversion effectiveness, where it is claimed that governance strongly influences how resources (i.e., ICT infrastructure) are effectively converted to productivity measures (i.e., e-government maturity). In the next section of this essay, I derive and explain each hypothesis.

3.2.4. Hypotheses Development

3.2.4.1. Moderating Influence of Voice and Accountability

Voice and accountability is an important dimension of governance because citizens as well as government institutions have a role to play in delivering governance that works for

the poor and enhances democracy. As noted in Goetz and Jenkins' (2001, 2002) model of voice and accountability, voice refers to a variety of formal and informal mechanisms through which people express their preferences, opinions and views; and accountability refers to the nature of relationship between two parties (e.g., citizens and government officials). Further, accountability concerns the requirement that officials answer to stakeholders on the disposal of their powers and duties, act on criticisms or requirements made of them and accept responsibility for failure, incompetence or deceit (UNDP 1997). According to Kaufmann et al. (1999), voice and accountability concerns the civil liberties and political rights of the individuals, their freedom of expression, electoral participation and independence of media. Citizens' ability to express and exercise their views has the potential to influence government priorities. Further, they have the capacity to shape the governance processes by demanding transparency and accountability. Government in a country will be accountable to the needs and demands of its citizens only when they are clearly articulated (i.e., when their voice is effective). In the context of public-sector reform, effective voice and accountability mechanisms in a country have a potential to transform governmental actions and decisions by (1) demanding appropriate channels for deliberative, participatory decision-making in public policy; and (2) addressing the demand-side aspects of public service delivery, monitoring and accountability. Given this, it is appropriate to argue that such mechanisms will help in (1) strengthening the links between citizens and local government; and (2) assisting local authorities and service providers to become more responsive and effective. In sum, when voice and accountability in a country is effective, the level of sophistication of its online public services will progress beyond basic information publishing to transactional and connected service. Therefore, voice and accountability when combined with ICT infrastructure, they will lead to the higher levels of e-government maturity in a country. That is, effective voice and accountability in a country will complement the effect of

ICT infrastructure on the growth and maturity of its e-government. Consequently, I hypothesize:

H2.1: *Voice and accountability positively moderates the relationship between ICT infrastructure and e-government maturity in a country.*

3.2.4.2. Moderating Influence of Political Stability

Political stability involves the likelihood of premature overthrow of government (e.g., coup d'état), domestic violence and terrorism, and forced discontinuities in policies (Kaufmann et al. 1999). Consequently, it is a measure of the degree of turbulence in a country (Meso et al. 2006). Research suggests that political instability may adversely affect economic growth. For instance, Cukierman (1992) argue that governments in politically unstable and polarized countries are more likely to adopt inefficient or suboptimal policies, including the maintenance of inefficient tax systems, higher current government consumption or the accumulation of larger external debts, which in turn adversely affect long-run economic growth. Sadowsky (1993, 1996) linking political stability with foreign direct investment (FDI) and with the risks associated with such investments, establish that the greater the degree of turbulence, the more risky it is to invest in the country. Meso et al. (2006) emphasize that the level of political stability in a country has the potential to influence the level of engagement by local citizens in productive economic activity. That is, in situations of high political instability, citizens will be more likely to retire their productive resources, transfer them to more stable environments or convert them into assets that will protect them against possible loss of life and wealth, thereby resulting in economic productivity loss. Such a situation is not only limited to economic development and prosperity but also can affect other dimensions of national development such as social development and ICT-led developments. For instance, Kasigwa (2006, p. 78) in their

discussion on the role of ICTs and their sustainability in the context of developing countries, indicate that "technological infrastructure and political stability are crucial factors for ICT-led development." Further, as ICT-led developments such as e-government is a major transformational exercise in change management, strong political leadership and stable political conditions are required for e-government applications to (1) overcome resistance and barriers; (2) change mindsets; (3) push through organizational change; and (4) sustain investment (Sudan 2005). Another exploratory study by Al-Solbi and Al-Harbi (2008), specific to the context of Saudi Arabia, highlight political instability in Middle East as a critical determinant affecting the success of e-government in the country. Further, they generalize by arguing that such instability in any region or country will reduce ICT-led investments and will have a negative impact on the ICT-led developments. In sum, under the conditions of high political stability in a country, the level of its e-government maturity will be higher. Therefore, political stability when combined with ICT infrastructure, they will lead to the higher levels of e-government maturity in a country. That is, political stability in a country will complement the effect of ICT infrastructure on the growth and maturity of its e-government. Consequently, I hypothesize:

H2.2: *Political stability positively moderates the relationship between ICT infrastructure and e-government maturity in a country.*

3.2.4.3. Moderating Influence of Government Effectiveness

The goals and objectives of a government in a country can be multifarious ranging from economic to social (Srivastava and Teo 2007a). Whereas economic objectives are concerned with making a nation (and its businesses) competitive, social objectives are related to enhancing the lives of its citizens by reducing poverty and social inequalities. It is a widely acknowledged thought that governments can accomplish such objectives only when it is

committed to its stakeholders (i.e., citizens and businesses) in delivering goods and services (Kaufmann et al. 1999). In other words, governments should be effective in producing and implementing good policies and systems, and delivering public services online to achieve such objectives. That is, governments will be instrumental in developing e-government initiatives and delivering online public services only when its (1) national institutions are effective; (2) resource allocation is efficient; (3) quality of public administration is effectual; (4) civil servants are competent; and (5) civil service is independent from political pressures (Kaufmann et al. 1999). For instance, about few years ago, in Singapore, applying for licenses was a daunting task for many startups and existing businesses. As most business activities commonly were under the purview of more than one agency, many businesses had to visit different agencies to apply for licenses, which resulted in significant opportunity and compliance costs for them. After the government launched the Online Business Licensing Service (a seamless system for businesses to apply for required licenses), applicants have to submit only one online form, and the average approval processing time was reduced by 65%, from an average of 21 to 8 days (Teo and Koh 2010). Such a development and level of sophistication in delivering online public service was possible only due to the government's effectiveness and its commitment to its citizens and businesses. In sum, under the conditions of high government effectiveness in a country, the level of its e-government maturity will be higher. Therefore, government effectiveness when combined with ICT infrastructure, they will lead to the higher levels of e-government maturity in a country. That is, government effectiveness in a country will complement the effect of ICT infrastructure on the growth and maturity of its e-government. Consequently, I hypothesize:

H2.3: *Government effectiveness positively moderates the relationship between ICT infrastructure and e-government maturity in a country.*

3.2.4.4. Moderating Influence of Regulatory Quality

Regulatory quality in a country is more focused on the policies themselves (Meso et al. 2006). According to Kaufmann et al. (1999), regulatory framework is concerned with the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development. Similarly, Radaelli (2007) indicate that improvements in regulatory performance include targets of burden reduction, cost effective regulation and increased reliance on market-friendly alternatives to regulation. As noted in the new growth theory, formulation of policies concerning pro-growth trade is a required condition for growth and development (Romer 1986; Lucas 1988). A large scale study conducted by the World Economic Forum (WEF) highlight that the regulatory environment in a country is a critical determinant of its ICT-led innovations and investments (Dutta and Mia 2010). Similarly, Schware (2005) stress the need for effective (or high quality) regulatory frameworks for the adoption and use of e-applications. Further, he highlight that regulatory reforms provide a positive enabling environment for ICT-led developments in a country. Another study by Neto et al. (2005), establish that regulatory reforms can play an important role in promoting competition and ICT investment, causing ICT prices to drop and extending access to more advanced ICT services. Further, they indicate that differences in regulatory quality generally account for a large part of the gap in technology use between countries. In sum, when the quality of regulatory framework is high, it is more likely that e-government services would progress beyond basic information publishing. That is, the level of sophistication of e-government will mature from emerging information services to transactional and connected services (UN-Report 2010). Therefore, regulatory quality when combined with ICT infrastructure, they will lead to the higher levels of e-government maturity in a country. That is, regulatory quality in a country will complement the effect of

ICT infrastructure on the growth and maturity of its e-government. Consequently, I hypothesize:

H2.4: *Regulatory quality positively moderates the relationship between ICT infrastructure and e-government maturity in a country.*

3.2.4.5. Moderating Influence of Rule of Law

Rule of law concerns the extent to which agents have confidence in and abide by the rules of society (Kaufmann et al. 1999). These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary and the enforceability of contracts. Together, these indicators measure the success of a society in developing an environment in which fair and predictable rules form the basis for economic and social interactions, and importantly, the extent to which property rights are protected. Meso et al. (2006) establish that the rule of law lies at the crux of the national development efforts. Further, they highlight that the legal framework to create an efficacious judiciary to administer the law, "forms a quintessential part of governance" (p. 194). In a report prepared for the World Summit on the Information Society, Schware (2005) stress the need for harmonizing the legal frameworks across countries for ensuring the cross-border interoperability of the Internet-based applications. This result is also observed by Satola et al. (2004) in their research on 23 countries in the East Asia and Pacific region. Further, Neto et al. (2005) highlight that ICT activity (in a country) depends significantly on appropriate legal frameworks (particularly, respect for the rule of law). Another study by Guermazi and Satola (2005, p. 23) establish that "it is critical for countries to adopt enabling legal environments that support e-development." As legal frameworks and laws provide a range of civil and criminal penalties and enforcement procedures, they are particularly essential to advance the e-government development agenda of a country. This finding is also observed in the recent longitudinal

study by Dutta and Mia (2010). Specifically, they note that legal frameworks facilitate ICT penetration and ICT-led innovations. In sum, under the conditions of effective legal frameworks in a country, the level of its e-government maturity will be higher. Therefore, rule of law when combined with ICT infrastructure, they will lead to the higher levels of e-government maturity in a country. That is, rule of law in a country will complement the effect of ICT infrastructure on the growth and maturity of its e-government. Consequently, I hypothesize:

H2.5: *Rule of law positively moderates the relationship between ICT infrastructure and e-government maturity in a country.*

3.2.4.6. Moderating Influence of Control of Corruption

Corruption is defined as the acts in which the power of public officials is used for personal gains in a manner that contravenes the rules of the game (Jain 2001). Such acts can take many forms, including bribery, embezzlement, theft, extortion, abuse of discretion, favoritism, exploiting conflicting interests and improper political contributions (UNODC 2004). Corruption in a country buckles the reward structure spelled out by the government regulations and institutions (Senior 2004), and often leads to unproductive behaviors (Rodriguez et al. 2005). The presence of corruption is often a clear appearance of a lack of respect of both the corrupter (e.g., citizen or private firm) and the corrupted (e.g., public official or politician) for the rules that govern their interactions, and hence represents a failure of governance (Meso et al. 2006). It is widely acknowledged that control of corruption in a country can facilitate its growth and development by strengthening institutions, lowering business costs, encouraging domestic and foreign investments, and deteriorating a perverse incentive system. On the other hand, a country in which corruption is endemic is usually plagued with widespread economic inefficiency (UNDP 2008). Extant studies have shown

that the existence of corruption in a country will hinder the growth of e-government (and other ICT-led developments) and will affect its level of sophistication (or maturity). For instance, Yoon and Chae (2009, p. 34) indicate that "corruption actually lowers the effectiveness of national e-strategy and its implementation." Further, Kim et al. (2009) and Lio et al. (2011) suggest that countries should embed effective strategies for fighting corruption in the design of the e-government system and stress the need for stronger leadership in implementing such systems. Few studies have acknowledged that corruption might hinder the introduction of ICTs (e.g., Oruame 2008; Quibria et al. 2003). In sum, when corruption in a country is under control, the level of its e-government maturity will be higher. Therefore, control of corruption when combined with ICT infrastructure, they will lead to the higher levels of e-government maturity in a country. That is, control of corruption in a country complements the effect of ICT infrastructure on the growth and maturity of its e-government. Consequently, I hypothesize:

H2.6: *Control of corruption positively moderates the relationship between ICT infrastructure and e-government maturity in a country.*

A summary of the hypotheses pertaining to this essay are presented in Table 3.4.

Table 3.4: Summary of Hypotheses of Essay 2

Hypotheses	Description
H2.1	Voice and accountability positively moderates the relationship between ICT infrastructure and e-government maturity in a country.
H2.2	Political stability positively moderates the relationship between ICT infrastructure and e-government maturity in a country.
H2.3	Government effectiveness positively moderates the relationship between ICT infrastructure and e-government maturity in a country.
H2.4	Regulatory quality positively moderates the relationship between ICT infrastructure and e-government maturity in a country.
H2.5	Rule of law positively moderates the relationship between ICT infrastructure and e-government maturity in a country.
H2.6	Control of corruption positively moderates the relationship between ICT infrastructure and e-government maturity in a country.

3.3. Research Design

To test the formulated hypotheses, I 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 and Teo 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 and Nathan 1985); and (3) robust to the threat of common method bias (Woszczynski and Whitman 2004). Hypotheses were tested via a cross-sectional analysis of 174 countries (after omitting the missing values) for a period of 2010 and 2012. According to Hair et al. (2006), 50 is the minimum number required to avoid degrees of freedom and efficiency problems. Further, as average scores (of two year datasets) provide more accurate and stable estimates than single year datasets (Wiggins and Ruefli 2005); I used a cross-section for the period 2010 and 2012. The concept of using average scores over single year datasets is consistent with what has been done in previous cross-country level studies from strategy literature (e.g., Brouthers et al. 2008; Habib and Zurawicki 2001; Voyer and Beamish 2004). The primary sources of data were the UN E-Government Survey Reports (UN-Report 2010; 2012), the World Bank's Worldwide Governance Indicators database 2013 (WGI-Database 2013), and the World Bank's World Development Indicators database 2013 (WDI-Database 2013). In the following section of this essay, I describe the operationalization of study variables.

3.3.1. Operationalization of Constructs

3.3.1.1. Dependent Variable

For this study, the dependent variable is *e-government maturity*, which reflects the demonstrated behaviour of e-government in a country. It was measured using the online

service index, which assess the extent to which a government has established an online presence (UN-Report 2010; 2012). The scores for this index were obtained from the UN E-government Survey Reports (UN-Report 2010; 2012), and was based upon the UN's four stage model of e-government maturity. The four stages were: (1) emerging presence; (2) enhanced presence; (3) transactional presence; and (4) connected presence. Countries were coded in consonance with what they provide online and the stage of e-government maturity they were presently in. Hence, as a country migrated upwards through various stages, it was ranked higher in the index. To arrive at a set of the online service index values, the UN assessed each country's national website, including the national central portal and e-services portal, as well as the websites of the related ministries of education, labor, social services, health, finance and environment as applicable (UN-Report 2010; 2012). The values for this index ranged between 0 and 1, with the higher values corresponding to the higher level of e-government maturity. The value for a given country was equal to the total number of points scored by that country less the lowest score for any country divided by the range of values for all countries in the survey (UN-Report 2010; 2012). This index has been used in past studies such as Siau and Long (2006, 2009), and Srivastava and Teo (2007a, 2008, 2010).

3.3.1.2. Independent Variable

The independent variable for this study is *ICT infrastructure,* which is the gradual convergence of broadcasting content, telecommunications and computing (Tapscott 1996). In organizational sense, ICT infrastructure is envisioned as encompassing "all computerized networks, applications and services that citizens can use to access, create, disseminate and utilize digital information" (Selwyn and Brown 2000, p. 662). It was measured using the telecommunications infrastructure index, taken from the UN E-government Survey Reports (UN-Report 2010; 2012) and was a composite of five primary indicators: (1) number of

personal computers per 100 persons; (2) number of Internet users per 100 persons; (3) number of telephone lines per 100 persons; (4) number of mobile cellular subscription per 100 persons; and (5) number of fixed broadband subscribers per 100 persons. For computing this index, the UN followed three steps. First, based on the scores of the indicators (for countries), a maximum and minimum value was selected for each of the five indicators. Second, the country's relative performance (for each indicator) was measured by a value between 0 and 1 based on the formulae: Indicator value = (Actual value - Minimum value) / (Maximum value - Minimum value). Third, the telecommunications infrastructure index was constructed as a composite measure based on the formulae: Telecommunications Infrastructure Index = Average (personal computer index + Internet user index + telephone line index + mobile subscription index + fixed broadband index). The values for this index ranged between 0 and 1, with the higher values corresponding to the higher levels of ICT infrastructure. This index has been used in past academic studies like Siau and Long (2009), Singh et al. (2007), and Srivastava and Teo (2010).

3.3.1.3. Moderating Variables

There were six moderating variables in this study: *voice and accountability; political stability; government effectiveness; regulatory quality; rule of law;* and *control of corruption.* Each variable reflected the quality of governance in a country in some aspect (see Table 3.5 for the sample concepts measured under each dimension of governance), the values for which ranged between -2.5 and 2.5 (with the higher values corresponding to the better governance). The research team led by Kaufmann followed a three-step procedure to compute the scores for each of the aforementioned six variables: (1) assigning data from individual sources to aggregate indicator; (2) preliminary rescaling of the individual source data to run from 0 to 1; and (3) using an unobserved components model (a statistical tool) to make the 0-1 rescaled

data comparable across sources, and then to construct a weighted average of the data from each source for each country. Data for these variables were taken from the World Bank's Worldwide Governance Indicators Database (WGI-Database 2013), and was for the period 2010 and 2012. These measures have been used in studies such as Meso et al. (2006, 2009).

Table 3.5: Governance Dimensions and Concepts Measured

Dimension	Examples of Concepts Measured
Voice and accountability	Accountability of public officials, Freedom of political participation, Transparency of economic policy
Political stability	Government stability, Internal and external conflicts, Frequency of political killings
Government effectiveness	Institutional effectiveness, Bureaucratic quality, Quality of public administration
Regulatory quality	Administrative regulations, Business regulatory environment, Trade policy
Rule of law	Property rights, Law and order, Law enforcement
Control of corruption	Anti-corruption policy, Public trust in financial honesty of politicians, Frequency of household bribery

3.3.1.4. Control Variables

Additional control variables consisted of *economic condition of a nation, human capital,* and *regional difference*. I selected these three control variables, since they were both consistent with prior macro-level studies on e-government (e.g., Siau and Long 2006; Singh et al. 2007), and also makes logical sense in the regression model. The first control variable, economic condition of a nation depends both on the value of nation's products and services, measured by the prices they can command in open markets, and also on the efficiency with which they are produced (Porter 2006). Hence, consistent with extant studies (e.g., Srivastava and Teo 2010), I used Porter's productivity paradigm for operationalizing economic condition of a nation in terms of its GDP per capita (adjusted for purchasing power parity, PPP), the values for which were obtained from the World Bank's World Development Indicators database 2013 (WDI-Database 2013). Alike the main variables, I used average of 2010 and 2012 scores for this control variable.

The second control variable, human capital was measured using the human capital index with a value running between 0 and 1 (with the higher values corresponding to the higher levels of human capital). This index, taken from the UN E-government Survey Reports (UN-Report 2010; 2012) was a composite of the adult literacy rate and the gross enrolment ratio. While adult literacy rate was the percentage of people aged 15 years and above who can, with understanding, both read and write a short simple statement on their everyday life; gross enrolment ratio was the total number of students enrolled at the primary, secondary and tertiary level, irrespective of age, as a percentage of the population of school age for that level. This index has been used in past academic studies like Siau and Long (2009), Singh et al. (2007), and Srivastava and Teo (2008, 2010). Alike the main variables, I used average of 2010 and 2012 scores for this control variable.

The third control variable, regional difference was operationalized as the country-level difference across various regions of the world. Specifically, based on the UN's regional groupings, I coded 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)).

3.4. Analysis and Results

3.4.1. Descriptive Statistics and Correlations

Table 3.6 presents the descriptive statistics and correlations for all variables in the study. From the table, it is evident that most correlations among variables were significant at $p<0.001$. Further, as most correlations among variables were below the threshold value of 0.8, the concern for multicollinearity would be minimal (Gujarati 2003; Gujarati and Porter 2009). Although the correlations between (1) government effectiveness and regulatory quality ($r=0.80$); and (2) regulatory quality and rule of law ($r=0.81$) indicate a potential for multicollinearity, our use of robust method of moderated multiple regression to test the

hypotheses generally mitigates any undue influences (Hair et al. 2006). Further, considering the fact that these variables measure distinct parameters (Kaufmann et al. 1999) and are used as standard measures of governance quality in the world development reports (IBRD 2002), the high correlations may not seriously affect the results. Nevertheless, I followed up with the diagnostic statistical collinearity tests that measure variance inflation factor (VIF). VIF assesses the effect that the other independent (and moderating) variables have on the standard error of a regression coefficient (Hair et al. 2006; Husted 1999). That is, it measures the degree to which collinearity among the predictors degrades the precision of an estimate. The results of these tests revealed that our VIFs ranged from 1.39 to 3.27 (all tolerance levels above 0.30). A VIF of above 4.0, or a tolerance level below 0.25, may indicate the potential for multicollinearity (Fox 1991); thus, the concern in our model appeared to be minimal.

Table 3.6: Descriptive Statistics and Correlations of Essay 2

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Economic Condition[a]	8.24	1.27	-									
2. Human Capital	0.76	0.17	0.64	-								
3. Regional Difference	2.73	1.15	-0.24	-0.22	-							
4. ICT Infrastructure	0.24	0.22	0.65	0.62	-0.27	-						
5. Voice and Accountability	-0.10	0.99	0.52	0.48	-0.44	0.59	-					
6. Political Stability	-0.09	0.97	0.60	0.51	-0.20	0.54	0.57	-				
7. Government Effectiveness	-0.02	0.96	0.62	0.64	-0.22	0.69	0.58	0.62	-			
8. Regulatory Quality	-0.02	0.95	0.63	0.58	-0.31	0.63	0.57	0.60	0.80	-		
9. Rule of Law	-0.07	0.97	0.62	0.54	-0.18	0.65	0.56	0.61	0.70	0.81	-	
10. Control of Corruption	-0.05	1.01	0.58	0.51	-0.25	0.65	0.58	0.58	0.69	0.69	0.69	-
11. E-Government Maturity	0.32	0.23	0.61	0.54	-0.17	0.62	0.49	0.31	0.58	0.64	0.60	0.54

Note: [a]Log transformed variable; N = 174; M = Mean; SD = Standard Deviation; All correlations (except those underlined) are significant at $p<0.01$ (2-tailed) and underlined correlations are significant at $p<0.05$ (2-tailed).

