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E-government development and the digital economy: a reciprocal relationship

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Abstract

Purpose – The purpose of this paper is to capture and understand the nature of the relationship between e-government development and the digital economy.

Design/methodology/approach – Drawing on the Technology Acceptance Model and Fountain's technology enactment theory, a multidimensional research model was developed. The model was tested empirically through an international study of 67 countries using reputable archival data, primarily including the UN's e-government survey and the Economist Intelligence Unit's digital economy rankings.

Findings – The empirical findings indicate a strong positive reciprocal (two-way) relationship between e-government development and the digital economy. This finding provides empirical evidence to support the general notion of "co-evolution" between technology and organisations. The study also finds that along with social, economic, political, technological and demographic factors, certain national cultural characteristics have significant effects on the digital economy and e-government development.

Research limitations/implications – Relying on archival global data sets, this study is constrained by the coverage and formulation of the data set indices, the sample size (67 countries), and the impossibility of detecting errors that may occur in the process of data collection. Therefore, caution should be taken when making generalisations about the findings of this study.

Originality/value – The paper addresses a deficit of empirical research that is supported by sound and established theories to explain short-term dynamics and the long-term impact of the digital economy on public administration. The study contributes to a more accurate and comprehensive understanding of the dynamic relationship between e-government development and the digital economy.

Keywords Technology Acceptance Model, Digital economy, E-government development, Multidimensional approach, Technology enactment theory

Paper type Research paper

1. Introduction

Over the past several decades, the world has undergone a transition from a traditional economy (e.g. agriculture or industrial based) to a digital economy that is based on digital technologies (Tapscott and Agnew, 1999; Economist Intelligence Unit (EIU), 2010). In those countries where it has advanced furthest, the term "digital economy" is not limited to the economy; rather, it also refers to the entire society (EIU, 2010). This is why the term is often used interchangeably with digitalisation. This process of

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transformation has changed business models (e.g. e-business), people's everyday lives (e.g. communicating through social media), and transformed government policies and practises (e.g. offering e-government services) (Mossberger *et al.*, 2008; Weill and Woerner, 2013). Research shows that the digital economy has been a major contributor to economic growth (Brynjolfsson and McAfee, 2011). Alongside the advancement of digitalisation, an overwhelming majority of governments have implemented e-government initiatives, although the extent and scale of their implementation varies significantly among nations (United Nations, 2012; Nograšek and Vintar, 2014). The World Bank (2008) defines e-government as the use of information technology to improve business processes and service delivery by government departments and other government entities.

Dunleavy *et al.* (2006, p. 467) describe this trend as "digital-era governance", which is perceived by many researchers as critical for the emergence of post-New Public Management governance (e.g. Cordella and Iannacci, 2010; Margetts and Dunleavy, 2013). The e-government trend "offers a perhaps unique opportunity to create self-sustaining change, in a broad range of closely connected technological, organisational, cultural, and social effects" (Dunleavy *et al.*, 2006, p. 467). In this regard, the nature and the effects of e-government become multidimensional and complex.

However, to date empirical research supported by sound and established theories to understand the process and the transformative impacts of digitalisation on public administration is sparse (Bekkers and Homburg, 2007; Andersen *et al.*, 2010). The literature review of Heeks and Bailur (2007) and Yildiz (2007) find that most of the e-government models in the literature have no strong theoretical grounding. Similarly, Shareef *et al.* (2011) find that current research tends to address different perspectives on this complex phenomenon in a scattered fashion.

Therefore, this study seeks to address these weaknesses in the existing literature in three ways. First, it applies a multidimensional approach to understand and capture the multifaceted relationship between e-government development and the digital economy. In this regard, it elaborates on the suggestion by Zhao *et al.* (2014a) that contextual factors such as existing social, political, economic, demographic, IT, cultural factors interact and play a significant role in the global process of e-government adoption and digital development. Second, the study is grounded on sound and well-established theories, notably the Technology Acceptance Model (TAM) (Davis, 1989) and the technology enactment framework of Fountain (2001, 2005). The former focuses on understanding user adoption behaviour while the latter attempts to capture the impact of contextual technological, social, institutional and political factors on technology adoption. In doing so, this study contributes to a more accurate and comprehensive understanding of the relationship between the two. Third, this study is empirical in nature, conducting an international study of 67 countries using reputable global data sets such as the UN's e-government survey and the Economist Intelligence Unit's (EIU) digital economy rankings. Thus, the results of the study will have wider applications for policymakers at the national level.

The next section of this paper discusses the theoretical basis of this study, which helps shape its hypotheses and research framework. The subsequent section describes the methodology and presents the statistical results, while the following sections discuss the findings and their implications for policy and theory development. The limitations of the study and suggestions for future research are subsequently discussed before the primary contribution of the study is considered in the conclusions.

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2. Theoretical basis

After conducting a thorough literature review, Coursey and Norris (2008) find that the literature concerning the relationship between information technology and government has long suffered from a paucity of theoretical development and empirical testing. There are, however, a few exceptions, including the research built on the Diffusion of Innovation (DOI) theory of Rogers (1995), various TAMs (e.g. Davis, 1989; Venkatesh *et al.*, 2003) and socio-technical theories (e.g. Fountain, 2001, 2005). The DOI theory (Rogers, 1995) is often used in information systems research to explain user adoption of new technologies (e.g. Cooper and Zmud, 1990). Following a similar line of inquiry, Venkatesh *et al.* (2003) incorporated the key elements of eight various TAMs into the Unified Theory of Acceptance and Use of Technology model (UTAUT). In particular, they drew on the theory of reasoned action (Fishbein and Ajzen, 1975), the TAM (Davis, 1989), the motivational model (Davis *et al.*, 1992), the theory of planned behaviour (Ajzen, 1991), a model combining the TAM and the theory of planned behaviour (Taylor and Todd, 1995), the model of PC utilisation (Thompson *et al.*, 1991), the innovation diffusion theory (Rogers, 1995), and the social cognitive theory (Bandura, 1986) to study adoption behaviour. However, some critics argue that the UTAUT model cannot capture and specify the complete essence of e-government adoption behaviour by citizens. This is because functional characteristics of organisational, technological, economical, and social perspectives on e-government differ (e.g. Shareef *et al.*, 2011). Moreover, the UTAUT model is relatively new and has limited value because few empirical studies have been conducted to test it (Straub, 2009), particularly in the context of e-government adoption.

Among the various adoption models and theories, Davis' (1989) TAM is one of the most widely used. There are two main constructs of TAM that influence the adoption of e-government, namely, first, perceived usefulness and second, perceived ease of use. These have been tested by many authors in different geographical settings (Chang *et al.*, 2005; Hung *et al.*, 2013; Phang *et al.*, 2005; Alomari *et al.*, 2012). For example, Hung *et al.* (2013) find that perceived usefulness, perceived ease of use, and self-efficacy are all strong predictors of e-government adoption. The model provides a much-needed theoretical framework to support the shift in the study of technology diffusion from focusing on the supply to the demand side. It can be used to explain e-government use by identifying citizens' adoption behaviour because online citizenship in an information society is a central priority in e-government development (Sang *et al.*, 2009). However, research also shows that the TAM model needs to be integrated into a broader context and include variables related to both human and social change processes (Bélanger and Carter, 2012). We consider that the broader context may need to be at the organisational, social, and national levels when studying citizens' adoption behaviour regarding new technology such as e-government.

Another important theoretical model that deserves attention is Fountain's technology enactment framework, which is based on the literature on neo-institutionalism, bureaucracy, network organisations and governance (Fountain, 2001; Schellong, 2007). Unlike other works that focus overwhelmingly on technology issues in e-government development, Fountain's (2001) framework illustrates how technology, organisations and institutions interact. Fountain (2001, p. 10) differentiates "objective technology" (e.g. hardware, software, and network capacity) from "enacted technology," which is actually an outcome of the interaction between information technology and organisational/institutional arrangements. She argues, "Information technologies are not so much adopted or implemented but enacted by decision-makers" (Fountain, 2001, p. 12).

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In other words, new technology does not automatically generate organisational changes; rather, it is organisational and institutional arrangements that mediate the process of change. The framework was later revised to draw more attention to the multiple roles involved in enactment and the interaction, as well as the influence between them (Fountain, 2005, 2011). The multiple roles and influence refer not only to the actions of IT professionals, public servants and policymakers but also to the influence of contextual factors such as culture, social-structure, and legal norms and politics. She used the framework specifically to study government organisations and e-government development (e.g. Fountain, 2001, 2006, 2011). The technology enactment theory is influential and addresses, to some extent, the paucity of theoretical development and empirical research, particularly in the current e-government literature. However, Fountain's works have also attracted criticism. For example, her theory is perceived as "highly abstract and generalised, making it difficult to use as a predictive tool" (Bretschneider, 2003, p. 741). Moreover, the empirical case studies that Fountain relied on to test her theory were limited to a few US federal government organisations. This suggests a pressing need for further empirical research and testing of the theory. Our research, which is based on 67 countries' data, addresses this limitation.