3.4.2. Procedures Followed by the Reporting Agencies to Enhance the Reliability and Validity of Data

While the measures I used in this study were used by prior studies, it is worthy to note that the reporting agencies followed rigorous procedures for ensuring the reliability and validity of the data. For instance, while computing the online service index, the UN's assessment involved identification of the national and ministerial websites by its research team following a uniform set of guidelines (e.g., using a variety of search engines to locate the most relevant site when no responses were received from the Member States). Researchers were instructed and trained to scrutinize the websites very closely. The national sites were tested for a minimal level of web content accessibility as described in the Web Content Accessibility Guidelines of the World Wide Web Consortium. The research team was fully equipped to handle the official languages of the UN. Further, translators provided assistance as necessary. And, a web-based information management system was used for managing the survey effort and tracking results. To ensure that the websites were rated with maximum objectivity and accuracy, the second-level quality assurance group validated the data received from the primary research team. This resulted in adjustment of scores for a number of countries (UN-Report 2010; 2012).

Similarly, the research team led by Kaufmann for computing the scores pertaining to governance variables not only followed a three-step procedure described above (see section on 'Operationalization of Constructs') but also used multiple sources to gather the data, which included surveys of (1) households and firms; (2) commercial business information providers; (3) non-governmental organizations; and (4) public-sector organization (Kaufmann et al. 2010). In summary, I used the data directly from these reports as the data collecting agencies are trustworthy and followed stringent guidelines for ensuring its reliability and validity.

3.4.3. Hypotheses Testing

I used moderated multiple regression technique for testing the research hypotheses as it is an established method for testing the interaction effects and has been used in many similar studies in the fields of strategic management, IS, international business and macro-economics. I adopted the method recommended by Aiken and West (1991) for examining interactions in regression methods where I first centered or linearly-rescaled each of the two variables by subtracting the mean from each country's score for each variable to reduce the effect of multicollinearity between the interacting term and the main effect. All interaction terms were assessed simultaneously so that their effects could be seen in the context of the overall model (i.e., in the presence of other interaction effects) (Kankanhalli et al. 2005). Specifically, as a first step, the control variables namely, economic condition, human capital and regional difference were entered into the regression equation. In steps 2 and 3, I entered the independent variable (and moderating variables) and interaction terms respectively into the regression equation.

A summary of the regression results are presented in Table 3.7. The R^2 value of 0.70 and adjusted R^2 value of 0.68 ($F=23.49$, $p<0.001$) indicated that the overall model was effective in explaining the variance in e-government maturity. The change in R^2 value between steps 2 and 3 of regression was 0.03 (change in $F=9.16$, $p<0.01$), indicating that the outcome of the third step (i.e., testing of moderation effects) could be interpreted. Although not hypothesized, as shown in Table 3.7 (step 2), ICT infrastructure had a strong positive association with e-government maturity ($\beta=0.51$, $p<0.001$). Further, of the six governance dimensions, while political stability ($\beta=0.26$, $p<0.05$), government effectiveness ($\beta=0.35$, $p<0.01$) and rule of law ($\beta=0.47$, $p<0.001$) had significant positive associations with e-government maturity, voice and accountability ($\beta=-0.19$, n.s.), regulatory quality ($\beta=0.05$, n.s.) and control of corruption ($\beta=0.17$, n.s.) were not

significantly associated with it. Turning now to the complementary effects of governance dimensions on ICT infrastructure and e-government maturity relationship, of six interaction terms, five were significant (see Table 3.7, step 3). That is, the positive relationship of ICT infrastructure with e-government maturity were influenced by voice and accountability (β=-0.32, p<0.01), political stability (β=0.27, p<0.05), government effectiveness (β=0.36, p<0.01), rule of law (β=0.47, p<0.001) and control of corruption (β=0.34, p<0.01). Also, ICT infrastructure and e-government maturity relationship was not influenced by regulatory quality (β=0.11, n.s.).

Table 3.7: Regression Results of Essay 2

Variables and Statistics	β[a]		
	Step 1	**Step 2**	**Step 3**
Controls			
Economic Condition[b]	0.44***	-0.06	-0.11
Human Capital	0.21*	0.20*	0.21*
Regional Difference	0.02	0.04	0.03
Main Effects			
ICT Infrastructure (ICT Infra)		0.51***	0.54***
Voice and Accountability (VA)		-0.19	-0.25*
Political Stability (PS)		0.26*	0.28*
Government Effectiveness (GE)		0.35**	0.31**
Regulatory Quality (RQ)		0.05	0.21*
Rule of Law (RL)		0.47***	0.43***
Control of Corruption (CC)		0.17	0.35**
Interaction Effects			
ICT Infra × VA			-0.32**
ICT Infra × PS			0.27*
ICT Infra × GE			0.36**
ICT Infra × RQ			0.11
ICT Infra × RL			0.47***
ICT Infra × CC			0.34**
R	0.42	0.66	0.70
Adjusted R^2	0.41	0.63	0.68
F	45.71***	32.65***	23.49***
R^2 Change		0.24	0.03
F Change		13.06***	9.16**

Note: [a]The betas reported is based on standardized coefficients; [b]Log transformed variable; N=174; *p<0.05 **p<0.01 ***p<0.001 (2-tailed).

To determine if the patterns characterizing the significant interactions conform to the directions as proposed in the research hypotheses, I graphed the interaction effects (see Figures 3.2 to 3.6). This procedure was recommended by Cohen and Cohen (1983) for all interaction cases. In addition, to examine the consistency of the proposed direction throughout the range of independent variable, I performed simple slope analysis as recommended by Aiken and West (1991). This analysis reflects whether the slopes relating the independent and dependent variables differ from zero.

Figure 3.2 shows the disordinal (or cross-over) interaction of voice and accountability on the relationship between ICT infrastructure and e-government maturity. As shown, while there was a significant positive relationship between ICT infrastructure and e-government maturity at the low levels of voice and accountability, there was an insignificant positive relationship at the high levels of voice and accountability. Further, it is evident from the figure that there was little or no difference in e-government maturity values between the low and high levels of voice and accountability when ICT infrastructure was low but there was a substantial difference in e-government maturity values between the low and high levels of voice and accountability in favor of low voice and accountability when ICT infrastructure was high. Confirming this, a simple slope analysis revealed that when voice and accountability was high, the relationship of ICT infrastructure with e-government maturity was positive and insignificant (slope=0.19, t=1.11, n.s.). And, when voice and accountability was low, the relationship between ICT infrastructure and e-government maturity was positive and significant (slope=0.78, t=6.81, $p<0.0001$). This interaction contradicts H2.1, which suggested that a high voice and accountability would be associated with the steeper positive slope. Hence, H2.1 was not supported.

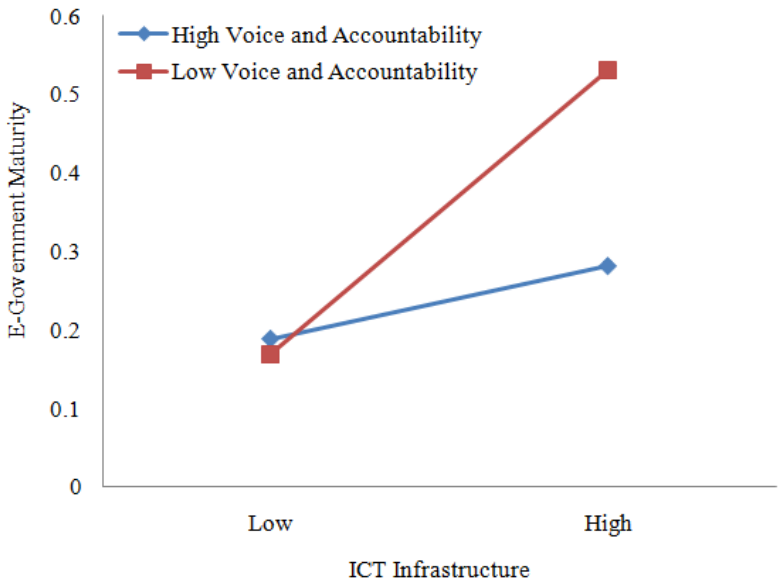

Figure 3.2: Interaction Plot for ICT Infrastructure × Voice and Accountability

Figure 3.3 shows the disordinal interaction of political stability on the relationship between ICT infrastructure and e-government maturity. As shown, while there was a significant positive relationship between ICT infrastructure and e-government maturity at the high levels of political stability, there was an insignificant positive relationship at its low levels. Further, it is evident from the figure that there was little difference in e-government maturity values between the low and high levels of political stability when ICT infrastructure was low but there was a substantial difference in e-government maturity values between the low and high levels of political stability in favor of high political stability when ICT infrastructure was high. A simple slope analysis revealed that when political stability was high, the relationship of ICT infrastructure with e-government maturity was positive and significant (slope=0.71, t=10.13, $p<0.0001$). And, when political stability was low, ICT infrastructure and e-government maturity relationship was positive but insignificant (slope=0.23, t=1.52, n.s.). This interaction is in line with H2.2, which suggested that a high political stability would be associated with the steeper positive slope. Hence, H2.2 was supported.

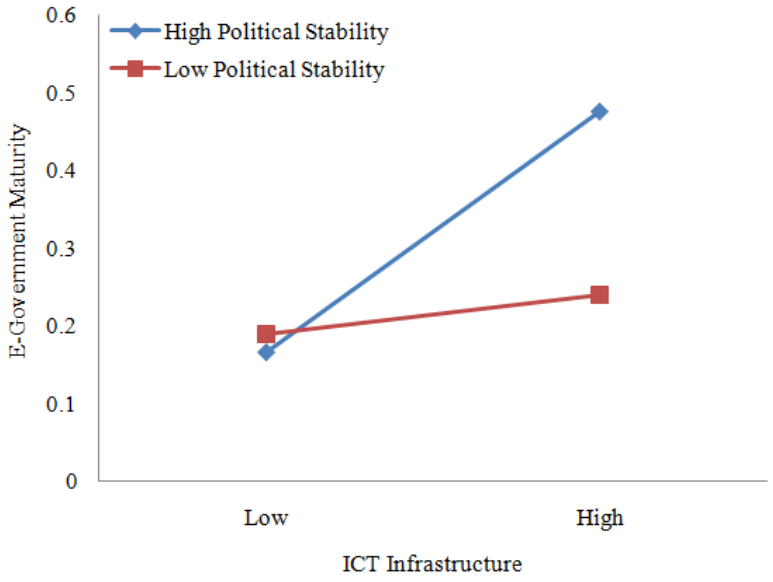

Figure 3.3: Interaction Plot for ICT Infrastructure × Political Stability

Figure 3.4 shows the ordinal interaction of government effectiveness on the relationship of ICT infrastructure with e-government maturity. As shown, while ICT infrastructure strongly predicted e-government maturity in the positive direction at the high levels of government effectiveness, the association was weakly positive at its low levels. In addition, it is evident from the figure that there was little difference in e-government maturity values between the low and high levels of government effectiveness when ICT infrastructure was low but there was a substantial difference in e-government maturity values between the low and high levels of government effectiveness in favor of high government effectiveness when ICT infrastructure was high. Confirming this, a simple slope analysis revealed that when government effectiveness was high, the relationship of ICT infrastructure with e-government maturity was positive and significant (slope=0.76, t=4.21, $p<0.001$). On the other hand, when government effectiveness was low, the relationship of ICT infrastructure with e-government maturity was positive but insignificant (slope=0.19, t=0.87, n.s.). This interaction is in line with H2.3, which suggested that

high government effectiveness would be associated with the steeper positive slope. Therefore, H2.3 was supported.

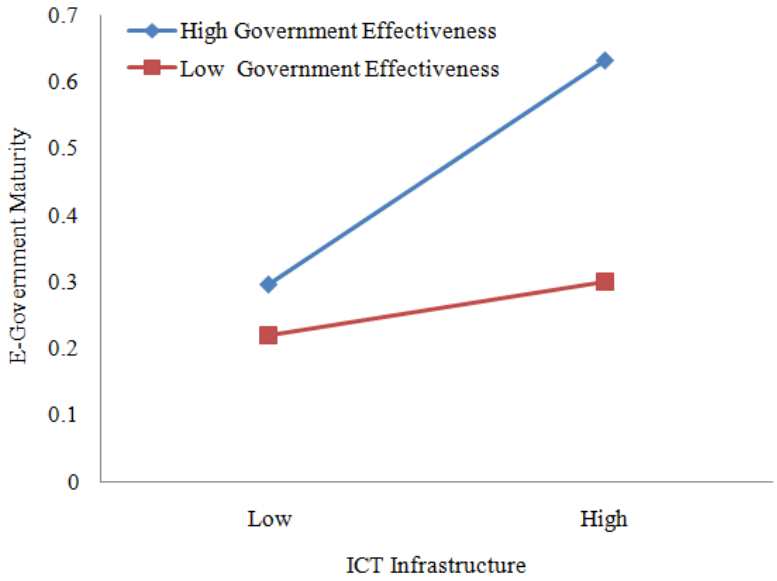

Figure 3.4: Interaction Plot for ICT Infrastructure × Government Effectiveness

Figure 3.5 shows the disordinal interaction of rule of law on the relationship between ICT infrastructure and e-government maturity. As shown, while there was a significant positive relationship between ICT infrastructure and e-government maturity at the high levels of rule of law, there was an insignificant negative relationship at its low levels. Further, it is evident from the figure that there was little difference in e-government maturity values between the low and high levels of rule of law when ICT infrastructure was low but there was a substantial difference in e-government maturity values between the low and high levels of rule of law in favor of high rule of law when ICT infrastructure was high. A simple slope analysis revealed that when rule of law was high, the relationship of ICT infrastructure with e-government maturity was positive and significant (slope=1.17, t=5.18, $p<0.0001$). And, when rule of law was low, ICT infrastructure and e-government maturity relationship was negative but insignificant (slope=-0.42, t=-1.19,

n.s.). This interaction is in line with H2.5, which suggested that high rule of law would be associated with the steeper positive slope. Hence, H2.5 was supported.

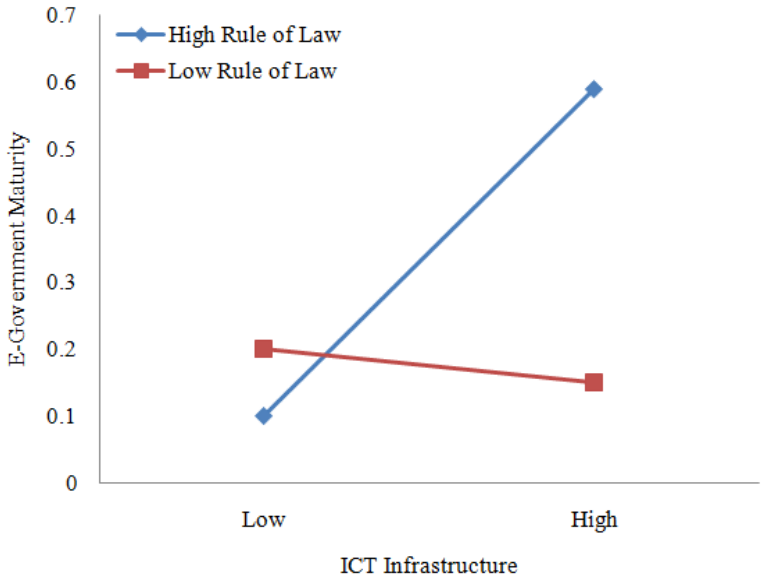

Figure 3.5: Interaction Plot for ICT Infrastructure × Rule of Law

Figure 3.6 shows the ordinal interaction of control of corruption on the relationship of ICT infrastructure with e-government maturity. As shown, while ICT infrastructure strongly predicted e-government maturity in the positive direction at the high levels of control of corruption, the association was weakly positive at its low levels. In addition, it is evident from the figure that there was little difference in e-government maturity values between the low and high levels of corruption when ICT infrastructure was low but there was a substantial difference in e-government maturity values between the low and high levels of control of corruption in favor of high control of corruption when ICT infrastructure was high. Confirming this, a simple slope analysis revealed that when control of corruption was high, the relationship of ICT infrastructure with e-government maturity was positive and significant (slope=0.81, t=5.31, $p<0.0001$). On the other hand, when control of corruption was low, the relationship of ICT infrastructure with e-government maturity was positive but insignificant (slope=0.22, t=0.91,

n.s.). This interaction is in line with H2.6, which suggested that high control of corruption would be associated with the steeper positive slope. Therefore, H2.6 was supported.

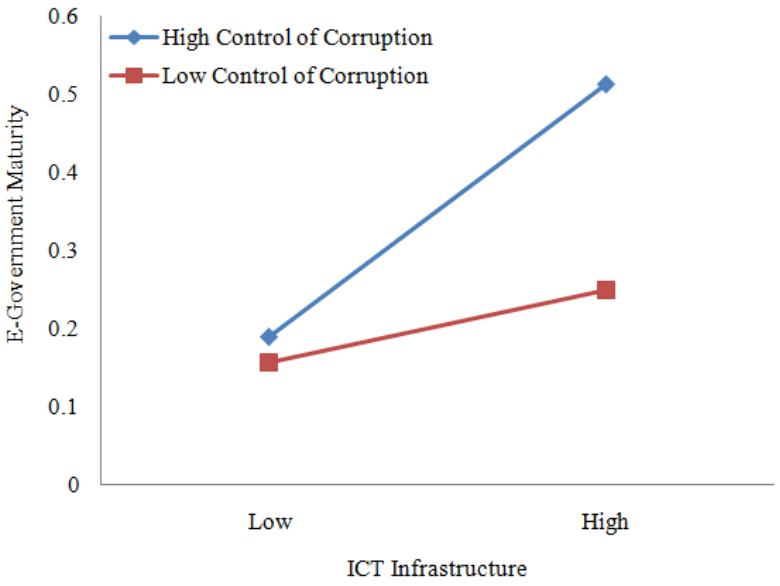

Figure 3.6: Interaction Plot for ICT Infrastructure × Control of Corruption

As power calculations are particularly relevant whenever the null hypothesis is rejected (Baroudi and Orlikowski 1989), I performed a power analysis for H2.4, the hypothesis that was not supported due to lack of significance. The objective of this analysis is to determine the accuracy of the conclusion that the hypothesis is truly insignificant at the 0.05 alpha level. Power is the likelihood of a Type II error, and it requires parameters for sample size, alpha level and desired effect size (Meso et al. 2009). According to Cohen (1977), an effect size (d) of 0.2 or less is considered small, that of 0.5 is deemed moderate, while an effect size greater than 0.8 is deemed to be strong. Using the Gpower statistical program, the calculated power for H2.4 was 0.92, with a sample size of 174 and an effect size of 0.5. This, according to Cohen's (1977) threshold of 0.80, allows me to conclude that there is negligible Type II error and the lack of significance can be believed. Finally, among the three control variables, while economic condition (β=0.44, $p<0.001$) and human capital (β=0.21, $p<0.05$) were significantly associated

with e-government maturity in the positive direction, regional difference (β=0.02, n.s.) had no significant influence. A summary of the hypotheses tests is presented in Table 3.8. In the ensuing section of this essay, I discuss the findings in detail.

Table 3.8: Summary of Hypotheses Tests of Essay 2

Hypotheses	Description	Result
H2.1	Voice and accountability positively moderates the relationship between ICT infrastructure and e-government maturity in a country.	Not Supported
H2.2	Political stability positively moderates the relationship between ICT infrastructure and e-government maturity in a country.	Supported
H2.3	Government effectiveness positively moderates the relationship between ICT infrastructure and e-government maturity in a country.	Supported
H2.4	Regulatory quality positively moderates the relationship between ICT infrastructure and e-government maturity in a country.	Not Supported
H2.5	Rule of law positively moderates the relationship between ICT infrastructure and e-government maturity in a country.	Supported
H2.5	Control of corruption positively moderates the relationship between ICT infrastructure and e-government maturity in a country.	Supported

3.5. Discussion

Findings from this study raise several issues that deserve mention. First, though not hypothesized explicitly, the direct effect of ICT infrastructure on e-government maturity was in line with the findings pertaining to Essay 1, which in turn is consistent with prior research (e.g., Siau and Long 2009; Srivastava and Teo 2010). This result suggests that the availability of robust, reliable and sound ICT infrastructure in a country facilitates the growth and maturity of its online public services (Shareef et al. 2011). Further, results indicated that not all dimensions of governance influenced e-government maturity. Of six dimensions of governance, only political stability, government effectiveness and rule of law were significantly associated with e-government maturity in the positive direction. Among them, rule of law was strongly associated with e-government maturity followed by government effectiveness and political stability. This result suggest that rule of law is not only important for a nation's socio-economic development

(Meso et al. 2006) but also lied at the crux of ICT-led developmental efforts. Further, the finding concerning government effectiveness indicates that a country's e-government will progress and reach the stage of maturity only when its national institutions are effective. Similarly, for the public-sector to transform from a bureaucratic organization to an anticipative and responsive government, political conditions must be stable, which in turn will lead to development, growth and maturity of e-government. These observations are refreshing as they are informative. Findings pertaining to governance from Essay 1 and extant studies (e.g., Singh et al. 2007; Das et al. 2011) indicate that there has been no impact of governance on e-government maturity. It should be noted that these studies unlike the current study viewed governance as a single-dimensional construct rather than a multi-dimensional concept.

Turning now to the complementary roles of governance, as revealed by the findings, voice and accountability, political stability, government effectiveness, rule of law and control of corruption were the principal moderating variables used to explain governance. Further, while political stability, government effectiveness, rule of law and control of corruption moderated the relationship of ICT infrastructure with e-government maturity in the positive direction, voice and accountability moderated the relationship negatively. Among the positive moderations, rule of law (like in main effects) again lied at the crux of e-government maturity efforts. An efficient legal framework in a country will provide a platform to its citizens for participation and resolving demanding situations, without marginalizing their security (Meso et al. 2006). Further, increased access to information through ICT infrastructure combined with the robust legal framework accelerates further development, growth and maturity of e-government systems. In sum, once the rule of law is established, it will spur innovations leading to the higher levels of e-government maturity.

Following rule of law, government effectiveness seemed to strengthen the effect of ICT infrastructure on e-government maturity. This indicates that government that is effective and committed to its citizens and businesses to deliver public goods and services, when combined with robust ICT infrastructure; they will further stimulate the maturity of e-government in that country. And finally, control of corruption and political stability also strengthened the relationship of ICT infrastructure on e-government maturity. This finding suggests that in a country when corruption is under control and when its political environment are stable, ICT infrastructure will provide a medium for inducing e-government maturity. Further, in such countries, ICT infrastructure will spur the growth and maturity of e-government by enhancing the delivery of public services.

Interestingly, voice and accountability affected the relationship of ICT infrastructure and e-government maturity in the negative direction. This could be due to its possible dual effect. Previous literature suggest that voice and accountability in terms of greater participation, often involving multiple and competing voices, can endanger freedom and rights, impede governability and jeopardize pluralism (Malik and Wagle 2002). In addition, there is a risk that increased participation may reduce the quality of dialogue, thereby undermining the governance process and delaying the e-government to reach its maturity level. This finding suggests that there could be other factor(s) that might strengthen the effect of voice and accountability on the relationship between ICT infrastructure and e-government maturity. For instance, ability of the institutions to handle multiple and competing voices might be one factor that could help enhance the potential benefits of voice and accountability on the relationship between ICT infrastructure and e-government maturity. Future research might consider identifying ways to realize benefits

from voice and accountability in strengthening the relationship of ICT infrastructure with e-government maturity.

Also, the relationship of ICT infrastructure with e-government maturity was not contingent on regulatory quality, which could be due to the reason that the effect of regulatory quality on ICT infrastructure and e-government maturity relationship might have been masked by stronger predictors with which it was correlated.

In summary, the findings from this study indicate that governance does matter in the context of e-government maturity, and the assumptions about ICT infrastructure and its impact on e-government maturity are justifiably stimulated by governance dimensions. That is, if appropriate governance dimensions are strengthened, they will stand to leverage the growth and maturity of e-government. This is one reason why governance and the strengthening of governance institutions has become one of the key millennium development goals for international development agencies (IBRD 2002).

3.6. Implications

This essay makes some important contributions which have implications for both research and practice.

3.6.1. Implications for Research

This study contributes to the knowledge base of complementarity perspective of RBV in two ways. First, in contrast to many past studies that have implicitly assumed that the assets could have direct effects on competitive advantage, this study draws from the theory of complementarities and posits that resources (here, ICT infrastructure) produce greater returns (here, e-government maturity) if certain other resources (here, governance) are present than it

would produce by itself. Second, among the limited work that has been undertaken to investigate the effects of complementarities on competitive advantage (Ravichandran and Lertwongsatien 2005), most studies are at the organizational-level. This study extends this firm-level argumentation to a macro-level (i.e., cross-country perspective) and establishes its usefulness in the empirical context of e-government maturity.

This study also makes several important contributions to the knowledge base of e-government research. First, this study gives heed to the consistent calls from researchers to key out the contextual factors that might strengthen the effect of another contextual factor (i.e., ICT infrastructure) on e-government maturity by identifying governance (in form of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption) as a factor that complements the effect of ICT infrastructure on e-government maturity. Second, by assessing the complementary role of governance dimensions, this study provides a basis for the development of ICT-related e-government maturity assessment tools for managerial use. Third, while most extant studies examining the linkage between governance and e-government have been undertaken via a qualitative case study approach, this study has identified a quantitative merit in the relationships among ICT infrastructure, governance dimensions and e-government maturity by making innovative use of publicly available archival data. Fourth, while extant studies provide contradicting responses to the question of impact of governance on e-government growth and maturity, this study highlights that governance does matter in the context of e-government. Further, this study acknowledges the imperative need for strengthening appropriate governance dimensions to enhance the growth and maturity of e-government in a country.

3.6.2. Implications for Practice

From a practical standpoint, by identifying the governance dimensions that would affect the relationship of ICT infrastructure on e-government maturity, this study not only helps the practitioners and policymakers to understand why differing levels of e-government maturity continues to prevail despite the investments in ICT infrastructure but also shows them the directions to increase the levels of e-government maturity by effectively leveraging benefits from appropriate governance dimensions. The implications from the interaction plots are insightful to them, and indicate that they should pay increased attention in managing appropriate governance dimensions alongside the investments in ICT infrastructure. That is, practitioners and policymakers should realize the negative role of voice and accountability and the positive roles of political stability, government effectiveness, rule of law, and control of corruption interacting with ICT infrastructure on e-government maturity. While nations with the lower levels of voice and accountability will benefit more in terms of e-government maturity from ICT infrastructure than countries with its high levels, nations with the higher levels of political stability, government effectiveness, rule of law and control of corruption will benefit more in terms of e-government maturity from ICT infrastructure than countries with their low levels.

3.7. Conclusion

Motivated by the consistent calls for research to key out the contextual factors that might impact the relationship of another contextual factor on e-government maturity, by drawing from the theory of complementarities, I proposed governance (in form of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption) as a contextual factor that complements the effect of ICT infrastructure (another

contextual factor) on e-government maturity. Specifically, I reasoned and demonstrated empirically the moderating influence of the aforementioned governance dimensions on the relationship of ICT infrastructure with e-government maturity. Finding from this study contribute to the theoretical discourse on e-government by identifying the differential roles of governance dimensions, and provide indications for practice in managing e-government maturity by enhancing appropriate governance dimensions, thereby leveraging the effect of ICT infrastructure on e-government maturity.

Chapter 4

Essay 3: Examining the Relationship of E-Government Maturity with Corruption, Economic Prosperity and Environmental Degradation[3]

Abstract

There is growing interest in the role and contribution of e-government in a country to the levels of its corruption, economic prosperity and environmental degradation. In this essay, utilizing the archival data from 103 countries, I explored the relationships among them. Results substantiated a significant relationship between (1) e-government maturity and corruption; and (2) e-government maturity, economic prosperity and environmental degradation through the mediating effects of corruption. Findings suggest that while e-government maturity did not contribute to economic prosperity and environmental degradation, its value could be realized indirectly via its impacts on corruption. Findings contribute to the theoretical discourse on e-government impact by identifying the role of e-government maturity in a country and provide indications to practice on enhancing its economic prosperity and lowering its environmental degradation by managing the levels of corruption.

[3]An abridged version of this essay has been published in "Information and Management" journal. The full citation is: Krishnan, S., Teo, T. S. H., and Lim, V. K. G. 2013. "Examining the Relationships among E-Government Maturity, Corruption, Economic Prosperity and Environmental Degradation: A Cross-Country Analysis," *Information and Management* (50:8), pp. 638–649.

4.1. Introduction

Governments, policymakers, practitioners and academics are often intrigued by the payoffs from e-government (Srivastava and Teo 2007a). While the last decade has witnessed a continuous growth in e-government research (Scholl 2007), there have been relatively fewer studies on e-government impact (Flak et al. 2009). Further, among them, most tend to be micro in orientation with reference to a particular region or country. Although the need for looking at the macro-level (i.e., cross-country level) perspective is largely stressed in the past literature (e.g., Srivastava 2011), researchers (with few exceptions – e.g., Srivastava and Teo 2007a) often ignored or overlooked them as there is a lack of cumulative theoretical development in e-government research to design an empirical study addressing macro-level issues (Heeks and Bailur 2007). Motivated by the facts that (1) the research on e-government impact is still in a nascent state; and (2) there is dearth of quantitative empirical studies offering a macro-level perspective, I conduct a cross-country quantitative empirical study to investigate the question of impact of e-government maturity, defined as the extent to which a government in a country has established an online presence (Singh et al. 2007; UN-Report 2012).

While it is widely acknowledged that e-government in a country has the potential to provide an efficient and an effective channel for government agencies to facilitate their internal administration and to improve their external services (Siau and Long 2006), studies indicate that its value is not fully realized due to "the fuzziness and diversity of the intended goals of e-government projects" (Srivastava 2011, p. 108). For instance, Chan et al. (2008) indicate that the purported benefits of e-government continue to be an elusive dream for many governments worldwide. Another study by Heeks (2008) highlight that 50% of the e-government initiatives are partial failure, in which major goals for the initiative were not attained and/or there were

significant undesirable outcomes. Further, Srivastava (2011) indicate that a major dilemma faced by e-government researchers in understanding if e-government is providing the promised returns is the variable on which the impact of e-government should be measured (e.g., financial return, social returns, returns on investment, etc.). Hence, it is necessary to understand what payoffs could be actually derived from e-government maturity, and the mediating activities through which the value of e-government maturity could be realized in achieving such payoffs.

Extant research on e-government impact indicate that e-government offers several benefits such as enhanced service delivery (Kibsi et al. 2001; Von Haldenwang 2004; West 2004), increased democratization (Von Haldenwang 2004; West 2004), reduction in corruption and increased government transparency (Banerjee and Chau 2004; Cho and Choi 2004; Von Haldenwang 2004; Wong and Welch 2004), reduction of social divide (Srivastava and Teo 2007a), economic performance and business competitiveness (Srivastava and Teo 2007a; 2008), ecological or environmental quality (Haigh 2004; Haigh and Griffiths 2008; Krishnan and Teo 2011), etc. Further, the review of extant literature indicate that the e-government impact variables investigated in prior studies were mostly intermediate impact variables (i.e., first-order effects) that may eventually lead to outcome impact (i.e., higher-order effects). However, it should be noted that this link has not been adequately examined in the current e-government literature. Hence, I address this gap in this study by conceptualizing the relationship between e-government maturity and outcome impact as mediated through intermediary impact (Barua et al. 1995; Melville et al. 2004). That is, I construe higher-order impact of e-government maturity as consisting of two variables namely, economic prosperity (e.g., value added of benefit – GDP per capita) and environmental degradation (e.g., pollution emissions – CO2 intensity), and first-order

impact as the intermediary mediating variable of corruption, defined as "the misuse of entrusted power for private gains" (UNDP 2008, p. 8).

I'm particularly interested in these three variables (i.e., corruption, economic prosperity and environmental degradation) as they are key national-level growth parameters that determine a country's competitive advantage (Porter 1990). Further, although a handful of research connecting e-government and the aforementioned variables exist, they are often limited in several ways. For instance, emerging research connecting e-government and first-order intermediary impact variable of corruption provides contradicting responses such that one group of research points to the negative impact of e-government on corruption (e.g., Banerjee and Chau 2004; Cho and Choi 2004; Wong and Welch 2004) and the other group raise doubts if information and communication technologies (ICTs) in general can effectively reduce corruption in reality (e.g., Kim et al. 2009; Wescott 2001). Adding to these contradictions, most investigations into the influence of e-government on corruption have been undertaken via a qualitative case study approach (e.g., Kim et al. 2009).

Similarly, I note that most research linking e-government and higher-order outcome impact variables of economic prosperity and environmental degradation remain – except a few recent studies – at best anecdotal, conjectural and descriptive. Further, among the few recent studies, all focus on either one of the outcome impact variables. For instance, while a study by Haigh (2004) focused on environmental degradation, Srivastava and Teo (2010) focused on economic prosperity. Also, alike studies connecting e-government and corruption, I also observe that most investigations into the influence of e-government on economic prosperity and environmental degradation have been undertaken via a qualitative case study approach (e.g., Haigh 2004; Haigh and Griffiths 2008). In sum, in this study I seek to identify if indeed there is a

quantitative merit in the relationship of e-government maturity with corruption, economic prosperity and environmental degradation. Specifically, I examine (1) the direct relationships of e-government maturity with corruption, economic prosperity and environmental degradation; and (2) the indirect relationships of e-government maturity with economic prosperity and environmental degradation through the mediating effects of corruption. The key research question (RQ) that this essay aims at answering is as follows:

RQ3: *How is e-government maturity in a country related with its corruption, economic prosperity and environmental degradation?*

The rest of this essay is organized as follows. In the next section, I develop a theoretical model by reviewing the literature connecting e-government with corruption, economic prosperity and environmental degradation; and derive the research hypotheses. Thereafter, using archival data from 103 countries (see Appendix C for the list of countries), I test the hypothesized model. Lastly, I discuss the findings and their contributions to the knowledge base in e-government research and practice.

4.2. Literature Review and Hypotheses

In this section, I describe the theoretical linkage of e-government maturity with corruption, economic prosperity and environmental degradation. The diagrammatic representation of the research model with hypotheses indicated is presented in Figure 4.1.

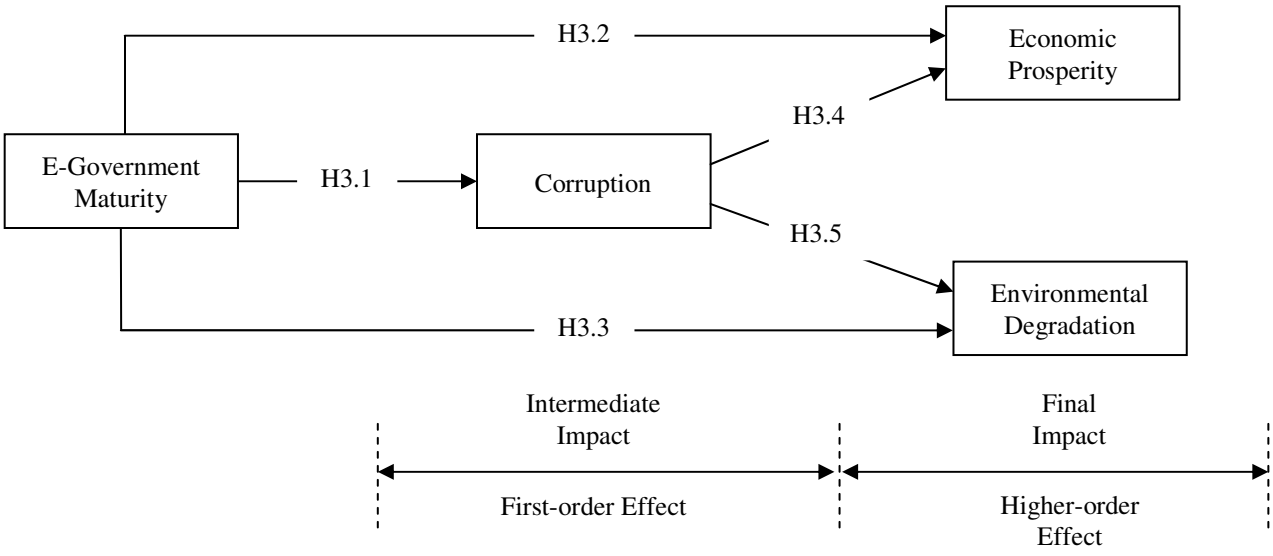

Figure 4.1: Research Model of Essay 3

4.2.1. Relating E-Government Maturity to Corruption

Corruption is a complex term having various connotations (Ojha et al. 2008). Jain (2001) defined corruption as the acts in which the power of public officials is used for personal gains in a manner that contravenes the rules of the game. Such acts can take many forms, including bribery, embezzlement, theft, extortion, abuse of discretion, favouritism, exploiting conflicting interests and improper political contributions (UNDOC 2004). Klitgaard (1988) argued that corruption is a problem of asymmetric information and incentives, which can be explained by the principal–agent–client model (based on the agency theory). According to this model, the principals are the honest public officials within a government, in-charge of public servants (the agents) responsible for service delivery to businesses and citizens (the clients). The model predicts that corruption is more likely to occur when a public official possesses access to a monopoly, has discretion in administering it, and operates with a lack of accountability (Lio et al. 2011). That is, the problem of corruption arises in situations where there is a problem of asymmetric information, in which the agents know far more about the administration than either

the principals or the clients (Lio et al. 2011). In such situations, the agents exploit their position as go-betweens and take advantage of the power entrusted to them to act more in their own interest, commonly through bribery, extortion, fraud, nepotism or embezzlement (UNDP 2008).

An important implication of this model is that in order to reduce corruption, it is crucial to restructure the principal–agent–client relationship to alter the amount of monopoly, discretion and accountability with which the agent is endowed (Klitgaard 1988). Mahmood (2004), employing a similar line of thought, explained that ICTs (in specific, the Internet) has the potential to reduce corruption when adequately used to alter the principal–agent–client relationship in the public-sector–citizen interface through e-government. UNDP (2008) uses several cases to illustrate how governments can use ICTs to increase transparency and accountability. For instance, the Indian Government has formulated plans to computerize all court complexes, create a database of new and pending cases, and digitalize the law libraries and court archives, all of which can help combat corruption in the judiciary (Lio et al. 2011). Further, India's Central Vigilance Commission has published on its website the names of officers against whom corruption investigations have been ordered or on whom penalties have been imposed, and on this website any citizen can lodge a complaint (Lio et al. 2011). Another familiar case is, since 1999, the Seoul Metropolitan Government has used ICTs to reduce corruption in applications for licenses and other permits by launching an Online Procedure Enhancement for Civil Applications (OPEN) system covering 54 common procedures, which enables citizens to monitor the progress of their applications as those responsible officials have to upload reports and documents (Kim et al. 2009; Lio et al. 2011; UNDP 2008).

However, as Kim et al. (2009) have pointed out, it should be noted that there are also doubts if ICTs can effectively reduce corruption in reality. For example, based on a study of five

cases regarding ICTs and corruption, Heeks (1998) established that sometimes, ICTs has no significant effects on reducing corruption, and even create new opportunities for corruption. Wescott (2001) indicate that ICTs can lead to an upskilling of corruption and reduce competition for upskilled corrupt civil servants. Despite the mixed findings in past literature, I note that there are strong theoretical grounds to believe that the maturity of e-government in a country can reduce the level of corruption by (1) increasing transparency and lessening the asymmetric information problem by enhancing access to information; (2) curbing the agent's chances for arbitrary activities by reducing discretion; and (3) advancing accountability as it enhances the ability of citizens to track the decisions and actions of individual officials and emboldens citizens and businesses to question unreasonable procedures and their arbitrary application by making rules simpler and more transparent (Lio et al. 2011). Hence, I posit:

H3.1: *E-government maturity in a country is negatively associated with its corruption.*

4.2.2. Relating E-Government Maturity to Economic Prosperity

Porter, in his seminal work on Competitive Advantage of Nations, indicate that for an economy to become competitive (or to prosper), it should possess advanced and specialized factors that are rare and valuable rather than basic and general factors that may be easily imitable and substitutable (Porter 1990). In line with his exposition, some nations like Singapore, which are devoid of basic and general resources such as land and labour, have become very competitive in the present day world because of a proactive focus on advanced and specialized resources such as ICTs and human capital (Teo and Lim 2004).

Research indicates that ICTs' role in enabling economic prosperity has become more significant (Dedrick et al. 2003). Further, in the current era of knowledge economy, public-sector

ICT-led innovations (e.g., e-government) are considered to be one of the critical factors contributing to the nation's prosperity (Dutta and Jain 2005). For instance, Clark et al. (2003) highlighted how the use of the Internet technologies at the local government-level led to proliferation of e-government resulting in economic welfare of the country. Also, Moynihan (2004), Von Haldenwang (2004) and West (2004) established that the growth and maturity of e-government had an impact on the efficiency of a country in a number of ways, thereby improving its economic prosperity. Recent studies by Srivastava and Teo (2008, 2010) established that national economic performance and business competiveness in terms of GDP per capita were dependent on the maturity of e-government in a country. Consequently, I propose:

H3.2: *E-government maturity in a country is positively associated with its economic prosperity.*

4.2.3. Relating E-Government Maturity to Environmental Degradation

ICTs have significant importance for managing and containing carbon emissions. According to a study by McKinsey (Boccaletti et al. 2008), ICT-related production and consumption accounted for about 2% of overall carbon emissions in 2007 (about 0.86 gigatons of emissions a year). However, the share of ICTs' footprint is likely to go up to about 3% by 2020 (about 1.54 gigatons of emissions a year), an increase of about 80% from the current levels. Much of this anticipated increase is because of the high growth rate of computing needs in developed world and large scale adoption of computers, mobile phones and proliferation of data centers in developing economies. In fact, carbon emissions from production and use of ICTs in 2020 will form a substantial portion of the total carbon emissions, exceeding the total carbon emissions of the United Kingdom (UK); and raise concerns regarding climate impact and

environmental sustainability. Fortunately, offsetting this concern, ICTs has the potential to help curb the carbon emissions in the general economy (e.g., buildings, power, transport and manufacturing) by about 7.8 gigatons (i.e., 15% of the global emissions in 2007) thereby potentially contributing, on the whole, to environmentally sustainable growth (Boccaletti et al. 2008; Elliot 2011; Melville 2010; Watson et al. 2010).

According to Chen et al.'s (2008) model of information systems (IS) and ecological sustainability, IS has the potential to enable organizations to achieve environmental objectives through automation, defined as the operation and control of business processes via electronic means. Extending this argument to the context of public-sector organizations, governments can lower environmental degradation by providing public services online. Such automation or ICT-led transformation of the public-sector can bring forth efficient practices through what Shrivastava (1995) calls as an *information technology (IT) nature swap*, which involves practices such as digitization (Chen et al. 2008). Digitizing documents and e-filing not only improves service quality and saves cost (Fu et al. 2006) but also helps in achieving energy savings by saving paper, the manufacture of which is energy intensive and generates large amounts of waste (Haigh 2004). To illustrate, a service agenda released by the Australian Government notes that electronic delivery serves the government's environmental objectives by helping to reduce paper, energy consumption and greenhouse gas emissions (Ausgov 2007). The agenda also states that connected government provides greater opportunities for agencies to share and reuse technology, reducing overall infrastructure costs.

Governments by bringing their ICT-led innovations (such as e-government) and environmental objectives together can lower the degradation of the environment through service and cost efficiencies (Prahalad and Hammond 2002). E-government has the potential to deliver

positive environmental outcomes by (1) disseminating environmental issues faster and with broader coverage throughout the nation (Cormier and Magnan 2004; Judge and Douglas 1998); and (2) developing real-time decision support systems that integrate with governmental IS innovations, and enables policymakers to make operational decisions that are aligned with environmental goals (Box 2002). The information processing capabilities of ICT-led innovations in the public-sector helps government agencies and nations in achieving environmentally sustainable outcomes (Box 2002; Chen et al. 2008). Clearly, environmental degradation that indicates the environmental conditions of a nation (e.g., pollution emissions) is dependent on the growth and maturity of technological developments (Dutta and Mia 2009) by government agencies. Hence, I propose:

H3.3: *E-government maturity in a country is negatively associated with its environmental degradation.*

4.2.4. Relating Corruption to Economic Prosperity

Corruption has often been touted as one of the biggest threats to development of nations (Robertson and Watson 2004). The latest Transparency International report indicates that the vast majority of the 183 nations surveyed had a score less than five, on a scale from 10 (very clean) to 0 (highly corrupt), signaling a serious corruption problem (TICPI-Report 2011). Taking an economic perspective, while some scholars have attempted to defend corruption as a pragmatic action that actually accelerates economic prosperity and benefits the society in which corruption occurs (e.g., Nas et al. 1986; Nye 1979), others have asserted that corruption is costly (e.g., Rose-Ackerman 1999). However, studies supporting the notion that corruption accelerates economic prosperity are often criticized for its methodology and model development. For

instance, Goudie and Stasavage (1997) criticized Brunetti's (1995) study that argued for positive associations between corruption and economic prosperity. Specifically, they noted flaws in Brunetti's methodology and model development, and concluded that the effects of corruption depended in part on how corruption was organized and on the country's level of efficiency at the outset. Further, Getz and Volkema (2001, p. 11) indicated that "the arguments asserting that corruption adversely affects economic development are more recent and more compelling."