Grounded largely on the study of user adoption (Davis, 1989; Rogers, 1995) and the technological, social, institutional and political aspects of Fountain's theory, we take a multidimensional perspective to establish a more comprehensive understanding of the relationship between e-government development and the digital economy.

3. The research model and hypothesis development

As shown in the preceding section, the conceptualisation and research of the digital economy and e-government go far beyond technology, revolving largely around economics, sociology, politics, management, and culture. Given the cross-disciplinary and complex nature of the topic areas, we draw on two theoretical frameworks: TAM, which looks into adoption behaviour, and Fountain's technology enactment, which focuses on social, organisational and institutional variables. On this basis, we develop a multidimensional research model. This model will allow us not only to examine the relationship between e-government development and the digital economy but also the various ways in which different contextual factors - economic, social, political, demographic, cultural - and ICT infrastructure may influence the two. Furthermore, the model studies and encompasses the *adoption* variables: the adoption of ICT in the digital economy and e-participation in e-government development. Figure 1 presents our research model, illustrating the hypothetical relationships among the variables that are discussed as below.

3.1 Digital economy – a multidimensional concept

Due to its ubiquity, the digital economy has become a notion that is too dynamic and wide to be described synthetically and precisely by a single definition. Such economists as Moulton (2000) have interpreted the digital economy as including information technology and e-commerce. Tapscott (1996) has described the digital economy as a new economy that is based on the networking of human intelligence. It has 12 characteristics knowledge, digitalisation, virtualisation, molecularisation, integration/internetworking, disintermediation, convergence, innovation, presumption, immediacy, globalisation, and discordance. These characteristics demonstrate clearly the newness and distinctiveness of the digital from the industrial economy. Carlsson (2004, p. 245), alternatively, has defined the digital economy as "the proliferation of the use of the internet, a new level and form of

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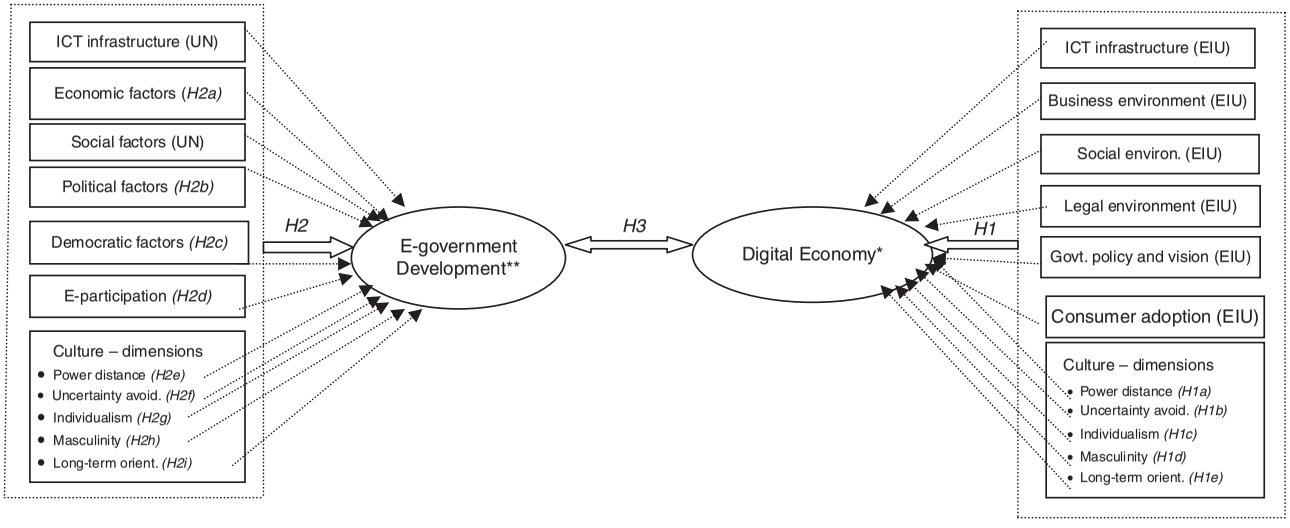

Figure 1.
A multidimensional research model to study e-government development and the digital economy

Notes: We adopted Economist Intelligence Unit (2010) model to study the multiple aspects of the digital economy but extended it to cover cultural aspects. We adopted United Nations (2012) e-government development model which includes ICT infrastructure and social factors as part of e-government development index as they are important contributors to e-government development

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connectivity among multiple heterogeneous ideas and actors, giving rise to a vast new range of combinations". The findings of an international study of 161 nations carried out by Chinn and Fairlie (2006) suggest that economic development, IT infrastructure, and government regulations are the key contributors to a nation's digital development. Therefore, the challenging question remains as to how to define and measure the digital economy, as it is multidimensional and constantly evolving.

To better understand the digital economy and its relationships with various contingencies, a multidimensional and holistic approach is essential. For that purpose, we chose the digital economy model developed and tested by the EIU, one of the most reputable and independent economic and industry analysis institutions in the world. The EIU has conducted several consecutive surveys over 70 major economies in the world since 2000. It has attempted to address the challenges in assessing and measuring a country's "e-readiness". In its most recent report titled "Digital economy rankings 2010 – Beyond e-readiness", the EIU changed the name of its rankings from "e-readiness" to "digital economy". The reason for the change is "to reflect the increasing influence of ICT in economic (and social) progress" (EIU, 2010, p. 1). According to EIU (2010), a country's digital economy is essentially a measure of its e-business environment, and a collection of other factors that indicate how amenable a market is to Internet-based opportunities. There are several other benchmarking models to gauge the capability of a country in ICT diffusion. Among them, the model developed by the International Telecommunication Union (ITU) is the most influential. The ITU's model measures the level of a nation's digitalisation in the following areas: ICT infrastructure and access; access and use of ICT by households and individuals, use of ICT by businesses, the ICT sector, trade in ICT goods, ICT in education, and ICT in government (International Telecommunication Union (ITU), 2011). The benchmarking results are often used to indicate the digital divide at the international level by international organisations such as the United Nations (2012).

However, when compared with the model of ITU, the EIU's model is more comprehensive in terms of assessing the ability of states and nations to take up information and communications technology (ICT) to the benefit of their economy and society. The model ranks the performance of a nation from six perspectives, including ICT connectivity, business environment, social and cultural environment, legal environment, government policy and vision, and consumer and business adoption of ICT. This model is commendable because it addresses the complex nature of the digital economy in which different contextual factors come into play as well as takes into account the ICT adoption as one of the key categories. Moreover, the model measures not only the process but also the outcome of the digital economy. Therefore, we adopt the multidimensional model as well as the ranking results generated through assessment of the digital economy from the six perspectives. However, we note that the notion of social and cultural environment used in the assessment is limited to a population's web literacy, experience in using the Internet and receptivity to it and the technical skills of the workforce (EIU, 2010, p. 19). This measure is limited in terms of how the culture construct is defined by the mainstream literature.

Culture is a multi-level (i.e. national, organisational, and individual) and multi-faceted (e.g. values, beliefs, artefacts, etc.) construct (Taras *et al.*, 2009) that can be defined in many ways. Hofstede (2001, p. 9) defines it as "the collective programming of the mind that distinguishes the members of one group or category of people from another." Studies show that culture (i.e. national culture in this study) influences user behaviour in technology diffusion (e.g. Zhang and Maruping, 2008). For example, Al-Gahtani *et al.* (2007) have studied Internet user behaviour in Saudi Arabia and find

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that in higher power distance and lower individualism cultures such as those in the Arab world, there is a strong association between subjective norms and user behavioural intentions. Hofstede (2001) also states that low-uncertainty-avoidance cultures make greater use of recent technological innovations such as the Internet than do high-uncertainty-avoidance societies. Therefore, while adopting the EIU's model to measure the digital economy, we will also test specifically if culture has an effect on the digital economy. Thus, we develop our first hypothesis:

H1. In addition to ICT connectivity, business environment, social and cultural environment, legal environment, government policy and vision, and consumer and business adoption of ICT, national culture has an impact on the digital economy.

According to the seminal study of Hofstede (2001), culture is manifested by five dimensions – power distance, uncertainty avoidance, individualism vs collectivism, masculinity vs femininity, and long-term vs short-term orientation. In this regard, we will test the effect of each of the five cultural dimensions on the digital economy as follows:

H1a. Power distance influences the digital economy.