Scholars have developed two fundamental arguments against corruption. First, corruption has *disincentive effects* on economic prosperity, since it increases the risk and uncertainty faced by potential investors (Getz and Volkema 2001), as well as adding bribes and other dubious expenses to the costs of doing business (Robertson and Watson 2004). Mauro (1995), for instance, found that corruption has a negative effect on investment, thus resulting in less economic growth. Second, corruption has *distortionary effects* on economic prosperity (Goudie and Stasavage 1997), since monies paid for bribery are inefficiently allocated resources. Further, the secrecy surrounding bribery may lead government officials to bias their activities toward companies with the lowest risk of detection. Shleifer and Vishny (1993, p. 599) argue that corruption is "much more distortionary and costly than its sister activity, taxation." This highlights the managerial relevance of corruption in a country; "in assessing the cost of doing business in a particular country, firms and their managers should consider the level of corruption even more carefully than the level of taxation" (Robertson and Watson 2004, p. 386). In sum, by advancing unproductive and manipulative behavior, corruption in nations leads to uncertainty and inefficiency resulting in low levels of economic prosperity. Hence, I propose:

H3.4: *Corruption in a country is negatively associated with its economic prosperity*

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4.2.5. Relating Corruption to Environmental Degradation

Turning now to the relationship between corruption and environmental degradation, while corruption has been recognized as a global problem for the conservation of biodiversity (Barbier et al. 2005; Laurance 2004; Smith et al. 2003), I note that investigations into the influence of corruption on environmental degradation are still in a nascent stage. Emerging studies have found that the level of corruption in a country is positively associated with environmental degradation. For instance, Carter (1997) undertaking a qualitative approach focused on environmental regulation in the state of New York and how this interacted with organized crime and corruption. Robbins (2000), by introducing a theoretical framework for the analysis of corruption and enforcement of protection for a nature reserve, found that the lack of enforcement, in the empirical context of Rajasthan, India was fuelled by corruption among foresters, which led to substantial habitat destruction. Further, Lopez and Mitra (2000) argued, in a theoretical paper, that corruption and environmental policy stringency are characterized by a monotonic (negative) relationship. Their results showed that corruption leads to a sub-optimal level of environmental protection and firms will bribe the government to tolerate overexploitation of natural resources. Extending Lopez and Mitra's arguments, Fredriksson and Millimet (2001) claimed that there is a non-monotonic correlation between corruption levels and environmental protection. They established that after a certain threshold of corruption, a further increase in corruption would yield an increase in the stringency of environmental policy. Damania (2002) showed that environmental regulations are ineffective if bureaucrats are highly corrupted. He made the case for complete deregulation if there is no possibility to reduce corruption. Welsch (2004) found that corruption affects environmental quality as it hinders the

formation and enforcement of environmental regulations. Also, Morse (2006) established that corruption is bad for environmental sustainability. Thus, I posit:

H3.5: *Corruption in a country is positively associated with its environmental degradation.*

4.2.6. Mediated Effects of Corruption

Having assembled each of the piecewise elements and relations in the research model, I logically deduce one more hypothesis. I posit that corruption serves as an intervening mechanism or, at the least, partial conveyor of the effects of e-government maturity on economic prosperity and environmental degradation. That is, e-government maturity indirectly affects economic prosperity and environmental degradation by lowering the levels of corruption. More formally, I therefore offer the following:

H3.6: *The relationships of e-government maturity in a country with its (a) economic prosperity and (b) environmental degradation are partially mediated by its corruption.*

A summary of the hypotheses pertaining to this essay are presented in Table 4.1.

Table 4.1: Summary of Hypotheses of Essay 3

Hypotheses	Description
Direct Effects	
H3.1	E-government maturity in a country is negatively associated with its corruption.
H3.2	E-government maturity in a country is positively associated with its economic prosperity.
H3.3	E-government maturity in a country is negatively associated with its environmental degradation.
H3.4	Corruption in a country is negatively associated with its economic prosperity.
H3.5	Corruption in a country is positively associated with its environmental degradation.
Mediated Effect	
H3.6 (a, b)	The relationships of e-government maturity in a country with its (a) economic prosperity and (b) environmental degradation are partially mediated by its corruption.

4.3. Research Design

To test the formulated hypotheses, I 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 and Teo 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 and Nathan 1985); and (3) robust to the threat of common method bias (Woszczynski and Whitman 2004). Hypotheses were tested via a cross-sectional analysis of 103 countries (after omitting the missing values) for a period of 2010 and 2012. According to Hair et al. (2006), 50 is the minimum number required to avoid degrees of freedom and efficiency problems. Further, as average scores (of two year datasets) provide more accurate and stable estimates than single year datasets (Wiggins and Ruefli 2005); I used a cross-section for the period 2010 and 2012. The concept of using average scores over single year datasets is consistent with what has been done in previous studies examining corruption and other variables such as investment (e.g., Brouthers et al. 2008; Habib and Zurawicki 2001; Voyer and Beamish 2004).

The primary sources of data were the UN E-Government Survey Reports (UN-Report 2010; 2012), the Transparency International's Corruption Perception Index Reports (TICPI-Report 2010; 2012) and the World Bank's World Development Indicators database 2013 (WDI-Database 2013). In the following section, I describe the operationalization of study variables.

4.3.1. Operationalization of Constructs

4.3.1.1. Dependent Variables

For this study, the dependent variables are *economic prosperity* and *environmental degradation.* The variable, economic prosperity depends both on the value of nation's products and services, measured by the prices they can command in open markets, and also on the efficiency with which they are produced (Porter 2006). Hence, consistent with extant studies (e.g., Srivastava and Teo 2010), I used Porter's productivity paradigm for operationalizing economic prosperity of a nation in terms of its GDP per capita (adjusted for purchasing power parity, PPP), the values for which were obtained from the World Bank's World Development Indicators database 2013 (WDI-Database 2013). Another dependent variable, environmental degradation captures the extent of pollution emissions, measured in terms of CO2 emissions (i.e., CO2 intensity, kg per kg of oil equivalent energy use), representing the emissions from solid fuel consumption (i.e., emissions from use of coal as an energy source), the values for which were taken from the World Bank's World Development Indicators database 2013 (WDI-Database 2013). This measure has been used in past studies like Jorgenson et al. (2010).

4.3.1.2. Independent Variable

For this study, the independent variable is *e-government maturity*, which reflects the demonstrated behaviour of e-government in a country. It was measured using the online service index, which assess the extent to which a government has established an online presence (UN-Report 2010; 2012). The scores for this index were obtained from the UN E-government Survey Reports (UN-Report 2010; 2012), and was based upon the UN's four stage model of e-government maturity. The four stages were: (1) emerging presence; (2) enhanced presence; (3)

transactional presence; and (4) connected presence. Countries were coded in consonance with what they provide online and the stage of e-government maturity they were presently in. Hence, as a country migrated upwards through various stages, it was ranked higher in the index. To arrive at a set of the online service index values, the UN assessed each country's national website, including the national central portal and e-services portal, as well as the websites of the related ministries of education, labor, social services, health, finance and environment as applicable (UN-Report 2010; 2012). The values for this index ranged between 0 and 1, with the higher values corresponding to the higher level of e-government maturity. The value for a given country was equal to the total number of points scored by that country less the lowest score for any country divided by the range of values for all countries in the survey (UN-Report 2010; 2012). This index has been used in past studies such as Siau and Long (2006, 2009), and Srivastava and Teo (2007a, 2008, 2010).

4.3.1.3. Mediating Variable

In this study, the mediating variable is *corruption*, which is defined as the misuse of public power for private gains, and is measured using the corruption perception index (CPI). The values for this index range from 0 (highly corrupt) to 10 (very clean). I used Husted's (1999) transformation of the CPI in order to make values of this corruption variable more intuitive. That is, I inverted the 0 to 10 scale by subtracting each country's score from 10, thus making a 10 the most corrupt country and a 0 the least corrupt. The CPI has been a focal variable in a number of international studies of corruption and its validity appears to be strong (e.g., Getz and Volkema 2001; Heidenheimer 1996; Husted 1999; Volkema and Chang 1998).

4.3.1.4. Control Variables

Additional control variables consisted of *exports (as a % of total GDP), manufacturing (as a % of total GDP), urban population (as a % of total population),* and *population aged 15 to 64 (in %)*. I selected these particular control variables, since they are both consistent with prior macro-level studies on economic prosperity (e.g., Tiwari and Mutascu 2011) and environmental degradation (e.g., Jorgenson et al. 2010). The values for these variables were taken from the World Bank's World Development Indicators database 2013 (WDI-Database 2013). I also controlled for the effect of *political stability* and *regional difference*. While political stability measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means (Kaufmann et al. 1999), regional difference is the country-level difference across various regions of the world. The scores for political stability were obtained from the World Bank's Worldwide Governance Indicators Database (WGI-Database 2013). And, based on the UN's regional groupings, I operationalized regional difference by coding 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)). Alike the main variables, the control variables (except regional difference) were the average scores for the period 2010 and 2012.

4.4. Analysis and Results

4.4.1. Descriptive Statistics and Correlations

Table 4.2 presents the descriptive statistics and correlations for all variables in the research model. As shown in the table, most correlations were significant at $p<0.001$. Further, e-government maturity was negatively correlated with corruption, and positively correlated with economic prosperity and environmental degradation. Also, corruption was negatively

(positively) correlated with economic prosperity (environmental degradation). Further, as all correlations among the variables were below the threshold value of 0.8, the concern for multicollinearity would be minimal (Gujarati 2003; Gujarati and Porter 2009). Nevertheless, I followed up with collinearity test that measure the variance inflation factor (VIF). VIF assesses the effect that the other independent variables have on the standard error of a regression coefficient (Hair et al. 2006). The results of these tests revealed that the VIFs ranged from 1.62 to 3.51 (all tolerance levels above 0.28). According to Fox (1991), a VIF of above 4.0, or a tolerance level below 0.25, may indicate the potential for multicollinearity; thus, the concern in the model appeared to be minimal.

Table 4.2: Descriptive Statistics and Correlations of Essay 3

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Exports[a]	3.64	0.52	-								
2. Manufact	15.82	6.61	0.17	-							
3. Urb Pop	64.39	5.79	0.36***	0.31***	-						
4. Pop 15-64	60.15	20.84	0.28**	0.09	0.45***	-					
5. Pol Stab	-0.09	0.95	0.29**	0.30**	0.19	0.15	-				
6. Reg Diff	2.14	1.13	0.16	0.20*	0.13	0.12	0.21*	-			
7. E-Gov Mat	29.44	5.26	0.10	0.25**	0.46***	0.49***	0.30***	-0.17	-		
8. Corruption	5.45	2.47	-0.21*	-0.13	-0.46***	-0.59***	-0.27**	0.18	-0.61***	-	
9. Econ Prosp[a]	8.04	1.53	0.33***	0.19	0.60***	0.63***	0.30**	-0.19	0.64***	-0.72***	-
10. Envi Deg[a]	0.60	0.63	0.28**	0.26**	0.64***	0.44***	-0.18	0.16	0.30**	0.20*	0.49***

Note: [a]Log transformed variable; N = 103; M: Mean; SD: Standard Deviation; Exports (as a % of total GDP); Manufact: Manufacturing (as a % of total GDP); Urb Pop: Urban Population (as a % of total population); Pop 15-64: Population aged 15 to 64 (in %); Pol Stab: Political Stability; Reg Diff: Regional Difference; E-Gov Mat: E-Government Maturity; Econ Prosp: Economic Prosperity; Envi Deg: Environmental Degradation; *p<0.05 **p<0.01 ***p<0.001 (2-tailed).

4.4.2. Procedures Followed by the Reporting Agencies to Enhance the Reliability and Validity of Data

While the measures I used in this study were used by prior studies, it is worthy to note that the reporting agencies followed rigorous procedures for ensuring the reliability and validity of the data. For instance, while computing the online service index, the UN's assessment involved identification of the national and ministerial websites by its research team following a uniform set of guidelines (e.g., using a variety of search engines to locate the most relevant site when no responses were received from the Member States). Researchers were instructed and trained to scrutinize the websites very closely. The national sites were tested for a minimal level of web content accessibility as described in the Web Content Accessibility Guidelines of the World Wide Web Consortium. The research team was fully equipped to handle the official languages of the UN. Further, translators provided assistance as necessary. And, a web-based information management system was used for managing the survey effort and tracking results. To ensure that the websites were rated with maximum objectivity and accuracy, the second-level quality assurance group validated the data received from the primary research team. This resulted in adjustment of scores for a number of countries (UN-Report 2010; 2012).

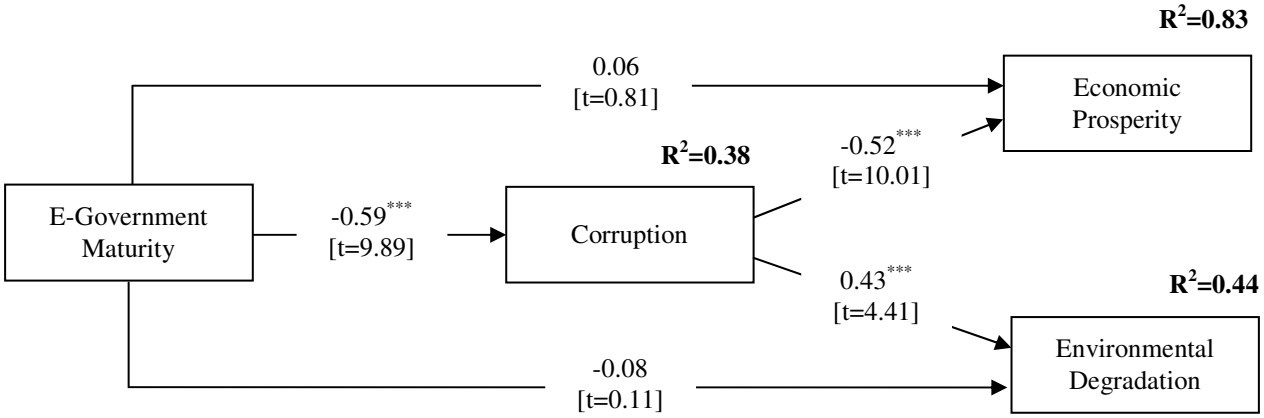
Similarly, the research team from Transparency International also followed several rigorous procedures to compute the CPI. For instance, a number of independent surveys were used to compute this index. These surveys differed with respect to respondents and items used, but were strongly correlated. Target questions typically included questions that ranged from the frequency of corruption in various contexts (such as obtaining permits, avoiding taxes, etc.) to the common occurrence of bribery to politicians, senior civil servants and judges (TICPI-Report 2010; 2012). Moreover, all of these sources employed a degree of corruption measure which

added consistency and reliability to the final compiled scores. In most cases, the sample designs were restricted to business practitioners who were local residents (TICPI-Report 2010; 2012). In summary, I used the data directly from these reports as the data collecting agencies are trustworthy and followed stringent guidelines for ensuring its reliability and validity.

4.4.3. Hypotheses Testing

Structural equation modeling (SEM) analysis was chosen over regression analysis as SEM can simultaneously analyze all paths in one analysis (Chin 1998). Within SEM, I employed Partial Least Squares (PLS) over covariance-based SEM techniques (such as LISREL, EQS or AMOS) for four reasons. First, PLS places minimal restrictions on measurement scales, sample size and residual distributions (Chin 1998). Second, PLS analysis is distribution free and does not assume true independence of the variables, leading to more reliable results (Tobias 1999). Third, PLS is robust against data structural problems such as skew distributions and omissions of regressors (Cassel et al. 1999; Gefen et al. 2000). And fourth, the exploratory theory development stage that e-government maturity, corruption, economic prosperity and environmental degradation research is currently in makes PLS a suitable choice for analyzing data in this study (Barclay et al. 1995; Gefen et al. 2000). In the model tested, all constructs were modeled as reflective as their measurement items were manifestations of intended constructs (Barclay et al. 1995). SmartPLS (version 2.0.M3) was used to analyze the data in this study (Ringle et al. 2005). In specific, I used a PLS bootstrapping technique with 500 resamples (Ko et al. 2005; Rai et al. 2006; Venkatesh et al. 2003) to assess the significance of model linkages. The results of PLS analysis for the structural model are shown in Figure 4.2. The proposed model

(including the control variables) explained 38% of variance in corruption, 83% in economic prosperity and 44% in environmental degradation.



Control Variables	Model Variables	
	Economic Prosperity	Environmental Degradation
Exports	0.06 [t=1.01]	0.01 [t=0.17]
Manufacturing	-0.04 [t=0.21]	0.10 [t=1.17]
Urban Population	0.32*** [t=4.57]	0.17 [t=1.67]
Population Aged 15 to 64	0.21** [t=3.49]	0.53*** [t=5.91]
Political Stability	0.14 [t=1.49]	0.08 [t=1.07]
Regional Difference	0.12 [t=1.12]	0.10 [t=1.18]

Note: N=103; 500 bootstrap samples; **p<0.01 ***p<0.001 (2-tailed). Control variables were entered simultaneously with model variables.

Figure 4.2: Results of PLS Analysis of Essay 3

As shown in Figure 4.2, e-government maturity was negatively associated with corruption (β=-0.59, t=9.89, p<0.001), and not associated with economic prosperity (β=0.06, t=0.81, n.s.) and environmental degradation (β=-0.08, t=0.11, n.s.). Hence, H3.1 was supported, and H3.2 and H3.3 were not supported. Also, as expected, corruption was negatively associated with economic prosperity (β=-0.52, t=10.01, p<0.001) and positively associated with environmental degradation (β=0.43, t=4.41, p<0.001). Therefore, H3.4 and H3.5 were supported.

To test the mediated effects of corruption on the relationships of e-government maturity with economic prosperity and environmental degradation (i.e., H3.6), this study referred to the method that Preacher and Hayes (2008) recommended for testing indirect effects. Preacher and Hayes' method examines the total and direct effects of the independent variable on the dependent variable, and the indirect effects through the mediator. As per Preacher and Hayes' suggestions, I elected the bootstrapping strategy for the tests. Bootstrapping is a non-parametric 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 effect of the mediator in each resampled dataset. Based on repeated samplings, an empirical approximation of the indirect effect can be estimated and used to construct confidence intervals (CIs) for the indirect effect. In this study, I used the bias-corrected (BC) bootstrap, as Preacher and Hayes recommended. Preacher and Hayes, consistent with prior research (e.g., Williams and MacKinnon 2008), argues 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 BC bootstrap performs best in terms of both statistical power and Type I error rate.

A Preacher and Hayes analysis includes an examination of 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 the mediator. The analysis also yields an estimation of the indirect effect of the mediator. In addition, the BC bootstrap will generate a 95% CI for the mediator. If the interval for a mediator does not contain zero, it means the indirect effect of the mediator is significantly different from zero.

Table 4.3 presents the summary of mediation results. First, Model 1 was examined, in which e-government maturity was the independent variable and economic prosperity was the

dependent variable with environmental degradation treated as a covariate along with other control variables. As shown in Table 4.3, e-government maturity had a significant total effect on economic prosperity. When the mediating variable corruption was introduced, the direct effect of e-government maturity on economic prosperity became insignificant. This meant that corruption fully mediated the impact of e-government maturity on economic prosperity. Furthermore, the difference between the total and direct effects was the indirect effect as mediated through corruption with a point estimate of 0.3301 and a 95% BC bootstrap CI of 0.1539 to 0.5604, indicating that the indirect effect of corruption between e-government maturity and economic prosperity was significantly different from zero.

Next, Model 2 was examined, in which e-government maturity was the independent variable and environmental degradation was the dependent variable with economic prosperity treated as a covariate along with other control variables. As shown in Table 4.3, e-government maturity did not have a significant total effect on environmental degradation. While some researchers (e.g., Baron and 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 and Bolger 2002) argued that this is not necessary for mediation to occur. Thus, I proceeded to examine the mediating effect of corruption. As shown in the table, the indirect effect was significant, with a point estimate of -0.0484 and a 95% BC bootstrap CI of -0.1319 to -0.0081, indicating that the indirect effect of corruption on e-government maturity and environmental degradation was significantly different from zero. In summary, this assessment indicated that e-government maturity had indirect effects with economic prosperity and environmental degradation via corruption. In other words, corruption partially mediated the impact of e-government maturity on economic prosperity and

environmental degradation. Hence, H3.6 was supported. A summary of the hypotheses tests is presented in Table 4.4.

Table 4.3: Summary of Tests of Mediation Effects of Essay 3

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	Upper
Model 1: Economic prosperity as DV (controlling for environmental degradation along with other controls)							
0.4126***	4.1765	0.0913	1.0412	Total	0.3301	0.1539	0.5604
				Corruption	0.3301	0.1539	0.5604
Model 2: Environmental degradation as DV (controlling for economic prosperity along with other controls)							
-0.0501	-0.7206	-0.0054	-0.0819	Total	-0.0484	-0.1319	-0.0081
				Corruption	-0.0484	-0.1319	-0.0081
Note: N=103; 5000 bootstrap samples (as recommended by Preacher and Hayes (2008)); Model 1's R^2=83% (Adjusted R^2=82%); Model 2's R^2=50% (Adjusted R^2=49%); IV: Independent Variable; DV: Dependent Variable; BC: Bias-Corrected Bootstrap; CI: Confidence Interval; ***p<0.001 (2-tailed); 'Total' is the total relation between independent variable and dependent variable without the consideration of other variables.							

Table 4.4: Summary of Hypotheses Tests of Essay 3

Hypotheses	Description	Result
Direct Effects		
H3.1	E-government maturity in a country is negatively associated with its corruption.	Supported
H3.2	E-government maturity in a country is positively associated with its economic prosperity.	Not Supported
H3.3	E-government maturity in a country is negatively associated with its environmental degradation.	Not Supported
H3.4	Corruption in a country is negatively associated with its economic prosperity.	Supported
H3.5	Corruption in a country is positively associated with its environmental degradation.	Supported
Mediated Effect		
H3.6a	The relationship of e-government maturity in a country with its economic prosperity is partially mediated by its corruption.	Supported
H3.6b	The relationship of e-government maturity in a country with its environmental degradation is partially mediated by its corruption.	Supported

Turning to the effect of the control variables, as shown in Figure 4.2, while urban population and population aged 15 to 64 had significant effects on economic prosperity, other control variables namely, exports, manufacturing, political stability and regional difference were not significantly associated with it. Similarly, while population aged 15 to 64 had significant effect on environmental degradation, the other five control variables were not significantly associated with it.

Lastly, I also tested for reverse causality and endogeneity. Although all the hypotheses were formulated so as to signify a relationship rather than a causation between e-government maturity and impact variables (i.e., corruption, economic prosperity and environmental degradation), there is an implicit implied causality. Therefore, I tested for possible endogeneity. To examine this, I conducted two-stage least squares (2SLS) regression with two additional instrumental variables of human capital and ICT infrastructure. The hypothesized relationship for e-government maturity with corruption (β=-0.55 t=9.38, $p<0.001$) remained significant, and the relationships of e-government maturity with economic prosperity (β=0.07, t = 0.91, n.s.) and environmental degradation (β=-0.10, t=0.54, n.s.) remained insignificant; thus providing evidence for robust results and minimal concern for endogeneity.