H1b. Uncertainty avoidance influences the digital economy.

H1c. Individualism influences the digital economy.

H1d. Masculinity influences the digital economy.

H1e. Long-term orientation influences the digital economy.

3.2 E-government development and the digital economy

Digitalisation has taken place in many key areas of public sector involvement, such as government services to citizens, healthcare and education. One of governments' major steps towards digitalisation of the economy and society is to deliver e-government services to businesses and citizens. For example, the Australian government has identified the improvement of online government service delivery and engagement as one of the key national digital economy strategies (Department of Broadband, Communications and the Digital Economy, Australian Government, 2013). In this sense, e-government is synonymous with digital government (Fountain, 2003).

The concept of e-government was introduced to public administration after private-sector adoption of e-business and e-commerce (Gauld and Goldfinch, 2006). E-government has distinctive technical and commercial features (Fishenden and Thompson, 2013). Thus although it shares many features with e-commerce in terms of offering e-services and online transactions, e-government goes well beyond analogies to e-commerce. As information technology evolves, e-government in many countries becomes "Government 2.0" involving Web 2.0 technologies. Wigand *et al.* (2010) have defined Web 2.0 as a paradigm shift in which users create content. McLoughlin and Lee (2007) have described Web 2.0 as a personalised and communicative form of the Internet, which enables active participation, connectivity, and collaboration. In this regard, the advent of Web 2.0 provides a better opportunity for e-participation (i.e. e-government participation) than the first generation of Web technologies. Furthermore, e-government not only comprises web-based developments but increasingly mobile applications (m-government) (United Nations, 2012).

The United Nations takes a multidimensional approach to evaluating its member states' e-government development with emphasis on the scope and quality of online services, telecommunications infrastructure, and human capacity (i.e. social/educational factors),

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respectively. In addition, the United Nations also measures e-participation, focusing on three dimensions: information sharing between governments and citizens (also called "e-information sharing"), consultation with citizens ("e-consultation"), and citizens' engagement in decision-making processes ("e-decision making") (United Nations, 2012). This approach indicates the importance of citizens and their engagement in e-government development. Research shows that e-participation is a key indicator of the level of e-democracy in a nation and may be linked to e-government development (Lee *et al.*, 2011). Luna-Reyes *et al.* (2012) posited that e-government has four dimensions: e-services (providing public services), e-management (improving managerial effectiveness), e-democracy (promoting democratic values and mechanisms), and e-policy (developing public policies). These connotations of e-government indicate that the development of e-government involves many factors, including quality of information, technological infrastructure, organisational and management characteristics, legal and regulatory environment, and economic and social contexts as well as citizens' adoption and participation. The study of Bélanger and Carter (2009) further indicate that socio-economic, demographic and skill factors all significantly influence the level of e-government adoption. Culture is also found to influence e-government development (Zhao, 2011). A recent study of 26 European countries finds that European countries with higher power distance tend to have a lower e-government adoption rate. On the other hand, European countries with high individualism and/or long-term orientation cultures are more willing to adopt e-government than the countries with a collective culture or a short-term orientation culture. In a more recent study, Zhao *et al.* (2014b) have found that culture directly affects e-government development while economic development has a moderating effect on the relationship between culture and e-government.

Based on the earlier studies discussed here, it is clear that understanding e-government requires it to be analysed using multiple perspectives. This approach is consistent with the theoretical precursors of the study (e.g. TAM and Fountain's technology enactment model). Therefore, we hypothesise that:

H2. ICT infrastructure, economic, social, political, demographic, and cultural factors as well as e-participation all have an impact on e-government development.

To test the effects of each of the individual factors on e-government development, we develop the following sub-hypotheses[1]:

H2a. Economic factors influence e-government development.

H2b. Political factors influence e-government development.

H2c. Demographic factors influence e-government development.

H2d. E-participation influences e-government development.

H2e. Power distance (as a dimension of culture) influences e-government development.

H2f. Uncertainty avoidance (as a dimension of culture) influences e-government development.

H2g. Individualism (as a dimension of culture) influences e-government development.

H2h. Masculinity (as a dimension of culture) influences e-government development.

H2i. Long-term orientation (as a dimension of culture) influences e-government development.

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The report on the recent United Nations e-government survey, the largest survey on e-government in the world, has suggested that e-government development is associated with the level of digital development of a nation (United Nations, 2012). However, the report does not test the relationship empirically. Likewise, there is generally a lack of systematic research and empirical evidence in the literature to establish and/or delve into the relationship between the two. However, a significant body of literature exists on the relationship between the digital divide and e-government development (e.g. Bélanger and Carter, 2009). The digital divide is often referred to as a marked gap in access to, and use of, ICT devices (ITU, 2011). The disparity is partially caused by a lack of information technology infrastructure and digital development of a nation. Some research finds that e-government development is curtailed by the digital divide which leads, in turn, to an e-government divide (Björn *et al.*, 2012). As the transition to a digital economy has gained momentum and become an inexorable trend in the current society as is generally claimed, it is important to know if and how e-government development and the digital economy are related to each other. Thus, we hypothesise:

H3. There is a positive relationship between e-government development and the digital economy.

4 Methodology

4.1 Data sources and data collection

To empirically test our research model and generate findings that are likely to have wider application internationally, we have used large global data sets. Table I presents a summary of the variables, measures and data sources that we used for a statistical analysis.

Given the constraints of our resources, it is very difficult, if not impossible, for our small research team to collect the primary global data that this study requires to test our hypotheses. Instead, we chose the archival data collected and compiled by the

Variables	Measures	Data source
Digital economy	ICT infrastructure	EIU (2010)
	Business environment	
	Social and cultural environment	
	Legal environments	
	Government policy	
	Consumer and business adoption	
E-Govt. development	Online-services	United Nations (2012)
	ICT infrastructure	
	Human capital (social/educational factors)	
E-participation	E-participation	United Nations (2012)
Economic	GNI per capita	World Bank (2011)
Demographic	Population age (age 15-64)	CIA (2011)
	Gender ratio (age 15-64)	
Political	Government effectiveness	World Bank (2011)
Culture	Power distance	Hofstede (2001)
	Uncertainty avoidance	
	Individualism	
	Masculinity	
	Long-term orientation	

Table I.
Summary of variables and measures

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world most reputable institutions and researchers in the field of study. For example, we used the most recent ranking scores of the digital economy compiled by the EIU (2010) and the synthetic composite index of e-government development of the United Nations (2012). The data sets are comprehensive and summarise a large number of multidimensional and complex indicators in an efficient way. The EIU data set consists of its digital development rankings of 70 economies. The 70 economies are considered to be the largest in the world with 67 of them being countries and three being economic states (see the Appendix 1 for detail). The rankings were based on multiple sources of data collected by the EIU and many other official institutions (EIU, 2010) to ensure the validity of the rankings. More detail on the method of the rankings is provided in the following sections. The Department of Economic and Social Affairs of the United Nations has conducted six consecutive e-government surveys (once every two years) of its over 190 Member States since 2003. We used the results of its latest survey conducted between 2011 and 2012. The survey, which collected data from the 193 Member States of the United Nations, assesses mainly the technical features of national web sites, e-government policies and strategies, and their implementation in terms of online delivery of essential services of governments. The reliability and validity of the instruments used to collect the multi-country data and the complex statistical procedures to calculate the scores are well documented and justified by the reporting agencies (see EIU, 2010; United Nations, 2012 for more detail).

4.2 Data analysis - statistical procedure

The statistical methods that we used to analyse the global data sets include correlations and multiple regression using IBM-SPSS version 20 as well as structural equation modelling (SEM) using the software EQS 6.1. To address the potential problem of multicollinearity in our multiple regression analysis, we examined the variance inflation factors (VIF) and found that none of the factors tested exceeded 10.0. All the case-to-independent variable ratios in the multiple regression analysis exceeded the preferred ratio of 15 to 1. The following explains in detail the variables we selected and why, as well as how the statistical analysis was performed.

4.3 Variables for measuring the digital economy

The model used by the EIU to assess the digital economy across 70 major economies in the world is by far the most comprehensive in terms of the scope of its coverage. The model measures a nation's digital economy in six primary areas:

(1) connectivity and technology infrastructure;

(2) business environment;

(3) social and cultural environment;

(4) legal environment;

(5) government policy and vision; and

(6) consumer and business adoption.

The comprehensiveness of the measures is exemplified by the 39 indicators and 82 sub-indicators used to analyse the six aspects of the digital economy (EIU, 2010). The Appendix 2 presents a summary of the measures and the primary indicators under the six categories.

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In our statistical analysis, we used the EIU's latest assessment results of 67 countries [2] in relation to the digital economy. The results contain an overall ranking score and the individual scores of each of the six aspects. However, given the purported effect of culture on the digital economy (see *H1*), we added another variable – culture – to the digital economy measures to test its influence. We chose Hofstede's culture indices to measure culture mainly for two reasons.

First, Hofstede's (2001) model of cultural indices generated in a seminal empirical study of approximately 117,000 IBM employees[3] in over 40 countries during the 1960s and 1970s is the most widely used by researchers, topping the social science citation index for many years (Erumban and de Jong, 2006; ITIM International, 2010). Second, these cultural indices contain a larger data set of 84 countries, compared with the cultural indices of House *et al.* (2004), which covers only 55 countries (among the 62 economies studied by House *et al.*, 2004, 55 were countries). A larger sample helps improve the validity of our findings. Although Hofstede's (2001) cultural indices have been used before to study the relationships between culture and technology diffusion (Zhang and Maruping, 2008; Lu *et al.*, 2013), our study is, to our knowledge, the first of its type to use Hostede's indices and the EIU's index to explore the impact of culture on the digital economy at the international level. Hofstede measured culture from five dimensions (A sixth dimension – indulgence vs restraint – was later added to his indices, although because far fewer countries were measured and included, we decided not to include this dimension in our study).

The five cultural dimension indices include:

(1) Power distance index, which measures the extent to which a society accepts the fact that power in institutions and organisations are distributed unequally.

(2) Uncertainty avoidance index, which measures the extent to which members of a society feel uncomfortable in ambiguous and uncertain situations and take actions to avoid them.

(3) Individualism-collectivism index, which measures the extent to which individuals are supposed to look after themselves or remain integrated into groups.

(4) Masculinity-femininity index, which measures the extent of distribution of emotional roles between the genders. It contrasts "tough" masculine with "tender" feminine societies.

(5) Long-term orientation index, which measures the extent to which a culture programs its members to accept delayed satisfaction of their material, social and emotional needs.

Each of the index scores represents a cluster of related values (a dimension), and each country receives a single numeric score for each index. We adopted the five indices as the indictors of cultural orientations and tested their relationships with the digital economy.

4.4 Variables for measuring e-government development

We used the e-government development index (EGDI) from the latest e-government survey of the United Nations (2012) as the measure of e-government development. The EGDI (see the Appendix) is a composite index and a weighted average of three normalised scores on the three most important dimensions of e-government: online service; telecommunication infrastructure; and human capacity. The maximum

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possible value of the EGDI is one and the minimum is zero. The e-government survey also measures e-participation. We used the e-participation index (EPI) (United Nations, 2012) because we posited that e-participation could be an important factor contributing to e-government development.

While the EGDI and EPI have the merit of measuring e-government development, other important factors may influence e-government development as our preceding discussion indicates. In line with our multidimensional approach illustrated in our research model, we included economic, political, demographic, and cultural factors in our analysis of e-government development. We used the World Bank's GNI per capita 2011 data as the key economic indicator, as it is widely used to measure the economic status of a nation. In terms of political factors, we chose the "government effectiveness" indicator from the Worldwide Governance Indicators project developed by the World Bank (2013). This indicator reflects the quality of government services, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. In this regard it fits well with our study of the role of government in e-government development. We used the data on age structure and gender ratio between ages 15 and 64 collected and published by the United States' Central Intelligence Agency in its Factbook (Central Intelligence Agency (CIA), 2011) as relevant proxies for demographic factors in our analysis because the two are generally used as the key indicators of demography. With regard to the measure of culture, we adhered to Hofstede's cultural dimension indices because this is consistent with the measure used in our analysis of the digital economy.

5. Results[4]

5.1 The digital economy

Table II presents a summary of our correlation analysis results. The results show that all the six aspects of digital economy are significantly correlated with each other. This demonstrates that the development of digital economy is contingent upon all the six aspects, thus supporting the digital economy model developed by the EIU. As mentioned earlier in this paper, the EIU's model does not measure the effect of culture on the digital economy. To address the gap, we tested the relationship between culture and the digital economy. Adopting Hofstede's approach, which measures culture in its five dimensions, we tested the relationships between the digital economy and each of the cultural dimensions. The correlation test results suggest that a negative correlation exists between the digital economy and power distance and a positive correlation between the digital economy and individualism, thus supporting our hypotheses *H1a* and *H1c*. However, the correlations between the other three cultural indices – masculinity (*H1d*), uncertainty avoidance (*H1b*) and long-term orientation (*H1e*) – and the digital economy are not statistically significant. To identify which cultural dimension is more relevant to the digital economy, we performed a standard regression test. The overall digital economy score (a sum of the weighted scores of all the six aspects measured) was entered as the dependent variable, while the five cultural dimension scores were entered as the predictors. The results indicate that overall, culture variables account for 53.8 per cent of the variance in the digital economy scores (see Table III). The strongest predictor of the digital economy is individualism ($\beta = 0.507$, $p < 0.001$), which is followed by power distance ($\beta = -0.331$, $p < 0.001$). Based on all these results, *H1* is sustained, which supports our multidimensional approach to the study of the digital economy.

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Table II.
Means, standard deviations, and correlations of variables studied for digital economy

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Digital economy (DE) (overall)	5.94	1.68											
2. DE – connectivity	5.06	1.94	0.946**										
3. DE – business environment	6.68	1.11	0.887**	0.787**									
4. DE – social and cultural environment	6.18	1.56	0.958**	0.914**	0.798**								
5. DE – legal environment	6.64	1.58	0.908**	0.796**	0.816**	0.847**							
6. DE – Govt. policy	6.18	1.86	0.958**	0.855**	0.866**	0.892**	0.890**						
7. DE – consumer and business adoption	5.63	2.15	0.986**	0.916**	0.856**	0.939**	0.887**	0.939**					
8. Culture – power distance	62.8	21.0	−0.651**	−0.629**	−0.486**	−0.658**	−0.609**	−0.587**	−0.651**				
9. Culture – uncertainty avoidance	66.8	21.4	−0.100	−0.086	−0.188	−0.021	−0.050	−0.115	−0.107	0.206			
10. Culture – individualism	41.6	22.0	0.706**	0.698**	0.599**	0.714**	0.629**	0.600**	0.698**	−0.619**	−0.190		
11. Culture – masculinity	49.9	17.3	−0.150	−0.130	−0.183	−0.126	−0.085	−0.174	−0.145	0.115	−0.044	0.132	
12. Culture – long-term orientation	37.88	20.39	−0.045	0.023	0.027	−0.057	−0.056	−0.013	−0.118	0.008	−0.045	−0.047	−0.091

Note: $n = 67$. *$p < 0.05$; **$p < 0.01$

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5.2 E-government development

To examine the purported associations of social, cultural, economic, demographic and political factors and e-participation (adoption) with e-government development, we performed a correlation analysis of several variables, including the composite index of e-government development, GNI per capita, government effectiveness, age and gender, and all the five cultural indices. Table IV presents a summary of the results. The results suggest a strong significant correlation between e-government development and government effectiveness ($r = 0.849$, $p < 0.001$ and with e-participation ($r = 0.731$, $p < 0.001$). The economic factor measured by GNI per capita is also found significantly correlated to e-government development ($r = 0.675$, $p < 0.001$). Two of the five cultural dimensions – individualism and power distance are found to be significantly associated with e-government development while the association is positive for individualism and negative for power distance (see Table IV for more detail).

To identify the predictors of e-government development among the variables studied, we conducted standard multiple regression analysis. The EGDI was entered as the dependent variable, while the five cultural dimension scores (cultural variables), GNI per capita (economic variable), population age and gender (demographic variables), government effectiveness (political variable) and e-participation (adoption variable) were entered as predictors. The results indicate that overall the model accounts for 88.4 per cent of the variance in e-government development. This supports *H2* and provides further validation for our multidimensional approach to this study.

Looking at the individual contributions of the predictors (see Table V), we find that the significant predictors are power distance (*H2e*), individualism (*H2g*), age structure (*H2c*), government effectiveness (*H2b*) and e-participation (*H2d*) (see Table V for more details). The regression coefficients indicate that countries that score high on individualism and low on power distance tend to score high on e-government development. Similarly, age structure, government effectiveness and e-participation are also positively correlated with e-government development. As for *H2a*, it is interesting to find that GNI per capita is not a significant predictor, although it has been found to be significantly correlated with e-government development (see Table IV).