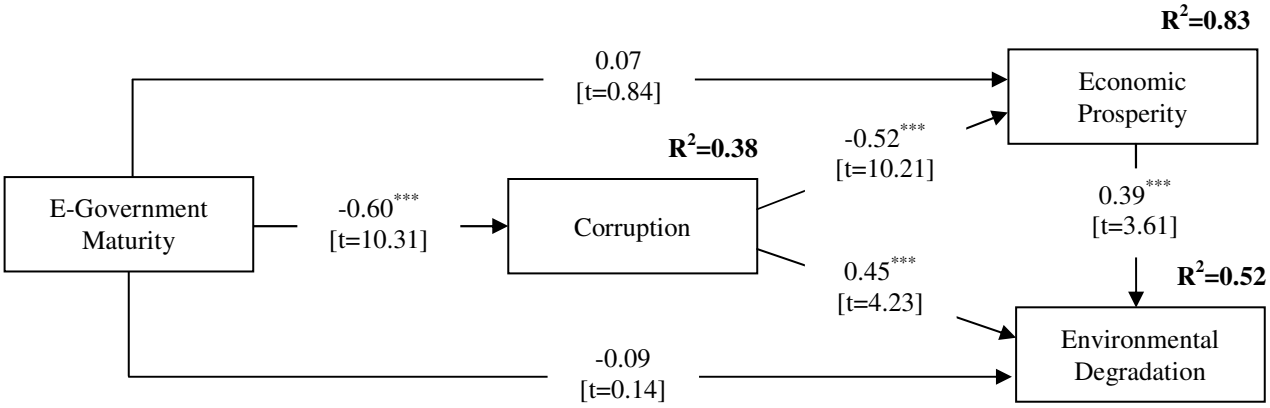
4.4.4. Post Hoc Analysis

The link between economic prosperity and environmental degradation has received attention in the literature for several years. Traditional economic theories posit a tradeoff between economic prosperity and environmental degradation (or environmental quality). As economic activities involve production and consumption processes that cannot be disentangled from the environment in which they are located, the impact of such activities on the environment

increases as the economy prospers (Kahuthu 2006). According to the treadmill of production perspective, an economic system predicated on constant growth generates ever increasing environmental degradation (Gould et al. 2008). Further political-economic approaches, including the metabolic rift and world-systems analysis, as well as structural human ecology, all argue that economic development is a key driver of environmental degradation (Jorgenson et al. 2010). Empirical studies examining the relationship between economic prosperity (in terms of GDP per capita) and environmental degradation (in terms of CO2 emissions) consistently showed a positive association between them (e.g., Clark and York 2005; Gould et al. 2008; York et al. 2003). In this section, I perform a PLS analysis by inserting a path from economic prosperity to environmental degradation to examine if economic prosperity in a country is positively associated with its environmental degradation.

A summary of post hoc analysis results are shown in Figure 4.3. As shown in the figure, in line with extant studies, the results indicated that economic prosperity in a country was positively associated with its environmental degradation (β=0.39, t=3.61, p<0.001). Further, there were not significant differences in path coefficients (and t-values) for links pertaining to hypotheses, H3.1: e-government maturity and corruption (β=-0.60, t=10.31, p<0.001); H3.2: e-government maturity and economic prosperity (β=0.07, t=0.84, n.s.); H3.3: e-government maturity and environmental degradation (β=-0.09, t=0.14, n.s.); H3.4: corruption and economic prosperity (β=-0.52, t=10.21, p<0.001); and H3.6: corruption and environmental degradation (β=0.45, t=4.23, p<0.001). Turning to the effect of the control variables, as shown in Figure 4.3, while urban population and population aged 15 to 64 had significant effects on economic prosperity, other control variables namely, exports, manufacturing, political stability and regional difference were not significantly associated with it. Similarly, while population aged 15 to 64

had significant effect on environmental degradation, the other five control variables were not significantly associated with it. The model (including the control variables) explained 38% of variance in corruption, 83% in economic prosperity and 52% in environmental degradation.



Control Variables	Model Variables	
	Economic Prosperity	Environmental Degradation
Exports	0.07 [t=1.12]	0.01 [t=0.16]
Manufacturing	-0.04 [t=0.27]	0.08 [t=1.14]
Urban Population	0.33*** [t=4.57]	0.18 [t=1.71]
Population Aged 15 to 64	0.21** [t=3.49]	0.52*** [t=5.82]
Political Stability	0.14 [t=1.49]	0.09 [t=1.10]
Regional Difference	0.12 [t=1.12]	0.10 [t=1.17]

Note: N=103; 500 bootstrap samples; **p<0.01 ***p<0.001 (2-tailed). Control variables were entered simultaneously with model variables.

Figure 4.3: Summary of Post hoc Analysis Results of Essay 3

4.5. Discussion

Findings from this study raise several issues that deserve mention. First, e-government maturity in a country was negatively related to its corruption. While there are strong theoretical grounds to believe that e-government can combat corruption, a handful of studies raised doubts if ICTs in general can effectively reduce corruption in reality. For instance, Heeks (1998) argued

that sometimes ICTs had no significant effects on reducing corruption, and even created new opportunities for corruption. Likewise, Wescott (2001) highlighted that ICTs could lead to an upskilling of corruption, and reduced competition for upskilled corrupt civil servants. As an attempt to address their doubts, this study established a quantitative merit in the relationship between e-government maturity in a country and its corruption indicating that as e-government matures, the level of corruption in a country decreases.

Second, results indicated that e-government maturity did not contribute significantly to economic prosperity and environmental degradation. One possible reason for this result might be due to the fact that e-government in a country is relatively small (compared to other ICT-led innovations). However, it is gratifying that the observation of the (1) positive relationship between e-government maturity and economic prosperity; and (2) negative relationship between e-government maturity and environmental degradation were in the same direction as past studies (e.g., Krishnan and Teo 2011; Srivastava and Teo 2010). Further, I note that published research (e.g., Srivastava and Teo 2010) examining the effect of e-government on economic performance often used single year datasets. In contrast, I used average scores, which might have caused insignificant results. Nevertheless, considering the fact that average scores provide more accurate and stable estimates than single year datasets (Wiggins and Ruefi 2005), the lack of significance could be believed. Also, it should be noted that studies examining the effect of e-government on environmental degradation found insignificant main effect between e-government development and environmental sustainability but significant interaction effects of national environmental factors (e.g., human capital and public institutions) on e-government development and environmental sustainability relationship (e.g., Krishnan and Teo 2011). Hence, it is likely that

the value of e-government could be realized in the presence of other contingency factors or intermediary variables, and future research might consider examining this.

Third, results showed that corruption was negatively associated with economic prosperity and positively associated with environmental degradation. These findings are consistent with prior empirical research (e.g., Morse 2006, Robertson and Watson 2004, Rose-Ackerman 1999, Welsch 2004) which showed that corruption promoted rewarding unmerited behavior resulting in inefficiencies. Further, results pertaining to the post hoc analysis showed that economic prosperity in a country was positively associated with its environmental degradation, thereby emphasizing that an economic system predicated on constant growth generates ever increasing environmental degradation (Gould et al. 2008). Lastly, results showed that e-government maturity was associated with economic prosperity and environmental degradation through the mediated effects of corruption. This finding indicates that the benefits from e-government could be realized indirectly via its intermediate impact variable of corruption, which in turn influences the outcome impact variables of economic prosperity and environmental degradation.

4.6. Implications

This essay makes some important contributions which have implications for both research and practice.

4.6.1. Implications for Research

This study contributes to the knowledge base of e-government research in three ways. First, by conceptualizing an e-government impact model as having first-order association with corruption, which in turn are related to higher-order outcome variables of economic prosperity and environmental degradation, this study is one among the few studies to take a processual

mediated view, thereby offering a more accurate and fuller understanding of the paths through which e-government benefits (i.e., enhancing economic prosperity and preventing environmental degradation) could be realized. Second, while existing studies on e-government linking corruption, economic prosperity and environmental degradation are often descriptive and mostly undertaken via qualitative case study approach, this study has identified a quantitative merit in the relationships among them by making innovative use of publicly available archival data. Third, while e-government researchers are constantly struggling with three major issues regarding the research questions pertaining to the impact of e-government (Srivastava 2011) namely, (1) variables of interest on which the impact of e-government maturity should be measured (here, economic prosperity and environmental degradation); (2) level of analyses (here, cross-country level); and (3) the mediating activities through which the value of e-government is realized (here, corruption), this study has clearly shown the research community on how to overcome such issues in their own research.

4.6.2. Implications for Practice

From a practical standpoint, this study makes two key contributions. First, by examining the influence of e-government maturity on corruption, economic prosperity and environmental degradation, this study helps practitioners and policymakers to understand why different levels of corruption, economic prosperity and environmental degradation continues to prevail among countries. Second, this study suggests that e-government maturity has indirect effects on economic prosperity and environmental degradation through corruption. That is, reduction in the levels of corruption in a country will enhance economic prosperity and prevent environmental degradation. Therefore, practitioners and policymakers should make concerted efforts in

enhancing economic prosperity and preventing environmental degradation by reducing the levels of corruption by focusing their efforts on the growth and maturity of e-government.

4.7. Conclusion

Despite an extensive recognition on the influence of e-government in a country on its corruption, economic prosperity and environmental degradation, both research and practitioner communities knows relatively little about how e-government can be effectively utilized to combat corruption, enhance economic prosperity and lower environmental degradation. As an initial step to be taken towards raising awareness for the pivotal role of e-government in managing corruption, economic prosperity and environmental degradation, I have constructed and validated a theoretical model by making innovative use of publicly available archival data. Further, I reasoned and demonstrated empirically the indirect relationships among e-government maturity, economic prosperity and environmental degradation through the mediated effects of corruption. In sum, this study provides insights on the path through which e-government benefits (i.e., enhancing economic prosperity and preventing environmental degradation) could be realized.

Chapter 5

Conclusion

The objectives of this dissertation were to examine two key concerns related to e-government maturity in a country namely, (1) antecedents; and (2) consequences, thereby contributing to the emerging body of knowledge in the field of e-government. I addressed these two concerns in my dissertation by studying the following five questions:

1. What contextual factors in a country affect its e-government maturity? **(Concern 1, Theme I, Essay 1)**
2. What are the mediating activities through which the contextual factors in a country affect its e-government maturity? **(Concern 1, Theme II, Essay 1)**
3. Can the effect of one contextual factor impact the relationship of another contextual factor in a country with its e-government maturity? **(Concern 1, Theme III, Essay 2)**
4. What are the payoffs of e-government maturity in a country? **(Concern 2, Theme IV, Essay 3)**
5. What are the mediating activities through which the value of e-government maturity could be realized? **(Concern 2, Theme V, Essay 3)**

In the *first essay* titled "Contextual Factors, Government's Willingness to Implement E-Participation, and E-Government Maturity: Testing a Multiple-Mediation Model," by drawing from the Technology-Organization-Environment (TOE) theory, I identified three factors namely, information and communication technology (ICT) infrastructure, human capital and governance as the TOE contextual factors that affects e-government maturity **(Theme I)**. Further, by drawing

from the literature on citizen engagement, I proposed government's willingness to implement e-participation in form of e-information sharing, e-consultation and e-decision-making as the mediating activities through which the TOE contextual factors affects e-government maturity **(Theme II)**. Specifically, I formulated a multiple-mediation model that examined (1) the TOE contextual factors affecting government's willingness to implement e-participation and e-government maturity; and (2) the mediating role of government's willingness to implement e-participation on the relationships between TOE contextual factors and e-government maturity. I hypothesized that ICT infrastructure, human capital and governance might have both direct and indirect relationships with e-government maturity through the mediating roles of government's willingness to implement e-participation.

Results from this essay showed that while ICT infrastructure and human capital were positively associated with government's willingness to implement e-participation and its e-government maturity, governance was not significantly associated with them. Also, government's willingness to implement e-participation had significant associations with e-government maturity. Specifically, of three dimensions of e-participation, government's willingness to implement e-information sharing and e-decision-making were positively associated with e-government maturity, and its willingness to implement e-consultation was negatively associated. Further, government's willingness to implement e-information sharing, e-consultation and e-decision-making partially mediated the influences of ICT infrastructure and human capital on e-government maturity. Results also indicated that the relationship of governance with e-government maturity was not mediated by government's willingness to implement e-participation. Findings from this essay contributed to the theoretical discourse on e-government by highlighting the roles of the TOE contextual factors on government's willingness

to implement e-participation and e-government maturity, and provide indications for practice in managing e-government maturity by (1) enhancing government's willingness to implement appropriate e-participation initiatives; and (2) leveraging the effects of the TOE contextual factors on government's willingness to implement e-participation and e-government maturity.

In the *second essay* titled "Does Governance Matter? Investigating the Moderating Effects of Governance on ICT Infrastructure and E-Government Maturity," motivated by the consistent calls for research to key out the contextual factors that strengthens the impact of another contextual factor on e-government maturity, by drawing from the theory of complementarities, I proposed governance (in form of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption) as a contextual factor that affects (or strengthens) the effect of ICT infrastructure (another contextual factor) on e-government maturity **(Theme III)**. Specifically, I reasoned and demonstrated empirically the moderating influence of the governance dimensions on the relationship of ICT infrastructure with e-government maturity.

Results indicated that while political stability, government effectiveness, rule of law and control of corruption moderated the relationship of ICT infrastructure and e-government maturity positively, voice and accountability moderated the relationship negatively. Further, the relationship between ICT infrastructure and e-government maturity was not contingent on regulatory quality. Findings from this essay indicated that governance does matter in the context of e-government maturity, and the assumptions about ICT infrastructure and its impact on e-government maturity were justifiably stimulated by governance dimensions. Further, findings contributed to the theoretical discourse on e-government by identifying the differential roles of governance dimensions, and provided indications for practice in managing e-government

maturity by enhancing appropriate governance dimensions, thereby leveraging the effect of ICT infrastructure on e-government maturity.

In the *third essay* titled "Examining the Relationship of E-Government Maturity, Corruption, Economic Prosperity and Environmental Degradation," motivated by the fact that the research on e-government impact is still in a nascent state, and predicated by the growing interest in the role and contribution of e-government maturity to the levels of its corruption, economic prosperity and environmental degradation, I conceptualized an e-government impact model as having first-order association with corruption **(Theme V)**, which in turn were related to higher-order outcome variables of economic prosperity and environmental degradation **(Theme IV)**, and explored their relationships.

Results substantiated a significant relationship between (1) e-government maturity and corruption; and (2) e-government maturity, economic prosperity and environmental degradation through the mediating effects of corruption. Findings suggested that while e-government maturity did not contribute to economic prosperity and environmental degradation, its value could be realized indirectly via its impacts on corruption. Taking a processual mediated view, this essay offers a more accurate and fuller understanding of the paths through which e-government benefits could be realized. Findings contributed to the theoretical discourse on e-government impact by identifying the role of e-government maturity, and provided indications for practice on enhancing economic prosperity and preventing environmental degradation by reducing the levels of corruption. Table 5.1 summarizes the key findings (including the results from post hoc analysis) and contributions emerged out from the three essays of this dissertation.

Table 5.1: Summary of Key Findings and Contributions of the Three Essays

Key Findings	Contributions
Essay 1	
1. While ICT infrastructure and human capital were positively associated with government's willingness to implement e-participation in a country and its e-government maturity, governance had little impact on them. 2. Government's willingness to implement e-participation in a country had significant associations with its e-government maturity. Specifically, of three dimensions of e-participation, government's willingness to implement e-information sharing and e-decision-making were positively associated with e-government maturity, and its willingness to implement e-consultation was negatively associated. 3. While government's willingness to implement e-information sharing, e-consultation and e-decision-making partially mediated the influences of ICT infrastructure and human capital on e-government maturity, the relationship between the levels of governance and e-government maturity was not mediated by government's willingness to implement e-participation. 4. Post hoc analysis indicated that within ICT infrastructure, all its dimensions namely, (a) personal computers; (b) Internet users; (c) telephone lines; (d) mobile cellular subscriptions; and (e) fixed broadband subscribers significantly contributed to the maturity of e-government in a country and its government's willingness to implement e-participation. Specifically, the dimensions of personal computers and the Internet users in comparison with the remaining three dimensions had stronger effects on government's willingness to implement e-participation in a country and its e-government maturity. 5. Post hoc analysis also indicated that within human capital, both the dimensions of adult literacy rate and gross enrolment ratio significantly contributed to government's willingness to implement e-participation in a country and its e-government maturity. Specifically, the dimension of adult literacy rate in comparison with gross enrolment ratio exhibited stronger effects on them.	1. Through theoretical synthesis, this study combined the attributes of the TOE theory with the citizen engagement perspective to understand the concept of government's willingness to implement e-participation in a country and its e-government maturity thereby showing that the TOE theory is a useful theoretical lens for studying such a global concept. Further, this study was among the few studies to demonstrate the applicability of the TOE theory in the global context by making an innovative use of publicly available archival data. 2. This study contributed to research on e-government by focusing on the maturity aspect of e-government (representing the demonstrated behavior) rather than its readiness aspect (representing the potential of a country to achieve e-government). Further, this study offered a supply-side view (i.e., government perspective) of e-participation rather than its demand-side perspective (i.e., citizens' view) by doing a deeper analysis of government's willingness to implement e-participation in terms of its three dimensions namely, e-information sharing, e-consultation and e-decision-making. 3. From a practical standpoint, this study established that for a country's e-government to attain the stage of maturity, concerted efforts should be made by (a) investing in ICT infrastructure and human capital; and (b) enhancing government's willingness to implement relevant e-participation initiatives.

Key Findings	Contributions
Essay 2	
1. Of six dimensions of governance, voice and accountability, political stability, government effectiveness, rule of law and control of corruption were found to be the principal moderating variables used to explain governance. 2. While political stability, government effectiveness, rule of law and control of corruption moderated the relationship of ICT infrastructure with e-government maturity in the positive direction, voice and accountability moderated the relationship negatively. Further, the relationship of ICT infrastructure and e-government maturity was not contingent on regulatory quality.	1. This study contributed to the theory of complementarities by extending its firm-level argumentation to a macro-level, and established its usefulness in the empirical context of e-government by positing that resource (here, ICT infrastructure) produces greater returns (here, e-government maturity) if certain other resources (here, governance) are present than it would produce by itself. 2. By assessing the complementary role of governance dimensions in form of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption, this study not only keyed out the contextual factor(s) that strengthens the effect of another contextual factor (i.e., ICT infrastructure) on e-government maturity but also provided a basis for the development of ICT-related e-government maturity assessment tools for managerial use. 3. The interaction plots are insightful to the practitioners and policymakers implying that they should pay increased attention in managing appropriate governance dimensions alongside the investments in ICT infrastructure.
Essay 3	
1. E-government maturity in a country was negatively associated with its corruption. Further, corruption in a country was negatively associated with its economic prosperity and positively associated with its environmental degradation. 2. While e-government maturity in a country was not significantly associated with its economic prosperity and environmental degradation, findings indicated that its value could be realized indirectly via its impacts on corruption. 3. Post hoc analysis indicated that economic prosperity in a country was positively associated with its environmental degradation.	1. By conceptualizing an e-government impact model as having first-order association with corruption, which in turn were related to higher-order outcome variables of economic prosperity and environmental degradation, this study was one among the few studies to take a processual mediated view, thereby offering a more accurate and fuller understanding of the paths through which e-government benefits could be realized. 2. This study established that the practitioners should make concerted efforts in enhancing economic prosperity and preventing environmental degradation by reducing the levels of corruption, thereby focusing their efforts on the growth and maturity of e-government.

While the three essays of this dissertation viewed the concerns pertaining to e-government maturity through multiple theories and perspectives, its findings and contributions (as shown in Table 5.1) should be viewed and interpreted in the light of a few limitations that are worth mentioning at this point. *First*, I used archival data obtained from different reports and databases (e.g., UN-Reports, World Bank's Worldwide Governance Indicators database, World Bank's World Development Indicators database, Transparency International reports, etc.). While primary data might have given a better control over the definition of variables, it is less feasible to undertake a large-scale cross-country data collection given the limited amount of resources and time. However, considering the fact that the data I used in my dissertation have been collected by reputable and authorized organizations, and the indices have been formulated using suitable statistical procedures (e.g., use of multiple respondent expert surveys in each nation and correcting the internal consistency before index calculation) to ensure its reliability and validity, relying on these secondary sources provided a cost-effective way for conducting the three studies.

Second, for all the three studies in the dissertation, I analyzed data only from the countries commonly available in all the primary sources. For instance, I could not include countries like Hong Kong and Taiwan in any of the three studies as these countries were not commonly available in all the data sources. Given that the bootstrapping approach to mediation (used in Essay 1) and multiple regression statistical technique (used in Essay 2) 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), discarding a few countries may not make significant differences in the results. Likewise, as PLS (used in Essay 3)

places minimal restrictions on sample size and residual distributions (Chin 1998), omitting a few countries may not make considerable differences in the results.

Third, in Essay 1, whereas the correlation between government's willingness to implement e-consultation in a country and its e-government maturity was positive, regression results showed a negative association. Although I offered a plausible explanation behind this result by grounding the discussion in the purpose of implementing e-consultation initiatives in a country, it is likely that the sign change would have occurred due to other variables in the regression model with which it was correlated. Likewise, in Essay 2, correlations between a few governance dimensions were greater than 0.8. Specifically, the correlations between government effectiveness and regulatory quality, and regulatory quality and rule of law were 0.80 and 0.81 respectively. Although (1) these variables measure distinct parameters (Kaufmann et al. 1999) and are used as the standard measures of governance quality in the world development reports (IBRD 2002); and (2) I used the robust method of moderated multiple regression to test the hypotheses that generally mitigates any undue influences (Hair et al. 2006), it is likely that the insignificant effect of regulatory quality on the relationship of ICT infrastructure and e-government maturity would have occurred due to the aforementioned high correlations. Also, while voice and accountability was positively correlated with both ICT infrastructure (r=0.59) and e-government maturity (r=0.49), regression results showed a negative moderation effect. Though I offered a plausible explanation behind this result by grounding the discussion in the dual effect of voice and accountability, it is likely that the sign change would have occurred due to other variables in the regression model with which it was correlated. Predicated by these concerns, future researchers might consider working on the aforementioned findings by utilizing alterative measures for government's willingness to implement e-consultation and governance

variables. Despite these three potential limitations, this research is one among the few studies with a macro-level orientation offering a global perspective that contributes to the field of e-government.