5.3 E-government development and the digital economy

To test *H3*, the relationship between e-government development and the digital economy, we first conducted a bivariate correlation analysis. The summary of the correlations is presented in Table VI. As expected, there is a very strong positive correlation between the

						Model summary				
	B	SE	*β*	*t*	*p*	Adj. R^2	*F*	df1	df2	*p*
Dependent variable						0.538	14.289	5	52	< 0.001
Digital economy (overall)										
Predictors										
Culture (power distance index)	*−0.024*	*0.009*	*−0.331*	*−2.771*	*0.008*					
Culture (uncertainty avoidance index)	0.002	0.007	0.025	0.273	0.786					
Culture (individualism index)	*0.035*	*0.008*	*0.507*	*4.246*	*0.000*					
Culture (masculinity index)	−0.009	0.008	−0.115	−1.226	0.226					
Culture (long-term orientation index)	0.004	0.007	0.054	0.584	0.562					

Note: $n = 67$

Table III. Summary of regression analysis: culture dimensions predicting digital economy

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Table IV.
Means, standard deviations, and correlations of variables studied for e-government development

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. E-Govt. development	0.493	0.206										
2. GNI per capita	1,414	2,157	0.675**									
3. Gender ratio	0.983	0.267	0.151*	0.280**								
4. Age structure (%)	63.83	6.61	0.697**	0.383**	0.259**							
5. Govt. effectiveness	−0.057	0.984	0.849**	0.701**	0.214**	0.568**						
6. Power distance	62.88	21.04	−0.498**	−0.514**	0.110	−0.001	−0.621**					
7. Uncertainty avoidance	66.88	21.55	0.039	−0.138	0.013	0.062	−0.170	0.206				
8. Individualism	41.61	22.07	0.587**	0.605**	0.030	0.160	0.671**	−0.619**	−0.190			
9. Masculinity	49.89	17.34	−0.050	−0.024	0.085	0.103	−0.054	0.115	−0.044	0.132		
10. Long-term orientation	37.88	20.39	0.208	0.040	−0.272*	0.252*	0.124	0.008	−0.045	−0.047	−0.091	
11. E-participation	0.224	0.256	0.731**	0.495**	0.161**	0.420**	0.611**	−0.354**	−0.071	0.381**	−0.098	0.031

Note: $n = 67$. *$p < 0.05$; **$p < 0.01$

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Table V.
Summary of regression analysis: predictors of e-government development

						Model summary				
	B	*SE*	*β*	*t*	*p*	Adj. R^2	*F*	df1	df2	*p*
Dependent variable						0.884	58.051	10	65	< 0.001
E-Govt. development (EGDI)										
Predictors										
Culture (power distance index)	*0.000*	*0.001*	*−0.194*	*−4.015*	*< 0.001*					
Culture (uncertainty avoidance index)	0.002	0.000	0.023	0.327	0.753					
Culture (individualism index)	*0.001*	*0.001*	*0.167*	*2.285*	*< 0.0026*					
Culture (masculinity index)	−0.001	0.001	−0.087	−1.658	0.102					
Culture (long-term orientation index)	0.000	0.000	0.047	0.889	0.377					
GNI per capita	0.000	0.000	0.125	1.463	0.148					
Age structure (%) – population between 15 and 64	*0.008*	*0.002*	*0.245*	*3.822*	*< 0.001*					
Gender ratio	−0.035	0.033	−0.064	−1.039	0.303					
Govt. effectiveness	*0.150*	*0.035*	*0.768*	*4.256*	*< 0.001*					
E-participation	*0.166*	*0.032*	*0.257*	*5.200*	*< 0.001*					

Note: $n = 67$

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Table VI.
Correlations between e-government development and digital economy

Variables		1	2	3	4	5	6	7	8	9	10
1	E-govt. Development Index (EGDI) (composite)										
2	Digital Economy (Overall)	0.88**									
3	EGDI (Online service index)	0.87**	0.76**								
4	EGDI (Telecomm. infrastructure index)	0.92**	0.89**	0.73**							
5	EGDI (Human capital index)	0.82**	0.64**	0.54**	0.70**						
6	Digital Economy (Connectivity)	0.91**	0.95**	0.75**	0.94**	0.55**					
7	Digital Economy (Business Environment)	0.78**	0.89**	0.75**	0.75**	0.56**	0.79**				
8	Digital Economy (Social & Cultural Environment)	0.87**	0.96**	0.73**	0.89**	0.55**	0.91**	0.80**			
9	Digital Economy (Legal Environment)	0.71**	0.91**	0.59**	0.74**	0.37**	0.80**	0.82**	0.85**		
10	Digital Economy (Gov't Policy & Vision)	0.82**	0.96**	0.77**	0.80**	0.58**	0.85**	0.87**	0.89**	0.89**	
11	Digital Economy (Consumer & Business Adoption)	0.84**	0.99**	0.72**	0.85**	0.53**	0.92**	0.86**	0.94**	0.89**	0.94**

Notes: $n = 67$. **$p < 0.01$

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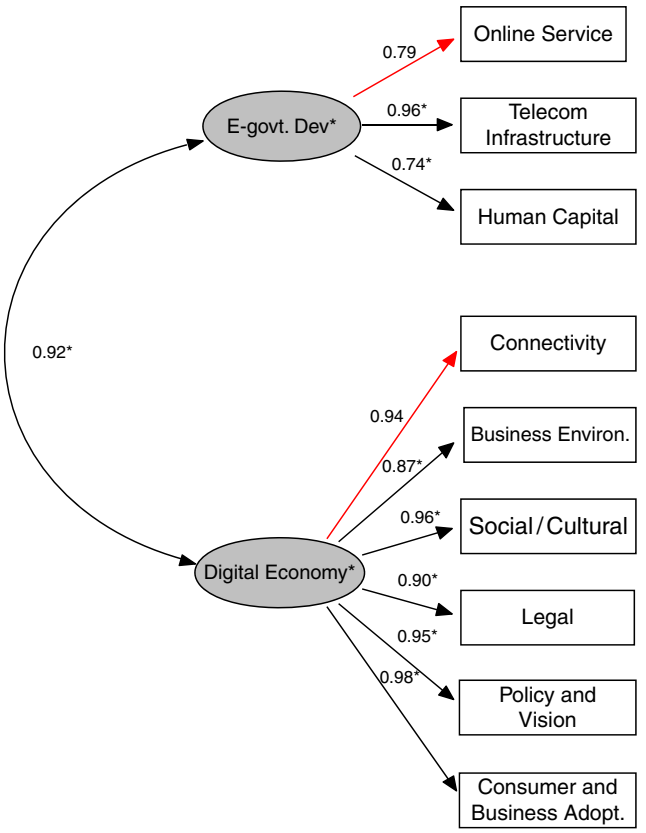
composite index for e-government development and the overall score of the digital economy. Intercorrelations between the component scores of each variable are also identified. The results indicate that all bivariate correlations are statistically significant. The positive correlations range from 0.37 to 0.99.

To further test the relationship between the two, we performed SEM. The added advantage of using SEM is that it takes into account measurement errors when it determines the relationship between e-government development and the digital economy. The software EQS 6.1 was used to generate maximum likelihood parameter estimates. Fit indices are based on robust method adjustments (see Figure 2 for more detail). The results confirm that there is a strong positive correlation between e-government development and the digital economy. The indices are all indicative of good data-model fit. Based on the results of both tests, we are confident in concluding that e-government contributes to, and is affected by, the development of the digital economy, which supports *H3*.



Notes: *$p<0.05$, $\chi^2=116.90$, df=26, $p<0.001$. NFI=0.912, NFI=0.908, CFI=0.933. RMSEA=0.205 (90CI: 0.161-0.246). We constrained two variables (online service and connectivity) to ensure identification in SEM analysis

Figure 2.
Standardized parameter estimates

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6. Discussions

6.1 A reciprocal relationship

Our empirical findings indicate a strong positive reciprocal relationship between e-government and the digital economy. Many studies tend to examine and discuss the impact of digitalisation on governance and the way that the public sector is managed by treating the digitalisation as an external trend that leads to changes (Orlikowski and Iacono, 2002; Margetts and Dunleavy, 2013; Nograšek and Vintar, 2014). Our findings, however, indicate that a more dynamic relationship, namely, a bidirectional one, exists between digitalisation and organisations. This result implies that government and public institutions can be the primary forces of the digital economy and can play a proactive rather than reactive role in the transition and development of the digital economy. The findings provide empirical evidence to support the general notion of "co-evolution" or a "reciprocal relationship" between technology and organisations (Fountain, 2011).