All the essays together clearly bring out some important considerations for future researchers examining the field of e-government. *First*, researchers may consider extending the cross-sectional studies to longitudinal (panel) studies when more data becomes available. Specifically, Dewan et al. (2010) indicate that at least nine years of data are required to support a robust estimation of empirical specifications while performing panel data analysis (especially in the context of country-level studies). Further, this would help to examine the issues of temporal precedence (leads/lags between variables).

Second, although this dissertation looked at the concern of antecedents and consequences of e-government maturity, it should be noted that I looked at them separately. That is, while Essays 1 and 2 focused on antecedents, Essay 3 dealt with consequences. Future research might consider studying both the concerns together cohesively under a unified theoretical framework (e.g., Srivastava and Teo 2010). Such studies might be helpful (1) to practitioners and policymakers as new ideas might originate in the fields of practice offering several insightful policy implications; and (2) in identifying and understanding aggregate patterns of e-government.

Third, future research might also study the concerns of antecedents and consequences in the context of e-government readiness (i.e., potential for a country to achieve e-government) and compare them with the concept of e-government maturity (i.e., demonstrated behavior). Such studies might offer insightful implications to practitioners and policymakers in understanding

how to leverage the beneficial effects of a country's resources on managing its e-government development.

Fourth, future research might also consider looking at the demand side aspect of e-participation (i.e., citizen's perspective) in form e-information-sharing, e-consultation and e-decision-making as the mediating activities through which the effects of TOE contextual factors on e-government maturity could be realized. A comparison of supply- and demand-side perspectives of e-participation as the mediating activities on the TOE contextual factors and e-government maturity relationships might provide interesting and insightful implications to practitioners and policymakers.

Fifth, researchers might also look at keying out other contextual factors (e.g., micro- and macro-economy) that might impact the relationship of ICT infrastructure on e-government maturity. *Sixth,* while reduction in corruption was identified as a mediating activity through which the higher-order impact of e-government maturity in form of enhanced economic prosperity and prevention of environmental degradation could be realized, future research might considering doing a deeper analysis on the mediating activity of corruption. Specifically, they could consider studying the concept of corruption at various institutions namely, political institutions, judicial institutions, police institutions, educational institutions, etc. *Seventh,* it is also imperative to identify other intermediary (e.g., resource spending efficiency and administrative process efficiency) and outcome impacts (e.g., reduction of social divide) of e-government maturity in a country.

Lastly, as more than 6000 references of predominantly English language, peer-reviewed works on e-government exists in the E-Government Reference Library (Version 9.4) spanning several disciplines namely, Business/Management, Public Administration and Information

Systems (IS), future research might consider coming up with a research agenda offering a transdisciplinary perspective on e-government. I believe that some (or all) parts of Table 1.1 have the potential to be the basis of such a research agenda. As e-government is a complex concept, a planned approach investigating e-government by applying a transdisciplinary perspective will certainly bring out fresh insights into its theory and practice.

In sum, this dissertation is a small, albeit a significant step, in examining some of the e-government issues that the governments, policymakers, practitioners and academics are currently grappling with and also charts out a roadmap for future research on the subject.

Bibliography

Abdallah, S., and Fan, I.-S. 2012. "Framework for E-Government Assessment in Developing Countries: Case Study from Sudan," *Electronic Government, an International Journal* (9:2), pp. 158-177.

Accenture. 2007. Leadership in Customer Service: Delivering on the Promise. Retrieved on December 5, 2013 from: http://nstore.accenture.com/acn_com/PDF/2007LCSDelivPromiseFinal.pdf

Ahn, M. J. 2011. "Adoption of E-Communication Applications in US Municipalities: The Role of Political Environment, Bureaucratic Structure, and the Nature of Applications," *American Review of Public Administration* (41:4), pp. 428-452.

Ahn, M. J., and Bretschneider, S. 2011. "Politics of E-Government: E-Government and the Political Control of Bureaucracy," *Public Administration Review* (71:3), pp. 414-424.

Aiken, L. S., and West, S. G. 1991. *Multiple Regression: Testing and Interpreting Interactions,* Thousand Oaks, CA: Sage.

Akesson, M., Skalen, P., and Edvardsson, B. 2008. "E-Government and Service Orientation: Gaps between Theory and Practice," *International Journal of Public Sector Management* (21:1), pp. 74-92.

Akingbade, A., Navarra, D., Zevenbergen, J., and Georgiadou, Y. 2012. "The Impact of Electronic Land Administration on Urban Housing Development: The Case Study of the Federal Capital Territory of Nigeria," *Habitat International* (36:2), pp. 324-332.

Alghamdi, I. A., Goodwin, R., and Rampersad, G. 2011. "E-Government Readiness Assessment for Government Organizations in Developing Countries," *Computer and Information Science* (4:3), pp. 3-17.

Alhyari, S., Alazab, M., Venkatraman, S., Alazab, M., and Alazab, A. 2012. "Six Sigma Approach to Improve Quality in E-Services," *International Journal of Electronic Government Research* (8:2), pp. 57-74.

Almutairi, H. 2010. "Electronic Government Return Assessment by Measuring Information System Usage," *Electronic Government, an International Journal* (7:1), pp. 1-21.

Al-Sebie, M., and Irani, Z. 2005. "Technical and Organisational Challenges Facing Transactional E-Government Systems: An Empirical Study," *Electronic Government: An International Journal* (2:3), pp. 247-276.

Al-Solbi, A. N. H., and Al-Harbi, S. H. 2008. "An Exploratory Study of Factors Determining E-Government Success in Saudi Arabia," *Communications of the IBIMA* (4:25), pp. 188-192.

Amit, R., and Schoemaker, P. J. H. 1993. "Strategic Assets and Organizational Rent," *Strategic Management Journal* (14:1), pp. 33-33.

Andersen, K. V., and Henriksen, H. Z. 2006. "E-Government Maturity Models: Extension of the Layne and Lee Model," *Government Information Quarterly* (23:2), pp. 236-248.

Arpaci, I. 2010. "E-Government and Technological Innovation in Turkey: Case Studies on Governmental Organizations," *Transforming Government: People, Process and Policy* (4:1), pp. 37-53.

Asogwa, B. E. 2011. "The State of E-Government Readiness in Africa: A Comparative Web Assessment of Selected African Countries," *Journal of Internet and Information System* (2:3), pp. 43-57.

Ausgov (Australian Government). 2007. *Better Practice Checklist: Managing the Environmental Impact of Information and Communications Technology*, Department of Finance and Deregulation, Australian Government Information Management Office, Parkes ACT 2600.

Azad, B., Faraj, S., Goh, J. M., and Feghali, T. 2010. "What Shapes Global Diffusion of E-Government: Comparing the Influence of National Governance Institutions," *Journal of Global Information Management* (18:2), pp. 85-104.

Badri, M. A., and Alshare, K. 2008. "A Path Analytic Model and Measurement of the Business Value of E-Government: An International Perspective," *International Journal of Information Management* (28:6), pp. 524-535.

Bakry, S. H. 2004. "Development of E-Government: A STOPE View," *International Journal of Network Management* (14:5), pp. 339-350.

Baldersheim, H., and Ølgård, M. 2008. "Innovation in E-Government: Analysis of Municipal Webpages in the Nordic Countries," *Information Polity* (13:3-4), pp. 125-137.

Banerjee, P., and Chau, P. Y. K. 2004. "An Evaluative Framework for Analysing E-Government Convergence Capability in Developing Countries," *Electronic Government, an International Journal* (1:1), pp. 29-49.

Baqir, M. N., and Iyer, L. 2010. "E-Government Maturity over 10 Years: A Comparative Analysis of E-Government Maturity in Select Countries around the World," in *Comparative E-Government,* C. G. Reddick (ed.), New York: Springer, pp. 3-22.

Barbier, E. B., Damania, R., and Léonard, D. 2005. "Corruption, Trade and Resource Conversion," *Journal of Environmental Economics and Management* (50:2), pp. 276-299.

Barclay, D., Higgins, C., and Thompson, R. 1995. "The Partial Least Squares Approach to Causal Modeling: Personal Computer Adoption and Use as an Illustration," *Technology Studies* (2:2), pp. 285-309.

Barker, J. 2011. "The Technology–Organization–Environment Framework," in *Information Systems Theory: Explaining and Predicting our Digital Society*, Y. Dwivedi, M. Wade and S. Schneberger (eds.), New York: Springer, pp. 231-246.

Barney, J. B. 1991. "Firm Resources and Sustainable Competitive Advantage," *Journal of Management* (17:1), pp. 99-120.

Baron, R. M., and Kenny, D. A. 1986. "The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology* (51:6), pp. 1173-1182.

Baroudi, J. J., and Orlikowski, W. J. 1989. "The Problem of Statistical Power in MIS Research," *MIS Quarterly* (13:1), pp. 87-106.

Barua, A., Kriebel, C. H., and Mukhopadhyay, T. 1995. "Information Technologies and Business Value: An Analytic and Empirical Investigation," *Information Systems Research* (6:1), pp. 3-23.

Basu, S. 2004. "E-Government and Developing Countries: An Overview," *International Review of Law, Computers & Technology* (18:1), pp. 109-132.

Baum, C., and Di Maio, A. 2000. *Gartner's Four Phases of E-Government Model* (Gartner Group). Retrieved on December 5, 2013 from: https://www.gartner.com/doc/317292

Bellamy, C., and Taylor, J. A. 1998. *Governing in the Information Age,* Buckingham, UK: Open University Press.

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), pp. 264-271.

Bigdeli, A. Z., and de Cesare, S. 2011. "Barriers to E-Government Service Delivery in Developing Countries: The Case of Iran," *Emerging Themes in Information Systems and Organization Studies*, pp. 307-320.

Boccaletti, G., Loffler, M., and Oppenheim, J. M. 2008. "How IT Can Cut Carbon Emissions," *McKinsey Quarterly* (October), pp. 1-5.

Bogaert, I., Martens, R., and Cauwenbergh, A. V. 1994. "Strategy as a Situational Puzzle: The Fit of Components," in *Competence-Based Competition,* Hamel, G. and A. Heene (eds.), The Strategic Management Society, Sussex: John Wiley and Sons, pp. 57-74.

Borins, S. 2001. "Public Management Innovation: Toward a Global Perspective," *American Review of Public Administration* (31:1), pp. 5-21.

Bowonder, B., Jain, A., and Narendra Kumar, G. 2005. "E-Governance in a Fishermen Community: A Case Study of Pondicherry," *International Journal of Services Technology and Management* (6:3-5), pp. 294-321.

Box, W. J. 2002. "Sustainability is IT," *Pollution Engineering* (34:1), pp. 13-17.

Brouthers, L. E., Gao, Y., and Mcnicol, J. P. 2008. "Corruption and Market Attractiveness Influences on Different Types of FDI," *Strategic Management Journal* (29:6), pp. 673-680.

Brunetti, A. 1995. *Political Variables in Cross-Country Growth Analysis*, Working Paper, Harvard University, Cambridge, MA.

Burn, J., and Robins, G. 2003. "Moving Towards E-Government: A Case Study of Organizational Change Progress," *Logistics Information Management* (16:1), pp. 25-35.

Cahill, A., Stevens, J., and Laplante, J. 1990. "The Utilization of Information-Systems Technology and Impact on Organisational Decision-Making," *Knowledge-Creation Diffusion Utilization* (12:1), pp. 53-79.

Carter, T. S. 1997. "The Failure of Environmental Regulation in New York: The Role of Co-Optation, Corruption, and a Co-Operative Enforcement Approach," *Crime Law and Social Change* (26:1), pp. 27-52.

Carter, L., and Bélanger, F. 2005. "The Utilization of E-Government Services: Citizen Trust, Innovation and Acceptance Factors," *Information Systems Journal* (15:1), pp. 2-25.

Cassel, C., Hackl, P., and Westlund, A. H. 1999. "Robustness of Partial Least-Squares Method for Estimating Latent Variable Quality Structures," *Journal of Applied Statistics* (26:4), pp. 435-446.

Castelnovo, W. 2013. "A Country Level Evaluation of the Impact of E-Government: The Case of Italy," in *E-Government Success around the World: Cases, Empirical Studies, and Practical Recommendations*, J. R. Gil-Garcia (ed.), pp. 299-320.

Centeno, C., van Bavel, R., and Burgelman, J.-C. 2005. "A Prospective View of E-Government in the European Union," *Electronic Journal of e-Government* (3:2), pp. 59-66.

Chadwick, A., and May, C. 2003. "Interactions between States and Citizens in the Age of the Internet: 'E-Government' in the United States, Britain and the European Union," *Governance* (16:2), pp. 271-300.

Chan, M. L, Hackney, R., Pan, S. L., and Chou, T. Z. 2011. "Managing E-Government System Implementation: A Resource Enactment Perspective," *European Journal Information Systems* (20), pp. 529-541.

Chan, M. L., Lau, Y., and Pan, S. L. 2008. "E-Government Implementation: A Macro Analysis of Singapore's E-Government Initiatives," *Government Information Quarterly* (25:2), pp. 239-255.

Chan, M. L., and Pan, S. L. 2008. "User Engagement in E-Government Systems Implementation: A Comparative Case Study of Two Singaporean E-Government Initiatives," *Journal of Strategic Information Systems* (17:2), pp. 124-139.

Chang, I. C., Hwang, H. G., Hung, M. C., Lin, M. H., and Yen, D. C. 2007. "Factors Affecting the Adoption of Electronic Signature: Executives' Perspective of Hospital Information Department," *Decision Support Systems* (44:1), pp. 350-359.

Chen, A. J. W., Boudreau, M.-C., and Watson, R. T. 2008. "Information Systems and Ecological Sustainability," *Journal of Systems and Information Technology* (10:3), pp. 186-201.

Chen, Y. N., Chen, H. M., Huang, W., and Ching, R. K. H. 2006. "E-Government Strategies in Developed and Developing Countries: An Implementation Framework and Case Study," *Journal of Global Information Management* (14:1), pp. 23-46.

Chen, C. W., Pan, S. L., and Huang, W. 2009. "Managing E-Government Implementation in China: A Process Perspective," *Information and Management* (46:4), pp. 203-212.

Chin, W. W. 1998. "The Partial Least Squares Approach for Structural Equation Modeling," in *Modern Methods for Business Research,* G. A. Marcoulides (ed.), Mahwah, NJ: Lawrence Erlbaum, pp. 295-336.

Cho, Y. H., and Choi, B. 2004. "E-government to Combat Corruption: The Case of Seoul Metropolitan Government," *International Journal of Public Administration* (27:10), pp. 719-735.

Clark, D., Gillett, S., Lehr, W., Sirbu, M., and Fountain, J. E. 2003. *Local Government Stimulation of Broadband: Effectiveness, E-Government, and Economic Development,* NCDG Working Paper No. 03-002.

Clark, B., and York, R. 2005. "Carbon Metabolism: Global Capitalism, Climate Change, and the Biospheric Rift," *Theory and Society* (34:4), pp. 391-428.

Coff, R. W. 2002. "Human Capital, Shared Expertise, and the Likelihood of Impasse in Corporate Acquisitions," *Journal of Management* (28:1), pp. 107-128.

Cohen, J. 1977. *Statistical Power Analysis for the Behavioral Sciences,* New York: Academic Press.

Cohen, J., and Cohen, P. 1983. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences,* Hillsdale, NJ: Lawrence Erlbaum.

Collins, L. M., Graham, J. W., and Flaherty, B. P. 1998. "An Alternative Framework for Defining Mediation," *Multivariate Behavioral Research* (33:2), pp. 295-312.

Colombo, C. 2010. "E-Participation Experiences and Local Government in Catalonia: An Explanatory Analysis," *Lecture Notes in Computer Science* (6229), pp. 82-94.

Cormier, D. and Magnan, M. 2004. "The Impact of the Web on Information and Communication Modes: The Case of Corporate Environmental Disclosure," *International Journal of Technology Management* (27:4), pp. 393-416.

Cukierman, A., Edwards, S., and Tabellini, G. 1992. "Seigniorage and Political Instability," *American Economic Review* (82:3), pp. 537-555.

Dada, D. 2006. "The Failure of E-government in Developing Countries: A Literature Review," *The Electronic Journal on Information Systems in Developing Countries* (26:1), pp. 1-10.

Damania, R. 2002. "Environmental Controls with Corrupt Bureaucrats," *Environment and Development Economics* (7:3), pp. 407-427.

Das, J., DiRienzo, C., and Burbridge Jr., J. (2009). "Global E-Government and the Role of Trust: A Cross Country Analysis," *International Journal of Electronic Government Research* (5:1), pp. 1-18.

Das, A., Singh, H., and Joseph, D. 2011. "A Longitudinal Study of E-Government Maturity," in *Proceedings of the Pacific Asia Conference on Information Systems*, Brisbane, Australia.

Decman, M., Stare, J., and Klun, M. 2010. "E-Government and Cost-Effectiveness E-Taxation in Slovenia," *Transylvanian Review of Administrative Sciences* (31:E), pp. 48-57.

Dedrick, J., Gurbaxani, V., and Kraemer, K. L. 2003. "Information Technology and Economic Performance: A Critical Review of the Empirical Evidence," *ACM Computing Surveys* (35:1), pp. 1-28.

Devadoss, P. R., Pan, S. L., and Huang, J. C. 2002. "Structurational Analysis of E-Government Initiatives: A Case Study of SCO," *Decision Support Systems* (34:3), pp. 253-269.

Dewan, S., Ganley, D., and Kraemer, K. L. 2010. "Complementarities in the Diffusion of Personal Computers and the Internet: Implications for the Global Digital Divide," *Information Systems Research* (21:4), pp. 925-940.

Dutta, S., and Jain, A. 2005. "An Analysis of the Diffusion of Information and Communication Technologies of Nations," in *The Global Information Technology Report 2005*, World Economic Forum, Geneva, Switzerland.

Dutta, S., and Mia, I. 2009. "ICT for Sustainability," in *The Global Information Technology Report 2009-2010*, World Economic Forum, Geneva, Switzerland.

Dutta, S., and Mia, I. 2010. *The Global Information Technology Report 2010-2011,* World Economic Forum, Geneva, Switzerland.

Ebbers, W. E., and van Dijk, J. A. G. M. 2007. "Resistance and Support to Electronic Government, Building a Model of Innovation," *Government Information Quarterly* (24:3), pp.554-575.

Ekelin, A. 2003. *Working with the Fogbow: Design and Reconfiguration of Services and Participation in E-government,* Licentiate Dissertation, Blekinge Institute of Technology, Sweden.

Elliot, S. 2011. "Transdisciplinary Perspectives on Environmental Sustainability: A Resource Base and Framework for IT-Enabled Business Transformation," *MIS Quarterly* (35:1), pp. 197-236.

Eom, S. J. 2013. "Institutional Dimensions of E-Government Development: Implementing the Business Reference Model in the United States and Korea," *Administration & Society* (45:7), pp. 875-907.

Eriksson, O., and Goldkuhl, G. 2013. "Preconditions for Public Sector E-Infrastructure Development," *Information and Organization* (23:3), pp. 149-176.

Esteves, J., and Joseph, R. C. 2008. "A Comprehensive Framework for the Assessment of E-Government Projects," *Government Information Quarterly* (25:1), pp. 118-132.

Evans, D., and Yen, D. C. 2005. "E-Government: An Analysis for Implementation: Framework for Understanding Cultural and Social Impact," *Government Information Quarterly* (22:3), pp. 354-373.

Fagan, M. H. 2006. "Exploring City, County and State E-Government Initiatives: An East Texas Perspective," *Business Process Management Journal* (12:1), pp. 101-112.

Fan, B. 2013. "Achieving Horizontal Integration of Municipal E-Government in China: Assessment of Managerial Mechanisms," *Information Development* (29:4), pp. 333-348.

Farooquie, J. A. 2011. "A Review of E-Government Readiness in India and the UAE," *International Journal of Humanities and Social Science* (1:1), pp. 6-13.

Feller, J., Finnegan, P., and Nilsson, O. 2011. "Open Innovation and Public Administration: Transformational Typologies and Business Model Impacts," *European Journal of Information Systems* (20:3), pp. 358-374.

Fielden, K., and Malcolm, P. 2010. "E-Government in New Zealand: Local Governments, Digital Divides and the National Digital Strategy," *Comparative E-Government* (25), pp. 505-524.

Fined, P. 2011. "Factors Influencing E-government Maturity in Transition Economies and Developing Countries: A Longitudinal Perspective," *Data Base for Advances in Information Systems* (42:4), pp. 98-116.

Flak, L. S., Dertz, W., Jansen, A., Krogstie, J., Spjelkavik, I., and Ølnes, S. 2009. "What is the value of eGovernment – and how can we actually realize it?" *Transforming Government: People, Process and Policy* (3:3), pp. 220-226.

Flak, L. S., and Rose, J. 2005. "Stakeholder Governance: Adapting Stakeholder Theory to E-Governance," *Communications of the Association for Information Systems* (16:1), pp. 662-664.

Fountain, J. E. 2001. *Building the Virtual State: Information Technology and Institutional Change,* Washington, DC: Brookings Institution Press.

Fox, J. 1991. *Regression Diagnostics,* Newbury Park, CA: Sage.

Fredriksson, P. G., and Millimet, D. L. 2001. *Bureaucratic Corruption and Environmental Policy: Theory and Evidence from the United States*, Unpublished Manuscript.

Fu, J. R., Farn, C. K. Chao, W. P. 2006. "Acceptance of Electronic Tax Filing: A Study of Taxpayer Intentions," *Information and Management* (43:1), pp. 109-126.

Gallego-Álvarez, I., Rodríguez-Domínguez, L., and García-Sánchez, I.-M. 2010. "Are Determining Factors of Municipal E-Government Common to a Worldwide Municipal View? An Intra-Country Comparison," *Government Information Quarterly* (27:4), pp. 423-430.

Ganapati, S. 2011. "Uses of Public Participation Geographic Information Systems Applications in E-Government," *Public Administration Review* (71:3), pp. 425-434.

Garcia-Murillo, M. 2013. "Does a Government Web Presence Reduce Perceptions of Corruption?" *Information Technology for Development* (19:2), pp. 151-175.

Garcia-Sanchez, I. M., Rodriguez-Dominguez, L., and Gallego-Alvarez, I. 2011. "The Relationship between Political Factors and the Development of E-Participatory Government," *Information Society* (27:4), pp. 233-251.

Gartner. 2014. *Govt IT Spending to Rise 4.3% to $6.4 billion in 2014*. Retrieved on May 7, 2014 from: http://www.livemint.com/Industry/ZjEeWISFwLnoCyzI38rPaP/Govt-IT-spending-to-rise-43-to-64-billion-in-2014--Gart.html

Gascó, M., and Roy, J. 2006. "E-Government and Multi-Level Governance: A Comparative Examination of Catalonia, Spain, and Ontario, Canada," *International Journal of Electronic Government Research* (2:4), pp. 57-75.

Gauld, R., Goldfinch, S., and Horsburgh, S. 2010. "Do they want it? Do they use it? The 'Demand-Side' of e-Government in Australia and New Zealand," *Government Information Quarterly* (27:2), pp. 177-186.

Gefen, D., Straub, D., and Boudreau, M.-C. 2000. "Structural Equation Modeling and Regression: Guidelines for Research Practice," *Communications of the Association for Information Systems* (7:7), pp. 1-78.

Getz, K. A., and Volkema, R. J. "Culture, Perceived Corruption, and Economics," *Business & Society* (40:1), pp. 7-30.

Ghapanchi, A., Albadvi, A., and Zarei, B. 2008. "A Framework for E-Government Planning and Implementation," *Electronic Government, an International Journal* (5:1), pp. 71-90.

Gibbs, J. L., and Kraemer, K. L. 2004. "A Cross-Country Investigation of the Determinants of Scope of E-Commerce Use: An Institutional Approach," *Electronic Markets* (14:2), pp. 124-137.

Gichoya, D. 2005. "Factors Affecting the Successful Implementation of ICT Projects in Government," *Electronic Journal of e-Government* (3:4), pp. 175-184.

Goetz, A. M., and Jenkins, R. 2001. "Hybrid Forms of Accountability: Citizen Engagement in Institutions of Public-Sector Oversight," *Public Management Review* (3:3), pp. 363-384.

Goetz, A. M., and Jenkins, R. 2002. *Voice, Accountability and Human Development: The Emergence of a New Agenda,* Background paper for UNDP, New York: United Nations Development Programme.

Goldkuhl, G. 2009. "Innovation in a Regulated Environment?" *International Journal of Public Information Systems* (2), pp. 77-95.

Gonzalez, R., Gasco, J., and Llopis, J. 2007. "E-Government Success: Some Principles from a Spanish Case Study," *Industrial Management & Data Systems* (107:6), pp. 845-861.

Goudie, A. W., and Stasavage, D. 1997. *Corruption: The Issues*, Organization for Economic Cooperation and Development, Paris.

Gould, K. A., Pellow, D. N., and Schnaiberg, A. 2008. *The Treadmill of Production: Injustice and Unsustainability in the Global Economy*, Boulder, CO: Paradigm Publishers.

Grant, R. M. 1996. "Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration," *Organization Science* (7:4), pp. 375-387.

Grant, G., and Chau, D. 2005. "Developing a Generic Framework for E-Government," *Journal of Global Information Management* (13:1), pp. 1-31.

Grimmelikhuij-Sen, S. 2009. "Do Transparent Government Agencies Strengthen Trust?" *Information Polity* (14:3), pp. 173-186.

Grimsley, M., and Meehan, A. 2008. "Attaining Social Value from Electronic Government," *Electronic Journal of e-Government* (6:1), pp. 31-42.

Guermazi, B., and Satola, D. 2005. "Creating the "Right" Enabling Environment for ICT," in *E-Development: From Excitement to Effectiveness,* R. Schware (ed.), Washington, DC: The World Bank Group, pp. 23-46.

Gujarati, D. N. 2003. *Basic Econometrics,* Singapore: McGraw-Hill.

Gujarati, D. N., and Porter, D. C. 2009. *Basic Econometrics,* New York: McGraw-Hill.

Ha, H. 2013. "E-Government in Singapore: Critical Success Factors," in *E-Government Success around the World: Cases, Empirical Studies, and Practical Recommendations*, J. R. Gil-Garcia (ed.), pp. 176-197.

Habib, M., and Zurawicki, L. 2001. "Country-Level Investments and the Effect of Corruption—Some Empirical Evidence," *International Business Review* (10:6), pp. 687-700.

Haigh, N. 2004. "Linkages between E-business and Sustainability Outcomes: An Exploratory Study," *Innovation: Management, Policy & Practice* (6:2), pp. 236-246.

Haigh, N., and Griffiths, A. 2008. "E-Government and Environmental Sustainability: Results from Three Australian Cases," *Electronic Government, an International Journal* (5:1), pp. 45-62.

Hair, J. F., Anderson, R. E., Tatham, R. L., and Black, W. C. 2006. *Multivariate Data Analysis with Readings,* Englewood Cliffs, NJ: Prentice Hall.

Heeks, R. 1998. *Information Technology and Public Sector Corruption,* Information Systems for Public Sector Management Working Paper No. 4, Institute for Development Policy and Management, Manchester.

Heeks, R. 1999. "Reinventing Government in the Information Age," in *Reinventing Government in the Information Age: International Practice in IT-Enabled Public Sector Reform,* R. Heeks (ed), London: Rutledge, pp. 9-21.

Heeks, R. 2002. "E-Government in Africa: Promise and Practice," *Information Polity* (7), pp. 97-114.

Heeks, R. 2008. *Success and Failure in E-Government Projects.* Retrieved on December 5, 2013 from: http://www.egov4dev.org/success/sfrates.shtml

Heeks, R., and Bailur, S. 2007. "Analyzing E-Government Research: Perspectives, Philosophies, Theories, Methods, and Practice," *Government Information Quarterly* (24:2), pp. 243-265.

Heidenheimer, A. 1996. "The Topography of Corruption: Explorations in a Comparative Perspective," *International Social Science Journal* (158:3), pp. 337-347.

Hin, L. T. W., and Subramaniam, R. 2005. "E-Government: Implementation Policies and Best Practices from Singapore," in *Electronic Government Strategies and Implementation*, W. Huang, K. Siau, and K. K. Wei (eds.), Hershey, PA: Idea Group Publishing, pp. 305-324.

Holden, S. H. 2003. "The Evolution of Information Technology Management at the Federal Level: Implications for Public Administration," in *Public Information Technology: Policy and Management Issues*, G. D. Garson (ed.), PA: Idea Group Publishing, pp. 53-73.

Huang, Z. Y. 2007. "A Comprehensive Analysis of US Counties' E-Government Portals: Development Status and Functionalities," *European Journal of Information Systems* (16:2), pp. 149-164.

Husted, B. 1999. "Wealth, Culture, and Corruption," *Journal of International Business Studies* (30:2), pp. 339-360.

IBRD (International Bank of Reconstruction and Development). 2002. *Building Institutions for Markets,* World Development Report, New York: Oxford University Press.

Ifinedo, P., and Singh, M. 2011. "Determinants of E-Government Maturity in the Transition Economies of Central and Eastern Europe," *Electronic Journal of e-Government* (9:2), pp. 166-182.

Irani, Z., Love, P. E. D., and Montazemi, A. 2007. "E-Government: Past, Present and Future," *European Journal of Information Systems* (16), pp. 103-105

Jaeger, P. T. 2002. "Constitutional Principles and E-Government: An Opinion about Possible Effects of Federalism and the Separation of Powers on E-Government Policies," *Government Information Quarterly* (19:4), pp. 357-368.

Jain, A. K. 2001. "Corruption: A Review," *Journal of Economic Surveys* (15:1), pp. 71-121.

Jarvenpaa, S. 1991. "Panning for Gold in Information Systems Research: Second-Hand Data," in *Information Systems Research: Contemporary Approaches and Emergent Traditions,* H.-

E. Nissen, H. Klein and R. Hirschheim (eds.), North-Holland, Amsterdam: Elsevier Science, pp. 63-80.

Jarvenpaa, S. L., and Leidner, D. E. 1998. "An Information Company in Mexico: Extending the Resource-Based View of the Firm to a Developing Country Context," *Information Systems Research* (9:4), pp. 342-361.

Jessop, B. 1998. "The Rise of Governance and the Risk of Failure: The Case of Economic Development," *International Social Science Journal* (155:3), pp. 29-45.

Joia, L. A. 2008. "The Impact of Government-to-Government Endeavors on the Intellectual Capital of Public Organizations," *Government Information Quarterly* (25:2), pp. 256-277.

Jorgenson, A. K., Clark, B., and Kentor, J. 2010. "Militarization and the Environment: A Panel Study of Carbon dioxide Emissions and the Ecological Footprints of Nations, 1970-2000," *Global Environmental Politics* (10:1), pp. 7-29.

Judge, W. Q., and Douglas, T. J. 1998. "Performance Implications of Incorporating Natural Environmental Issues into the Strategic Planning Process: An Empirical Assessment," *Journal of Management Studies* (35:2), pp. 241-262.

Kable. 2006. *Central Government ICT Expenditure Forecast, 2004/05 to 2007/08.* Retrieved on December 5, 2013 from: http://www.kable.co.uk/

Kahuthu, A. 2006. "Economic Growth and Environmental Degradation in a Global Context," *Environment, Development and Sustainability* (8:1), pp. 55-68.

Kankanhalli, A., Tan, B. C. Y., and Wei, K. K. 2005. "Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation," *MIS Quarterly* (29:1), pp. 113-143.

Karunasena, K., and Deng, H. P. 2012. "Critical Factors for Evaluating the Public Value of E-Government in Sri Lanka," *Government Information Quarterly* (29:1), pp. 76-84.

Karunasena, K., Deng, H., and Singh, M. 2011. "Measuring the Public Value of E-Government: A Case Study from Sri Lanka," *Transforming Government: People, Process and Policy* (5:1), pp. 81-99.

Kasigwa, J., Williams, D., and Baryamureeba, V. 2006. "The Role of ICTs and their Sustainability in Developing Countries," in *Measuring Computing Research Excellence and Vitality,* V. Baryamureba and W. Ddembe (eds.), Kampala: Fountain Publishers, pp. 78-88.

Kaufmann, D., Kraay, A., and Mastruzz, M. 2010. *The Worldwide Governance Indicators: Methodology and Analytical Issues,* Draft policy research working paper, The World Bank Development Research Group, Washington, DC.

Kaufmann, D., Kraay, A., and Zoido-Lobotan, P. 1999. *Governance Matters,* Policy Research Working Paper 2196, The World Bank Development Research Group, Washington DC.

Kazancigil, A. 1998. "Governance and Science: Market-Like Modes of Managing Society and Producing Knowledge," *International Social Science Journal* (155:3), pp. 69-79.

Ke, W., and Wei, K. K. 2004. "Successful E-Government in Singapore," *Communications of the ACM* (47:6), pp. 95-99.

Kibsi, G., Boer, K., Mourshed, M., and Rea, N. 2001. "Putting Citizens Online, Not In Line," *The McKinsey Quarterly* (2), pp. 65-73.

Kiecolt, K. J., and Nathan, L. E. 1985. *Secondary Analysis of Survey Data,* Beverly Hills, CA: Sage.

Kim, D. Y., and Grant, G. 2010. "E-Government Maturity Model using the Capability Maturity Model Integration," *Journal of Systems and Information Technology* (12:3), pp. 230-244.

Kim, S., Kim, H. J., and Lee, H. 2009. "An Institutional Analysis of an E-Government System for Anti-Corruption: The Case of OPEN," *Government Information Quarterly* (26:1), pp. 42-50.

Klitgaard, R. 1988. *Controlling Corruption*, Berkeley: University of California Press.

Ko, D.-G., Kirsch, L. J., and King, W. R. 2005. "Antecedents of Knowledge Transfer from Consultants to Clients in Enterprise System Implementations," *MIS Quarterly* (29:1), pp. 59-85.

Koh, C. E., Prybutok, V. R., Ryan, S., and Ibragimova, B. 2006. "The Importance of Strategic Readiness in an Emerging E-Government Environment," *Business Process Management Journal* (12:1), pp. 22-33.

Koh, C. E., Ryan, S., and Prybutok, V. R. 2005. "Creating Value through Managing Knowledge in an E-Government to Constituency (G2C) Environment," *Journal of Computer Information Systems* (45:4), pp. 32-41.

Kottemann, J. E. 2009. "The Effects of Technological, Institutional and Fiscal Readiness on the Extent of Nations' E-Government," *Electronic Government, an International Journal* (6:3), pp. 327-341.

Kottemann, J. E. 2011. "Technological-Institutional Synergy and the Extent of National E-Governments," *International Journal of Public Administration* (34), pp. 436-446.

Kovačić, Z. J. 2005. "The Impact of National Culture on Worldwide E-Government Readiness," *Informing Science Journal* (8), pp. 143-158.

Krishnan, S., and Teo, T. S. H. 2011. "Moderating Effects of Environmental Factors on E-Government, E-Business, and Environmental Sustainability," in *Proceedings of the International Conference of Information Systems*, Shanghai, China.

Kuan, K. K. Y., and Chau, P. Y. K. 2001. "A Perception-Based Model for EDI Adoption in Small Businesses Using a Technology-Organization-Environment Framework," *Information and Management* (38:8), pp. 507-521.

Lakka, S., Stamati, T., Michalakelis, C., and Martakos, D. 2013. "What Drives E-Government Growth? An Econometric Analysis on the Impacting Factors," *International Journal of Electronic Governance* (6:1), pp. 20-36.

Laurance, W. F. 2004. "The Perils of Payoff: Corruption as a Threat to Global Biodiversity," *Trends in Ecology and Evolution* (19:8), pp. 399-401.

Layne, K., and Lee, J. W. 2001. "Developing Fully Functional E-Government: A Four Stage Model," *Government Information Quarterly* (18:2), pp. 122-136.

Lee, S. M., Tan, X., and Tirmi, S. 2005. "Current Practices of Leading E-Government Countries," *Communications of the ACM* (48:10), pp. 99-104.

Lewis, W. A. 1995. *The Theory of Economic Growth,* Homewood, Ill: Irwin.

Li, F. 2003. "Implementing E-Government Strategy in Scotland: Current Situation and Emerging Issues," *Journal of Electronic Commerce in Organizations* (1:2), pp. 44-65.

Liao, S.-H., and Jeng, H.-P. 2005. "E-Government Implementation: Business Contract Legal Support for Taiwanese Businessmen in Mainland China," *Government Information Quarterly* (22:3), pp. 505-524.

Lin, H. F., and Lin, S. M. 2008. "Determinants of E-Business Diffusion: A Test of the Technology Diffusion Perspective," *Technovation* (28:3), pp. 135-145.

Lio, M.-C., Liu, M.-C., and Ou, Y.-P. 2011. "Can the Internet Reduce Corruption? A Cross-Country Study based on Dynamic Panel Data Models," *Government Information Quarterly* (28:1), pp. 47-53.

Liou, K. T. 2008. "E-Government Development and China's Administrative Reform," *International Journal of Public Administration* (31:1), pp. 76-95.

Lopez, R., and Mitra, S. 2000. "Corruption, Pollution, and the Kuznets Environment Curve," *Journal of Environmental Economics and Management* (40:2), pp. 137-150.

Lucas, R. E. 1988. "On the Mechanics of Economic Development," *Journal of Monetary Economics* (22:1), pp. 3-42.

Ma, L., Chung, J., and Thorson, S. 2005. "E-Government in China: Bringing Economic Development through Administrative Reform," *Government Information Quarterly* (22:1), pp. 20-37.

MacKinnon, D. P. 2000. "Contrasts in Multiple Mediator Models," in *Multivariate Applications in Substance Use Research: New Methods for New Questions,* J. Rose, L. Chassin, C. C. Presson, and S. J. Sherman (eds.), Mahwah, NJ: Erlbaum, pp. 141-160.

Macueve, G. 2008. "Assessment of the Outcomes of E-Government for Good Governance: A Case of the Land Management Information System in Mozambique," *International Journal of Electronic Governance* (1:4), pp. 363-384.

Madon, S., Sahay, S., and Sudan, R. 2007. "E-Government Policy and Health Information Systems Implementation in Andhra Pradesh, India: Need for Articulation of Linkages between the Macro and the Micro," *Information Systems* (23:5), pp. 327-344.

Mahmood, R. 2004. "Can Information and Communication Technology Help Reduce Corruption? How So and Why Not: Two Case Studies from South Asia," *Perspectives on Global Development and Technology* (3:3), pp. 347-373.

Malik, K., and Waglé, S. 2002. "Civic Engagement and Development: Introducing the Issues," in *Capacity for Development: New Solutions to Old Problems*, S. Fukuda-Parr, C. Lopes and K. Malik (eds.), London: Earthscan, pp. 85-99.

Manoharan, A. 2013. "A Study of the Determinants of County E-Government in the United States," *American Review of Public Administration* (43:2), pp. 159-178.

Maureen Brown, M. 2007. "Understanding E-Government Benefits: An Examination of Leading-Edge Local Governments," *The American Review of Public Administration* (37:2), pp. 178-197.

Mauro, P. 1995. "Corruption and Growth," *Quarterly Journal of Economics* (110), pp. 681-712.

McNeal, S., Tolbert, C. J., Moddberger, K., and Dotterweich L. J. 2003. "Innovating in Digital Government in the American States," *Social Science Quarterly* (84:1), pp. 52-70.

Means, G., and Schneider, D. 2000. *Meta-Capitalism: The E-business Revolution and the Design of 21st Century Companies and Markets,* New York: John Wiley & Sons Inc.

Melitski, J., Holzer, M., Kim, S. T., Kim, C. G., and Rho, S. Y. 2005. "Digital Government Worldwide: An E-Government Assessment of Municipal Websites," *International Journal of Electronic Government Research* (1:1), 1-19.

Melville, N., Kraemer, K., and Gurbaxani, V. 2004. "Information Technology and Organizational Performance: An Integrative Model of IT Business Value," *MIS Quarterly* (28:2), pp. 283-322.

Melville, N. P. 2010. "Information Systems Innovation for Environmental Sustainability," *MIS Quarterly* (34:1), pp.1-21.

Meso, P., Datta, P., and Mbarika, V. 2006. "Moderating Information and Communication Technologies' Influences on Socioeconomic Development with Good Governance: A Study of the Developing Countries," *Journal of the American Society for Information Science and Technology* (57:2), pp. 186-197.

Meso, P., Musa, P. Straub, D., and Mbarika, V. 2009. "Information Infrastructure, Governance, and Socio-Economic Development in Developing Countries," *European Journal of Information Systems* (18:1), pp. 52-65.

Mishra, A. N., Konana, P., and Barua, A. 2007. "Antecedents and Consequences of Internet Use in Procurement: An Empirical Investigation of US Manufacturing Firms," *Information Systems Research* (18:1), pp. 103-120.

Miyata, M. 2011. "Measuring Impacts of E-Government Support in Least Developed Countries: A Case Study of the Vehicle Registration Service in Bhutan," *Information Technology for Development* (17:2), pp. 133-152.

Moon, M. J. 2002. "The Evolution of E-Government among Municipalities: Rhetoric or Reality?" *Public Administration Review* (62:4), pp. 424-433.

Morgan, A., and Cong, C. 2003. "Integrity, Internal Control and Security in Information Systems: Connecting Governance and Technology," *Journal of the American Society for Information Science and Technology* (54:10), pp. 976-977.

Morse, S. 2006. "Is Corruption Bad for Environmental Sustainability? A Cross-National Analysis," *Ecology and Society* (11:1), p. 22.

Moynihan, D. P. 2004. "Building Secure Elections: E-Voting, Security, and Systems Theory," *Public Administration Review* (64:5), pp. 515-528.

Nabafu, R., and Maiga, G. 2012. "A Model of Success Factors for Implementing Local E-government in Uganda," *Electronic Journal of Electronic Government* (10:1), pp. 31-46.

Nas, T. F., Price, A. C., and Weber, C. T. 1986. "A Policy-Oriented Theory of Corruption," *American Political Science Review* (80:1), pp. 107-119.

Ndou, V. 2004. "E-government for Developing Countries: Opportunities and Challenges," *The Electronic Journal on Information Systems in Developing Countries* (18:1), pp. 1-24

Nengomasha, C. T., McHombu, K., and Ngulube, P. 2010. "Electronic Government Initiatives in the Public Service of Namibia," *African Journal of Library, Archives & Information Science* (20:2), pp. 125-137.

Neto, I., Kenny, C., Janakiram, S., and Watt, C. 2005. "Look Before You Leap: The Bumpy Road to E-Development," in *E-Development: From Excitement to Effectiveness,* R. Schware (ed.), Washington, DC: The World Bank Group, pp. 1-22.

Norris, D. F., and Moon, M. J. 2005. "Advancing E-Government at the Grassroots: Tortoise or Hare?" *Public Administration Review* (65:1), pp. 64-75.

Norris, D. F., and Reddick, C. G. 2013. "Local E-Government in the U.S. – Transformation or Incremental Change," *Public Administration Review* (73:1), pp. 165-175.

Nye, J. S. 1979. "Corruption and Political Development: A Cost-Benefit Analysis," in *Bureaucratic Corruption in Sub-Saharan Africa: Causes, Consequences, and Controls,* M. Ekpo (ed.), Washington DC: University Press of America, pp. 57-79.

O'Donnell, O., Boyle, R., and Timonen, V. 2003. "Transformational Aspects of E-Government in Ireland: Issues to be Addressed," *Electronic Journal of e-Government* (1:1), pp. 23-32.

OECD (Organisation for Economic Co-operation and Development). 1997. *Information Infrastructures: Their Impact and Regulatory Requirements*, Paris.

OECD (Organisation for Economic Co-operation and Development), 2001. *Citizens as Partners: Information, Consultation and Public Participation in Policy-Making,* Paris.

Ojha, A., Palvia, S., and Gupta, M. P. 2008. "A Model for Impact of E-Government on Corruption: Exploring Theoretical Foundations" in *Critical Thinking in E-Governance,* J. Bhattacharya (ed.), Gift Publishing, New Delhi, pp. 160-170.

Olphert, W., and Damodaran, L. 2007. "Citizen Participation and Engagement in the Design of E-Government Services: The Missing Link in Effective ICT Design and Delivery," *Journal of the Association for Information Systems* (8:9), pp. 491-507.

Omar, E. M. K. 2011. "E-Government Readiness: Does National Culture Matter?" *Government Information Quarterly* (28:3), pp. 388-399.

Oruame, S. 2008. "Corruption is killing ICT in Nigeria," *Computerworld Africa*. Retrieved on December 5, 2013 from: http://computerworldzambia.com/articles/2008/11/20/corruption-killing-ict-nigeria

Palanisamy, R. 2004. "Issues and Challenges in E-Governance Planning," *Electronic Government, an International Journal* (1:3), pp. 253-272.

Pan, M. J., and Jang, W. Y. 2008. "Determinants of the Adoption of Enterprise Resource Planning within the Technology-Organization-Environment Framework: Taiwan's Communications," *Journal of Computer Information Systems* (48:3), pp. 94-102.

Phang, C. W., and Kankanhalli, A. 2008. "A Framework of ICT Exploitation for E-Participation Initiatives," *Communications of the ACM* (51:12), pp. 128-132.