The earlier study of Tapscott and Agnew (1999) drew the picture of digital governance following the transition from an industrial age to a digital age from four aspects. First, the digital economy enables e-voting and real-time participation of citizens in the governmental and democratic process to usher in a new democratic form of interaction between governments and citizens. Second, citizens will become more active partners in political campaigns rather than passive consumers of mass media. Third, mass politics will be replaced with electronic one-to-one relationships between citizens and politicians. Fourth, the form of the state will change from national or mono-cultural models to global, virtual and multicultural manifestations. In the 14 years since the publication of their work, empirical support for Tapscott and Agnew's (1999) predictions is emerging in a number of countries. For example, according to the latest United Nations e-government survey, in some countries such as Korea as well as in many European countries, citizens' participation in e-government has been growing strongly. However, the survey also finds that the majority of the countries surveyed have offered a very low level of e-participation opportunities. The survey finds that citizens' uptake of e-government services remains generally at low levels – a finding that can be primarily attributed to the digital divide (United Nations, 2012).

These findings suggest two important lessons if we examine the issues from the perspective of technology adoption (e.g. Davis, 1989) and the technology enactment theory (Fountain, 2011). First, digitalisation alone does not necessarily lead to the adoption of e-government or e-participation by citizens and institutions. From the demand side, user behavioural intention of the use of e-government service can be determined by a number of psychological, cultural, socio-economic and technological factors, such as perception, social norms, skill level, access to the Internet and technological infrastructure (Doong *et al.*, 2010; Zhao, 2011). Moreover, e-participation (e.g. citizens' participation in decision-making processes) depends more on political factors such as the political system and degree of democracy in a country. Second, from the supply side, the outcomes of e-government implementation are determined by how government organisations enact the digital technology used for e-government. In this regard, the perception and behaviour of key actors (e.g. policymakers, managers, and IT system personnel) and the institutional arrangements (e.g. culture and socio-structure) in government organisations are critical to the outcomes of e-government development. We therefore conclude that although e-government development is contingent on the level of digitalisation in a society, governments, citizens and contextual factors all play a

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role in e-government development. This conclusion supports the findings of earlier studies (Fountain, 2005, 2012; Bélanger and Carter, 2009; Al-Shafi and Weerakkody, 2010; Björn *et al.*, 2012).

6.2 Contextual factors

Unlike the fragmentary approach that has characterised the current emergent domain of e-government research (Yildiz, 2007; Wimmer *et al.*, 2008), this study develops a model that examines the relationship in a multidimensional way by taking into account different contextual factors that may influence digitalisation and e-government development. Our correlation analysis suggests that social (e.g. education), cultural (e.g. power distance and individualism), economic (e.g. GNI per capita), demographic (e.g. age structure) and political factors (e.g. government effectiveness) are all significantly correlated with e-government development and the digital economy (see Tables II and IV for detail). The finding supports the multidimensional approach to this study and our research model.

The multiple regression test results from this study pinpoint the salient factors in e-government development (see Table V). Of the contextual factors, government effectiveness is found to be most important ($\beta = 0.768, p < 0.001$). This finding not only highlights the crucial role of governments but also suggests that a high government performance orientation is a prerequisite for e-government development. To enhance government performance, e-government has been widely adopted as a promising tool to improve managerial efficiency and the quality of public service delivery to citizens (United Nations, 2012; Haque and Pathrannarakul, 2013). This reinforces the interdependent relationship between government effectiveness and e-government development. The finding supports the conclusion of the earlier studies such as Yildiz (2007) and Rodríguez Domínguez *et al.* (2011).

This study also verifies empirically that the demographic factor measured by age structure significantly affects e-government development. In other words, a population with a high percentage of people between the age of 15 and 64 is the key contextual factor to the digitalisation of government services. This finding is consistent with the results of Pew Research Center (2012) survey conducted in the USA, which show that although there is an increasing number of people age 65 and over who have started to use the Internet, the majority of the users are below the age of 65. However, we did not find that gender has a significant effect on e-government development. This finding supports the earlier finding of Rufín Moreno *et al.* (2013), although some studies also show that gender inequality exists in Internet skills and use due to socio-economic inequality (e.g. Hargittai, 2010; Van Deursen and Van Dijk, 2011). The inconsistent findings of these studies may be explained by the difference between general Internet use and e-government use as well as the factors that influence the two. For example, the empirical findings by Bélanger and Carter (2009) suggest that e-government users may need to possess more complex skill sets than general Internet users. The study of Björn *et al.* (2012) found that the factors influencing e-government use are not the same as those influencing Internet use.

It is interesting to find that although our correlation results (Table IV) indicate that the economic factor measured by GNI per capita is significantly associated with e-government development, it is not a salient factor. The reason could be that, compared with other factors, namely, government effectiveness, population age, and culture, economic factors may be played out or play only an indirect role in the

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e-government development. In other words, economic wealth may not necessarily lead to e-government development. This argument is supported by a recent empirical study that suggests that economic development in a nation plays a moderating role but not a direct role in e-government development (Zhao *et al.*, 2014b). This phenomenon may reflect the multidimensional nature of e-government development where many factors are likely to come into play and some are more salient than others.

Culture has rarely been considered as a salient contextual factor in the empirical study of e-government development and the digital economy. One of the important contributions that we have made is to integrate culture into this study and test its effect empirically. Among the five cultural dimensions of Hofstede (2001) that we tested, individualism and power distance are found to significantly affect the growth of the digital economy and e-government in a nation, while the effects of masculinity, uncertainty avoidance, and long-term orientation are marginal. This indicates that some cultural characteristics are more relevant to digitalisation and e-government than others. For example, a high power distance culture that respects hierarchy may become a hurdle to e-government service offerings that require a streamlined structure and seamless integration between government departments. This finding is consistent with some earlier studies (e.g. Kovačić, 2005; Khalil, 2011). The policy implications of this finding to policymaking will be discussed in the following section.

7. Implications for policymaking and strategies

Government spending on e-government projects is reportedly over 1 per cent of GDP per year. They undoubtedly constitute a critical part of public policy and government operations (Dunleavy *et al.*, 2006). One of the most difficult agendas for policymakers is making strategic choices in this area. This study's findings can shed some light on the choices involved.

First, the reciprocal relationship between e-government development and the digital economy found in this study implies that a "virtual state"[5] can be achieved if government organisations take advantage of information technologies to transform their processes and structures to improve the effectiveness and efficiency of public service delivery. In this transformation process, government organisations determine the outcomes of the transformation (Fountain, 2005). On the other hand, the behavioural intention of citizens (including institutional users) is of critical importance to information technology diffusion and e-government development (e.g. Davis, 1989; Zhao and Khan, 2013).

The present study helps policymakers understand the nature of the interrelationships between the digital economy, government organisations, and citizens' adoption. The strategic focus for public administration should thus be placed on organisational structures, processes, cultures and importantly, citizens' behaviour. The current vertical structures associated with the Weberian bureaucracy in many government organisations can make it difficult to realise the potential benefits of e-government services that often rely on streamlining processes and systems and the cross-department integration of procedures and services. As found in the present study, culture (i.e. individualism and power distance) is a significant salient factor in the relationship between e-government and the digital economy. The organisational culture, if dominated by such cultural orientations, could have a positive (in terms of individualism) and a negative (in terms of power distance) effect on e-government implementation. From the demand perspective, studies show that culture also influences citizens' behaviour intention of adopting information technology and

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e-government services (Khalil, 2011; Zhao, 2011). Therefore, governments need to take the role of cultures into account when formulating policies and strategies. For example, in countries where building strong family and group ties is highly regarded, the use of computers for communication by individuals may not be encouraged or even well accepted. In these cultures, e-government services may need to be more interactive, engaging and personal to attract users. In this case maybe governments could best make use of interactive technologies such as social networking tools to engage in e-consultation with their citizens.

Second, the findings of our study demonstrate that both the digital economy and e-government are complex and multifaceted phenomena. The findings support our argument that a multidimensional approach is needed to address issues related to digitalisation and e-government development. For example, policies and strategies that focus on investment in information technology and enhancing technological capacity alone may neglect the interdependencies found in this study between various contextual factors that collectively affect the growth of the digital economy and e-government development.

Third, this study finds that the effects of some factors, such as government effectiveness and the age group between 15 and 64, are more salient than others on e-government development. Although a comprehensive approach is highly recommended, government resources need to be prioritised to focus on these factors given the widespread resource constraints in the public sector. The increasing popularity of the social web (i.e. Web 2.0 technology), cloud computing, apps development and many more advanced technologies helps to generate the "second wave of digital governance" according to the study of Dunleavy and Margetts (2010). This "second wave" has reportedly more potential to improve government performance and presents more unprecedented challenges compared with the first generation of digital governance (e.g. enabled mostly by Internet and e-mail). For example, the study of Bertot *et al.* (2010) finds that in individual communities, social media is likely to increase the acceptance and usage of e-government when families, friends, and members of social networks have positive perceptions about e-governments. YouTube, Facebook, Twitter and mobile technologies played a crucial role in promoting democracy during the Arab Spring (Howard and Hussain, 2011). Research finds that social media can help promote government transparency and accountability (Mäkinen and Kuira, 2008; Fountain, 2013). For example, citizen journalism equipped with social media has more opportunities to report government corruption than using traditional media (e.g. Internet services) as censorship and filtering are less effective in controlling social media. Studies also show that the majority of social web users are young and middle-aged people (Pew Research Center, 2012). In this regard, policies and strategies should focus on how to engage citizens and encourage e-participation through social media to improve the effectiveness of e-government. For example, government organisations can use social media to allow citizens to track government activities, monitor government performance and report government corruption, thereby improving government effectiveness.

8. Theoretical contributions

This study builds largely on two theoretical bases – TAM and Fountain's technology enactment framework while addressing their limitations by studying user adoption in a broader context (e.g. social, economic, political, cultural and demographic), and

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extending Fountain's theory to include user adoption and citizens' participation. By doing so, this study has made three major contributions to the current literature. First, the current Technology Adoption models such as TAM tend to study the relationship between technology adoption and factors influencing it in a unidirectional causation way (Davis, 1989). Our research, however, investigates the relationship between digitalisation and e-government development in a bidirectional fashion. The result about the reciprocal relationship should provide fertile ground for further development of our understanding of the dynamic nature of the relationship between the two.

Second, this study contributes to the application of the applied social sciences to strengthen e-government research. The applied social sciences refer to the disciplines related to sociology, psychology, economics, political science, and the applied fields include public policy, public management and administration; and organisational behaviour. As noticed by many researchers such as Fountain (2001, 2010) and Yildiz (2007), e-government research has suffered from a fragmentary approach to its research agenda. The interrelationship between technical and non-technical variables requires a multidisciplinary approach. By taking a multidimensional research strategy, this study identifies the strong reciprocal (two-way) relationship between e-government development and the digital economy as well as the effects of various contextual factors on e-government development and the digital economy. The research model we developed and supported through large international empirical data sets demonstrates how to incorporate applied social science theories and a multidisciplinary approach to the study of e-government development and the digital economy. By doing so, the present study paves the way for further empirical research that may lead to the development of new theoretical models and theories on the relationship between e-government and the digital economy from a holistic and integrative perspective.

Third, our model extends the study of Fountain's technology enactment theory. Despite the merits of Fountain's technology enactment theory as discussed in this paper, citizens are not considered in her model. Drawing on the connotation of TAM, our research model addresses this limitation and studies the variables of adoption of citizens, including corporate citizens (businesses) of information technology in the digital economy and e-participation in e-government development. Fountain's theory emphasises how government organisations and institutional arrangements affect the use of technology and our model goes further to demonstrate the importance of users (i.e. citizens and businesses) and the cultures of users in the technology enactment.

9. Limitations and suggestions for future research

This study aims to explore the complex relationships between the digital economy and e-government and their various contextual factors. Extant research indicates that there is a lack of empirical cross-national study of e-government addressing macro-level issues (Krishnan *et al.*, 2013). We intended to address this limitation and chose to conduct a cross-nation study. However, collecting large-scale primary data at an international level (in our case, spanning 67 countries) is far beyond our limit in terms of time and resources. To achieve our research purpose, we used publicly available archival data in our study. The data allow policymakers to make ready cross-country comparisons and benchmark against their own country.

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However, the use of the archival global data sets and indices has its limitations. First, the study is constrained by the coverage and formulation of the indices. Some critics argue that composite indices and scores tend to be simplistic and may overlook deeper causes of a phenomenon, in particular when such indices are difficult to measure (Organization for Economic Cooperation and Development, 2008). As far as our study is concerned, the psychological aspects of adoption of information technology is an important indicator and should be included and measured (Martínez-López *et al.*, 2010). However, the composite indices we used do not contain such data. Second, the sample size (67 countries) is relatively small, which is caused by the constraints on our data sets (i.e. EIU and Hofstede's data sets). Third, although the archival (secondary) data were collected and compiled by experienced and reputable research teams (i.e. United Nations and EIU), the use of secondary data has its advantages and pitfalls. One of the pitfalls is that it is difficult, if not impossible, to detect errors that may occur in the process of data collection and calculating indices because we do not have access to the raw data (Shultz *et al.*, 2005). Therefore, caution should be taken when making generalisations from our findings. Future research may address the limitations and validate our research model using primary data collected from international, national and local communities through extensive and eclectic research. For example, an eclectic study (combining both quantitative and qualitative methods) conducted at a local level or national level may cover more aspects for the study and generate more detailed and in-depth findings that may complement an international study. Such research could lead to further theoretical development due to the convergent validity achieved by using various research methods and sources of data. The depth and scope of such a task are far beyond what can be achieved in this paper. Nevertheless, we strongly believe that the line of inquiry and approach that we have taken provide a valuable starting point for further theoretical and empirical research.

10. Conclusions

The advent of digitalisation is currently viewed as "the most general, pervasive, and structurally distinctive influence on how governance arrangements are changing in advanced industrial states" (Dunleavy *et al.*, 2006, p. 468). The most recent United Nations' e-government survey results indicate that the influence is not limited to the advanced industrial states but has extended widely and rapidly to the most nations of the world (United Nations, 2012). This study addresses this influence in a timely and multidimensional way through examining how social, economic, political, legal, technological, demographic and cultural factors interact with e-government development and the digital economy. By doing so, the study contributes to a more holistic understanding of the nature of the relationship between the two. The results of the study suggest that digitalisation may drive e-government development on the one hand, and e-government development can advance the development of digitalisation on the other. The reciprocal relationship has profound implications for policymaking and strategies in government organisations as discussed in this paper. Drawing on TAM and Fountain's technology enactment theory, the study is able to demonstrate both theoretically and empirically the important role that government organisations can play as well as the importance of citizens and their culture in the adoption of e-government.

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Hypotheses	Sustained	Rejected
H1: In addition to ICT connectivity, business environment, social and cultural environment, legal environment, government policy and vision, and consumer and business adoption of ICT, national culture has an impact on the digital economy	√	
H1a: Power distance influences the digital economy	√	
H1b: Uncertainty avoidance influences the digital economy		X
H1c: Individualism influences the digital economy	√	
H1d: Masculinity influences the digital economy		X
H1e: Long-term orientation influences the digital economy		X
H2: ICT infrastructure, economic, social, political, demographic, and cultural factors as well as e-participation all have an impact on e-government development	√	
H2a: Economic factors influence e-government development	Correlation	Predictor
H2b: Political factors influence e-government development	√	
H2c: Demographic factors influence e-government development	Age	Gender
H2d: E-participation influences e-government development	√	
H2e: Power distance (as a dimension of culture) influences e-government development	√	
H2f: Uncertainty avoidance (as a dimension of culture) influences e-government development		X
H2g: Individualism (as a dimension of culture) influences e-government development	√	
H2h: Masculinity (as a dimension of culture) influences e-government development		X
H2i: Long-term orientation (as a dimension of culture) influences e-government development		X
H3: There is a positive relationship between e-government development and the digital economy	√	

Table VII.
Summary of results of hypotheses testing

Notes

1. ICT infrastructure and social factors (i.e. education) are treated as integrative parts of e-government development by the research team of the United Nations (2012). As we have adopted the United Nations' model for e-government development and its composite index scores of e-government development using the model, there is no need to hypothesise or test the relationships between ICT infrastructure and social factors and e-government development in this paper.

2. EIU assessed a total of 70 major economies in the world, of which three are not the Member States of the United Nations (i.e. Hong Kong, Taiwan, and Bermuda) and were not included in the UN e-government surveys. As this study aims to examine the relationship between e-government development (using the UN e-government survey data) and the digital economy (using mostly the EIU data set), we have to exclude the three economies in our data analysis.

3. For detail about the data collection and analysis of Hofstede's cultural survey, please see Hofstede's (2001) Culture's consequences: Comparing values, behaviours, institutions and organisations across nations.

4. The results of all the hypotheses that we tested are summarised in Table VII.

5. The term 'virtual states' was coined by Jane Fountain (2001).

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References

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.

Al-Gahtani, S.S., Hubona, G.S. and Wang, J. (2007), "Information technology (IT) in Saudi Arabia: culture and the acceptance and use of IT", *Information & Management*, Vol. 44 No. 8, pp. 681-691.