Porter, M. E. 1990. *The Competitive Advantage of Nations,* New York, NY: Free Press.

Porter, M. E. 2006. "Building the Microeconomic Foundations of Prosperity: Findings from the Business Competitiveness Index," in *The Global Competitiveness Report 2005-2006: Policies Underpinning Rising Prosperity,* A. López-Claros, M. E. Porter and K. Schwab (eds.), Geneva, Switzerland: Palgrave Macmillan, pp. 29-56.

Prahalad, C. K., and Hammond, A. 2002. "Serving the World's Poor, Profitably," *Harvard Business Review* (80:9), pp. 48-59.

Preacher, K. J., and Hayes, A. F. 2008. "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models," *Behavior Research Methods* (40:3), pp. 879-891.

Premkumar, G. 2003. "A Meta-Analysis of Research on Information Technology Implementation in Small Business," *Journal of Organizational Computing and Electronic Commerce* (13:2), pp. 91-121.

Pudjianto, B., Zo, H., Ciganek, A. P., and Rho, J. J. 2011. "Determinants of E-Government Assimilation in Indonesia: An Empirical Investigation Using a TOE Framework," *Asia Pacific Journal of Information Systems* (21:1), pp. 49-80.

Pulliam D. 2005. *Pace of Information Technology Spending to Slow,* Report Predicts. Govexec.com Daily Briefing. Retrieved on December 5, 2013 from: http://www.govexec.com/technology/2005/05/pace-of-information-technology-spending-to-slow-report-predicts/19133/

Quibria, M. G., Ahmed, S. N., Tschang, T., and Reyes-Macasaquit, M. L. 2003. "Digital Divide: Determinants and Policies with Special Reference to Asia," *Journal of Asian Economics* (13:6), pp. 811-825.

Radaelli, C. M. 2007. "Whither Better Regulation for the Lisbon Agenda?" *Journal of European Public Policy* (14:2), pp. 190-207.

Rai, A., Patnayakuni, R., and Seth, N. 2006. "Performance Impacts of Digitally Enabled Supply Chain Integration Capabilities," *MIS Quarterly* (30:2), pp. 225-246.

Ravichandran, T., and Lertwongsatien, C. 2005. "Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective," *Journal of Management Information Systems* (21:4), pp. 237-276.

Ray, S. 2011. "Identifying Barriers to E-Government Services for Citizens in Developing Countries: An Exploratory Study," *International Journal of Electronic Government Research* (7:3), pp. 79-91.

Reddick, C. 2004. "Empirical Models of E-Government Growth in Local Governments," *e-Service Journal* (3:2), pp. 59-83.

Reece, B. 2006. "E-Government Literature Review," *Journal of E-Government* (3:1), pp. 69-110.

Rhodes, R. 1996. "The New Governance: Governing without Government," *Political Studies* (44), pp. 652-667.

Ringle, C. M., Wende, S., and Will, S. 2005. *Smartpls 2.0 (M3) Beta.* http://www.smartpls.de, Hamburg.

Robbins, P. 2000. "The Rotten Institution: Corruption in Natural Resource Management," *Political Geography* (19:4), pp. 423-443.

Robertson, C., and Watson, A. 2004. "Corruption and Change: The Impact of Foreign Direct Investment," *Strategic Management Journal* (25:4), pp. 385-396.

Rodriguez, P., Uhlenbruck, K., and Eden, L. 2005. "Government Corruption and the Entry Strategies of Multinationals," *Academy of Management Review* (30:2), pp. 383-396.

Romer, P. M. 1990. "Endogenous Technological Change," *Journal of Political Economy* (98:5), pp. S71–102.

Rose, R. 2005. "A Global Diffusion Model of E-Governance," *Journal of Public Policy* (25), pp. 5-27.

Rose-Ackerman, S. 1999. *Corruption and Government: Causes, Consequences, and Reform.* Cambridge, UK: Cambridge University Press.

Rose, W. R., and Grant, G. G. 2010. "Critical Issues Pertaining to the Planning and Implementation of E-Government Initiatives," *Government Information Quarterly* (27:1), pp.26-33.

Sadowsky, G. 1993. "Network Connectivity for the Developing Countries," *Communications of the ACM* (36:8), pp. 42-47.

Sadowsky, G. 1996. "The Internet Society and Developing Countries," *On the Internet: An International Publication of the Internet Society* (November/December), pp. 23-29.

Sæbø, O., Rose, J., and Flak, L. S. 2008. "The Shape of E-Participation: Characterizing an Emerging Research Area," *Government Information Quarterly* (25:3), pp. 400-428.

Sagsan, M., and Yildiz, M. 2010. "E-Government in the Turkish Republic of Northern Cyprus," *Comparative E-Government* (25), pp. 409-423.

Sarikas, O. D., and Weerakkody, V. 2007. "Realising Integrated E-Government Services: A UK Local Government Perspective," *Transforming Government: People, Process and Policy* (1:2), pp. 153-173.

Satola, D., Sreenivasan, R. and Pavlasova., L. 2004. "Benchmarking Regional E-Commerce in Asia and the Pacific and Assessment of Related Regional Initiatives," in *Harmonization of Legal and Regulatory Systems for E-Commerce in Asia and the Pacific: Current Challenges and Capacity Building Needs*, New York: United Nations Publications, pp. 3-22.

Scholl, H. J. 2007. "Central Research Questions in E-Government, or Which Trajectory Should the Study Domain Take?" *Transforming Government: People, Process and Policy* (1:1), pp. 67-88.
Schultz, T. W. 1961. "Investment in Human Capital," *American Economic Review* (51:1), pp. 1-17.
Schware, R. 2005. *E-Development: From Excitement to Effectiveness,* Report prepared for the World Summit on the Information Society, Washington, DC: The World Bank Group.
Schwester, R. W. 2009. "Examining the Barriers to E-Government Adoption," *Electronic Journal of e-Government* (7:1), pp. 113-122.
Selwyn, N. and Brown, P. 2000. "Education, Nation States and the Globalization of Information Networks," *Journal of Educational Policy* (15:6), pp. 661-682.
Seng, W. M., Jackson, S., and Philip, G. 2010. "Cultural Issues in Developing E-Government in Malaysia," *Behaviour & Information Technology* (29:4), pp. 423-432.
Senior, I. 2004. "Corruption, the Government and the Private Sector: Why it Matters and What Can be done," *Economic Affairs* (24:2), pp. 22-29.
Shackleton, P., Fisher, J., and Dawson, L. 2004. "Internal and External Factors Impacting on E-Government Maturity: A Local Government Case Study," *Journal of Information Technology Cases and Applications* (6:4), pp. 36-50.
Shanab, E. A. A., and Harb, Y. A. 2013. "E-Government Readiness Association with Human Rights Index," *Electronic Government, an International Journal* (10:1), pp. 56-67.
Shareef, M. A., Kumar, V., Kumar, U., and Dwivedi, Y. K. 2011. "E-government Adoption Model (GAM): Differing Service Maturity Levels," *Government Information Quarterly* (28:1), pp. 17-35.
Sharifi, H., and Zarei, B. 2004. "An Adaptive Approach for Implementing E-Government in I.R. Iran," *Journal of Government Information* (30:5-6), pp. 600-619.
Shleifer, A., and Vishny, R. 1993. "Corruption," *Quarterly Journal of Economics* (108:3), pp. 599-618.
Shrivastava, P. 1995. "The Role of Corporations in Achieving Ecological Sustainability," *Academy of Management Review* (20:4), pp. 936-960.
Shrout, P. E., and Bolger, N. 2002. "Mediation in Experimental and Nonexperimental Studies: New Procedures and Recommendations," *Psychological Methods* (7:4), pp. 422-445.
Siau, K., and Long, Y. 2005. "Synthesizing E-Government Stage Models – A Meta-Synthesis based on Meta-Ethnography Approach," *Industrial Management and Data Systems* (105:3/4), pp. 443-458.
Siau, K., and Long, Y. 2006. "Using Social Development Lenses to Understand E-Government Development," *Journal of Global Information Management* (14:1), pp. 47-62.
Siau, K., and Long, Y. 2009. "Factors Impacting E-Government Development*," Journal of Computer Information Systems* (50:1), pp. 98-107.
Singh, H., Das, A., and Joseph, D. 2007. "Country-Level Determinants of E-Government Maturity," *Communications of the Association for Information Systems* (20:1), pp. 632-648.
Smith, R. J., Muir, R. D. J., Walpole, M. J., Balmford, A., Leader-Williams, N. 2003. "Governance and the Loss of Biodiversity," *Nature* (426), pp. 67-70.
Soh, C., and Markus, L. 1995. "How IT Creates Business Value: A Process Theory Synthesis" in *Proceedings of the International Conference on Information Systems,* Amsterdam, The Netherlands.

Srivastava, S. C. 2011. "Is E-Government Providing the Promised Returns? A Value Framework for Assessing E-Government Impact," *Transforming Government: People, Process and Policy* (5:2), pp. 107-113.

Srivastava, S. C., and Teo, T. S. H. 2007a. "E-Government Payoffs: Evidence from Cross-Country Data," *Journal of Global Information Management* (15:4), pp. 20-40.

Srivastava, S. C., and Teo, T. S. H. 2007b. "What Facilitates E-Government Development? A Cross-Country Analysis," *Electronic Government, an International Journal* (4:4), pp. 365-378.

Srivastava, S. C., and Teo, T. S. H. 2008. "The Relationship between E-Government and National Competitiveness: The Moderating Influence of Environmental Factors," *Communications of the Association for Information Systems* (23:2), pp. 73-94.

Srivastava, S. C., and Teo, T. S. H. 2010. "E-Government, E-Business, and National Economic Performance," *Communications of the Association for Information Systems* (26:1), pp. 267-286.

Sudan, R. 2005. "The Basic Building Blocks of E-Government," in *E-Development: From Excitement to Effectiveness,* R. Schware (ed.), Washington, DC: The World Bank Group, pp. 79-100.

Sun, S.-Y., Ju, T. L., and Chen, P.-Y. 2006. "E-Government Impacts on Effectiveness: A Survey Study of an E-Official-Document System," *Electronic Government, an International Journal* (3:2), pp. 174-189.

Taipale, S. 2013. "The Use of E-Government Services and the Internet: The Role of Socio-Demographic, Economic and Geographical Predictors," *Telecommunications Policy* (37:4-5), pp. 413-422.

Tan, C. W., and Pan, S. L. 2003. "Managing E-Transformation in the Public Sector: An E-Government Study of the Inland Revenue Authority of Singapore (IRAS)," *European Journal of Information Systems* (12:4), pp. 269-281.

Tapscott, D. 1996. *The Digital Economy: The Promise and Peril in the Age of Networked Intelligence,* New York: McGraw-Hill.

Teece, D. J. 1986. "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy," *Research policy* (15:6), pp. 285-305.

Teicher, J., and Dow, N. 2002. "E-Government in Australia: Promise and Progress," *Information Polity: The International Journal of Government & Democracy in the Information Age* (7:4), pp. 231-246.

Teo, T. S. H., and Koh, T. K. 2010. "Lessons from Multi-Agency Information Management Projects: Case of the Online Business Licensing Service (OBLS) Project, Singapore," *International Journal of Information Management* (30:1), pp. 85-93.

Teo, T. S. H., and Lim, V. K. G. 2004. "Leveraging Information Technology to Achieve the IT2000 Vision: The Case Study of an Intelligent Island," *Behaviour & Information Technology* (17:2), pp. 113-123.

Teo, T. S. H., Ranganathan, C., and Dhaliwal, J. 2006. "Key Dimensions of Inhibitors for the Deployment of Web-Based Business-To-Business Electronic Commerce," *IEEE Transactions on Engineering Management* (53:3), pp. 395-411.

Teo, T. S. H., Srivastava, S. C., and Jiang, L. 2009. "Trust and Electronic Government Success: An Empirical Study," *Journal of Management Information Systems* (25:3), pp. 99-131.

Thompson, D. V., Rust, R. T., and Rhoda, J. 2005. "The Business Value of E-Government for Small Firms," *International Journal of Service Industry Management* (16:3-4), pp. 385-407.

TICPI-Report. 2010. *Corruption Perception Index 2010,* Transparency International, Berlin, Germany.

TICPI-Report. 2011. *Corruption Perception Index 2011,* Transparency International, Berlin, Germany.

TICPI-Report. 2012. *Corruption Perception Index 2012,* Transparency International, Berlin, Germany.

Tiwari, A. K., and Mihai, M. 2011. "Economic Growth and FDI in Asia: A Panel-Data Approach," *Economic Analysis and Policy* (41:2), pp. 173-187.

Tobias, R. D. 1999. *An Introduction to Partial Least Squares Regression,* SAS Institute, Cary, NC.

Tolbert, C. J., and Mossberger, K. 2006. "The Effects of E-Government on Trust and Confidence in Government," *Public Administration Review* (66:3), pp. 354-369.

Tornatzky, L. G., and Fleischer, M. 1990. *The Processes of Technological Innovation,* Lexington: Lexington Books.

UNDP (United Nations Development Programme). 1997. *Governance for Sustainable Human Development,* A UNDP policy document. Retrieved on December 5, 2013 from: http://mirror.undp.org/magnet/policy/

UNDP (United Nations Development Programme). 2008. *Tackling Corruption, Transforming Lives: Accelerating Human Development in Asia and the Pacific,* New Delhi: Macmillan Publishers.

UNODC (United Nations Office on Drugs and Crime). 2004. *The Global Programme against Corruption–UN Anti-Corruption Toolkit* (3rd ed), UNODC, Vienna.

UN-Report. 2008. *From E-Government to Connected Governance.* Retrieved on December 5, 2013 from: http://www.unpan.org/egovkb/global_reports/08report.htm

UN-Report. 2010. *Leveraging E-Government at a Time of Financial and Economic Crisis.* Retrieved on December 5, 2013 from: http://www.unpan.org/egovkb/global_reports/08report.htm

UN-Report. 2012. *E-Government for the People*. Retrieved on December 5, 2013 from: http://www.unpan.org/egovkb/global_reports/08report.htm

USOMB-Report. 2014. *FY 2013 Annual Report to Congress: E-Government Act Implementation.* Retrieved on May 7, 2014 from: http://www.whitehouse.gov/sites/default/files/omb/assets/egov_docs/fy_2013_e-government_act_implementation_report_final_03_01_2014_0.pdf

Valdes, G., Solar, M., Astudillo, H., Iribarren, M., Concha, G., and Visconti, M. 2011. "Conception, Development and Implementation of an E-Government Maturity Model in Public Agencies," *Government Information Quarterly* (28:2), pp. 176-187.

Van Dijk, J. 2000. "Widening Information Gaps and Policies of Prevention," in *Digital Democracy: Issues of Theory and Practice,* K. L. Hacker and J. Van Dijk (eds.), London: Sage, pp.166-183.

Van Veenstra, A., and Janssen, M. 2012. "Investigating Outcomes of T-Government Using a Public Value Management Approach," in *Electronic Government,* H. J. Scholl, M. Janssen, M. Wimmer, C. Moe, and L. Flak (eds.), Berlin, Heidelberg: Springer, Vol. 7443, pp. 187-197.

Van Veenstra, A., Janssen, M., and Tan, Y.-H. 2010. "Towards an Understanding of E-Government Induced Change – Drawing on Organization and Structuration Theories," in *Electronic Government,* M. Wimmer, J.-L. Chappelet, M. Janssen, and H. Scholl (eds.), Berlin, Heidelberg: Springer, Vol. 6228, pp. 1-12.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. 2003. "Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* (27:3), pp. 425-478.

Volkema, R., and Chang, S. 1998. "Negotiating in Latin America: What We Know (or Think We Know) and What We Would Like to Know," *Latin American Business Review* (1:2), pp. 3-25.

Von Haldenwang, C. 2004. "Electronic Government (E-Government) and Development," *The European Journal of Development Research* (16:2), pp. 417-432.

Voyer, P. A., and Beamish, P. W. 2004. "The Effect of Corruption on Japanese Foreign Direct Investment," *Journal of Business Ethics* (50:3), pp. 211-224.

Wade, M., and Hulland, J. 2004. "The Resource-Based View and Information Systems Research: Review, Extension, and Suggestions for Future Research," *MIS Quarterly* (28:1), pp. 107-142.

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), pp. 157-162.

Watson, R. T., Boudreau, M.-C., and Chen, A. J. 2010. "Information Systems and Environmentally Sustainable Development: Energy Informatics and New Directions for the IS Community," *MIS Quarterly* (34:1), pp. 23-38.

WDI-Database. 2013. *World Bank's World Development Indicators Database 2013*. http://data.worldbank.org/data-catalog/world-development-indicators

Weerakkody, V., Dwivedi, Y. K., and Kurunananda, A. 2009. "Implementing E-Government in Sri Lanka: Lessons from the UK," *Information Technology for Development* (15:3), pp. 171-192.

Weerakkody, V., El-Haddadeh, R., Sabol, T., Ghoneim, A., and Dzupka, P. 2012. "E-Government Implementation Strategies in Developed and Transition Economies: A Comparative Study," *International Journal of Information Management* (32:1), pp. 66-74.

Weill, P. 1991. "The Role and Value of Information Technology Infrastructure: Some Empirical observations," in *Strategic Information Technology Management: Perspectives on Organizational Growth and Competitive Advantage,* R. D. Banker, R.J. Kauffman and M. A. Mahmood (eds.), Harrisburg, PA: Idea Group Publishing, pp. 547-572.

Welch, E. W., and Pandey, S. K. 2007. "E-Government and Bureaucracy: Toward a Better Understanding of Intranet Implementation and its Effect on Red Tape," *Journal of Public Administration Research and Theory* (17:3), pp. 379-404.

Welsch, H. 2004. "Corruption, Growth, and the Environment: A Cross-Country Analysis," *Environment and Development Economics* (9:5), pp. 663-693.

Wescott, C. 2001. "E-Government in the Asia-Pacific Region," *Asia Journal of Political Science* (9:2), pp. 1-24.

West, D. M. 2004. "E-Government and the Transformation of Service Delivery and Citizen Attitudes," *Public Administration Review* (64:1), pp. 15-27.

WGI-Database. 2013. *World Bank's Worldwide Governance Indicators Database 2013.* http://data.worldbank.org/data-catalog/worldwide-governance-indicators

Whyte, A., and Macintosh, A. 2002. "Analysis and Evaluation of E-Consultations," *e-Service Journal* (2:1), pp. 9-34.

Wiggins, R., and Ruefli, T. W. 2005. "Schumpeter's Ghost: Is Hyper-Competition Making the Best of Times Shorter?" *Strategic Management Journal* (26:10), pp. 887-911.

Williams, J., and MacKinnon, D. P. 2008. "Resampling and Distribution of the Product Methods for Testing Indirect Effects in Complex Models," *Structural Equation Modeling: A Multidisciplinary Journal* (15:1), pp. 23-51.

Wong, W., and Welch, E. 2004. "Does E-Government Promote Accountability? A Comparative Analysis of Website Openness and Government Accountability," *Governance: An International Journal of Policy, Administration and Institutions* (17:2), pp. 275-297.

Woszczynski, A., and Whitman, M. 2004. "The Problem of Common Method Variance in IS Research," in *The Handbook of Information Systems Research,* A. Woszczynski and M. Whitman (eds.), Hershey, PA: Idea Group Publishing, pp. 66-77.

Yang, J., Harris, E. M., and Whitfield, M. 2009. "E-Government Application in Promoting Local Tourism: An Empirical Study," *Electronic Government, an International Journal* (6:1), pp. 54-69.

Yang, Z., Ng, B. Y., Kankanhalli, A., and Lim, J. 2013, "Analyzing the Enabling Factors of the Organizational Decision to Adopt Healthcare Information Systems," *Decision Support Systems* (55:3), pp. 764-776.

Yang, K., and Rho, S.-Y. 2007. "E-Government for Better Performance: Promises, Realities, and Challenges," *International Journal of Public Administration* (30:11), pp. 1197-1217.

Ya Ni, A., and Ho, T.-K. A. 2005. "Challenges in E-Government Development: Lessons from Two Information Kiosk Projects," *Government Information Quarterly* (22:1), pp. 58-74.

Yoon, J., and Chae, M. 2009. "Varying Criticality of Key Success Factors of National E-Strategy along the Status of Economic Development of Nations," *Government Information Quarterly* (26:1), pp. 25-34.

York, R. Rosa, E. A., and Dietz, T. 2003. "Footprints on the Earth: The Environmental Consequences of Modernity," *American Sociological Review* (68:2), pp. 279-300.

Yu, F.-L. T. 2008. "Uncertainty, Human Agency and E-Government," *Transforming Government: People, Process and Policy* (2:4), pp. 283-296.

Yun, H. J., and Opheim, C. 2010. "Building on Success: the Diffusion of e-Government in the American States," *Electronic Journal of e-Government* (8:1), pp. 71-82.

Zaied, A. N. H., Khairalla, F. A., and Al-Rashed, W. 2007. "Assessing E-Readiness in the Arab Countries: Perceptions towards ICT Environment in Public Organizations in the State of Kuwait," *Electronic Journal of e-Government* (5:1), pp. 77-86.

Zhao, F. 2013. "An Empirical Study of Cultural Dimensions and E-Government Development: Implications of the Findings and Strategies," *Behaviour & Information Technology* (32:3), pp. 294-306.

Zhu, K., and Kraemer, K. L. 2005. "Post-adoption Variations in Usage and Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry," *Information Systems Research* (16:1), pp. 61-84.

Zhu, K., Kraemer, K. L., and Xu, S. 2006. "The Process of Innovation Assimilation by firms in Different Countries: A Technology Diffusion Perspective on E-Business," Management Science (52:10), pp. 1557-1576.

Appendices

Appendix A: List of Countries Included in Data Analysis for Essay 1

Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo (Republic), Costa Rica, Côte d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Saint Kitts and Nevis, St. Lucia, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia and Montenegro, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vanuatu, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe.
Total number of countries: 183

Appendix B: List of Countries Included in Data Analysis for Essay 2

Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo (Republic), Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, South Africa, South Korea, Spain, Sri Lanka, St. Lucia, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vanuatu, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe.
Total number of countries: 174

Appendix C: List of Countries Included in Data Analysis for Essay 3

Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Bolivia, Bosnia, Botswana, Brazil, Bulgaria, Cambodia, Chile, China, Colombia, Congo (Republic), Costa Rica, Croatia, Cuba, Cyprus Republic, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Gabon, Georgia, Germany, Ghana, Guatemala, Honduras, Hungary, Iceland, India, Indonesia, Ireland, Italy, Japan, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Macedonia, Malaysia, Malta, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Senegal, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Trinidad, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vietnam, Zambia, Zimbabwe.
Total number of countries: 103