Alomari, M., Woods, P. and Sandhu, K. (2012), "Predictors for e-government adoption in Jordan: deployment of an empirical evaluation based on a citizen-centric approach", *Information Technology & People*, Vol. 25 No. 2, pp. 207-234.

Al-Shafi, S. and Weerakkody, V. (2010), "Factors affecting e-government adoption in the state of Qatar", *European and Mediterranean Conference on Information Systems 2010*, *Abu Dhabi*, *12-13 April 2009*.

Andersen, K.N., Henriksen, H.Z., Medaglia, R., Danziger, J.N., Sannarnes, M.K. and Enemærke, M. (2010), "Fads and facts of e-government: a review of impacts of e-government (2003-2009)", *International Journal of Public Administration*, Vol. 33 No. 11, pp. 564-579.

Bandura, A. (1986), *Social Foundations of Thought and Action*, Prentice-Hall, New York, NY.

Bekkers, V. and Homburg, V. (2007), "The Myths of e-government: looking beyond the assumptions of a new and better government", *The Information Society*, Vol. 23 No. 5, pp. 373-382.

Bélanger, F. and Carter, L. (2009), "The impact of the digital divide on e-government use", *Communications of the ACM*, Vol. 52 No. 4, pp. 132-135.

Bélanger, F. and Carter, L. (2012), "Digitizing government interactions with constituents: an historical review of e-government research in information systems", *Journal of the Association for Information Systems*, Vol. 13 No. 5, pp. 363-394.

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*, Vol. 27 No. 3, pp. 264-271.

Björn, N., Elena, G. and Ralf, P. (2012), "The digital divide vs the e-government divide: do socio-demographic variables (still) impact e-government use among onliners?", *Proceedings of European Conference on Information Systems, 2012, 10-13 June, Barcelona, Paper No. 199*, available at: http://aisel.aisnet.org/ecis2012/199 (accessed 5 September 2012).

Bretschneider, S. (2003), "Information technology, e-government, and institutional change", *Public Administration Review*, Vol. 63 No. 6, pp. 738-741.

Brynjolfsson, E. and McAfee, A. (2011), *Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy*, MIT Center for Digital Business, Cambridge, available at: http://ebusiness.mit.edu/research/Briefs/Brynjolfsson_McAfee_Race_Against_the_Machine.pdf (accessed 12 September 2013).

Carlsson, B. (2004), "The digital economy: what is new and what is not?", *Structural Change and Economic Dynamics*, Vol. 15 No. 3, pp. 245-264.

Chang, I.C., Li, Y.-C., Hung, W.-F. and Hwang, H.-G. (2005), "An empirical study on the impact of quality antecedents on tax payers" acceptance of internet tax-filing systems", *Government Information Quarterly*, Vol. 22 No. 3, pp. 389-410.

Chinn, M.D. and Fairlie, R.W. (2006), "ICT use in the developing world: an analysis of differences in computer and Internet penetration", IZA Discussion Paper No. 2206, Bonn.

Central Intelligence Agency (CIA) (2011), *The World Factbook*, available at: www.cia.gov/library/publications/download/download-2011/ (accessed 9 October 2013).

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:31 09 November 2016 (PT)

Cooper, R.B. and Zmud, R.W. (1990), "Information technology implementation research: a technological diffusion approach", *Management science*, Vol. 36 No. 2, pp. 123-139.

Cordella, A. and Iannacci, F. (2010), "Information systems in the public sector: the e-government enactment framework", *The Journal of Strategic Information Systems*, Vol. 19 No. 1, pp. 52-66.

Coursey, D. and Norris, D.F. (2008), "Models of e-government: are they correct? An empirical assessment", *Public Administration Review*, Vol. 68 No. 3, pp. 523-536.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-340.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1992), "Extrinsic and intrinsic motivation to use computers in the workplace", *Journal of Applied Social Psychology*, Vol. 22 No. 14, pp. 1111-1132.

Department of Broadband, Communications and the Digital Economy, Australian Government (2013), *Advancing Australia as a Digital Economy*, Department of Broadband, Communications and the Digital Economy, Australian Government, available at: www.dbcde.gov.au/digital_economy/national_digital_economy_strategy/advancing_australia_as_a_digital_economy (accessed 5 January 2014).

Doong, H., Wang, H. and Foxallc, G.R. (2010), "Psychological traits and loyalty intentions towards e-government services", *International Journal of Information Management*, Vol. 30 No. 5, pp. 457-464.

Dunleavy, P. and Margetts, H. (2010), "The second wave of digital era governance", *American Political Science Association Conference, Washington, DC, 4 September*, available at: http://eprints.lse.ac.uk/27684/ (accessed 20 March 2013).

Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J. (2006), "New public management is dead—Long live digital-era governance", *Journal of Public Administration Research and Theory*, Vol. 16 No. 3, pp. 467-494.

Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J. (2006), "Digital era governance: IT corporations, the state, and e-government", Oxford University Press, Oxford.

Economist Intelligence Unit (EIU) (2010), "Digital economy rankings 2010", available at: www-935.ibm.com/services/us/gbs/bus/html/ibv-digitaleconomy2010.html (accessed 8 April 2013).

Erumban, A.A. and de Jong, S.B. (2006), "Cross-country differences in ICT adoption: a consequence of culture?", *Journal of World Business*, Vol. 41 No. 4, pp. 302-314.

Fishbein, M. and Ajzen, I. (1975), *Belief, attitude, intention and behaviour: An Introduction to Theory and Research*, Addison-Wesley, Reading, MA.

Fishenden, J. and Thompson, M. (2013), "Digital government, open architecture, and innovation: why public sector IT will never be the same again", *Journal of Public Administration Research and Theory*, Vol. 23 No. 4, pp. 977-1004. doi: 10.1093/jopart/mus022.

Fountain, J. (2005), *Central issues in the political development of the virtual state, The Network Society: From Knowledge to Policy*, Center for Transatlantic Relations, Washington, DC, pp. 149-181.

Fountain, J.E. (2001), *Building the Virtual State: Information Technology And Institutional Change*, Brookings Inst. Press, Washington, DC.

Fountain, J.E. (2003), "Information, institutions and governance: advancing a basic social science research program for digital government", National Centre for Digital Government, Paper No. 9, Amherst.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:31 09 November 2016 (PT)

Fountain, J.E. (2006), "Enacting technology in networked governance: developmental processes of cross-agency arrangements", available at: http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1018&context=ncdg (accessed 30 March 2012).

Fountain, J.E. (2011), "Bringing institutions back in to strategic management: The politics of digitally mediated institutional change", Working Paper No. 11(001), National Center for Digital Government .

Fountain, J.E. (2013), "Promises and pitfalls of social media use in government", *Public Administration Review*, Vol. 73 No. 2, pp. 370-372.

Gauld, R. and Goldfinch, S. (2006), *Dangerous Enthusiasms – E-Government, Computer Failure and Information System Development*, Otago University Press, Dunedin.

Haque, S. and Pathrannarakul, P. (2013), "E-Government towards good governance: a global appraisal", *Journal of E-Governance*, Vol. 36 No. 1, pp. 25-34.

Hargittai, E. (2010), "Digital na (t) ives? Variation in internet skills and uses among members of the 'net generation", *Sociological Inquiry*, Vol. 80 No. 1, pp. 92-113.

Heeks, R. and Bailur, S. (2007), "Analyzing e-government research: perspective, philosophies, theories, methods, and practice", Working Paper No. 16, Institute for Development Policy and Management, The University of Manchester, Manchester.

Hofstede, G.H. (2001), *Culture's Consequences: Comparing Values, Behaviors, Institutions And Organizations Across Nations*, Sage, Thousand Oaks, CA.

House, R.J., Hanges, P.J., Javidan, M., Dorfman, P.W. and Gupta, V. (2004), *Culture, Leadership, and Organizations*, Sage, Thousand Oaks, CA.

Howard, P.N. and Hussain, M.M. (2011), "The role of digital media", *Journal of Democracy*, Vol. 22 No. 3, pp. 35-48.

Hung, S.Y., Chang, C.M. and Kuo, S.R. (2013), "User acceptance of mobile e-government services: an empirical study", *Government Information Quarterly*, Vol. 30 No. 1, pp. 33-44.

International Telecommunication Union (ITU) (2011), "Measuring the information society", annual report of International Telecommunication Union, Geneva.

ITIM International (2010), "Geert Hofstede™ cultural dimensions", available at: www.geert-hofstede.com/geert_hofstede_resources.shtml (accessed 20 March 2012).

Khalil, O.E. (2011), "E-government readiness: does national culture matter?", *Government Information Quarterly*, Vol. 28 No. 3, pp. 388-399.

Kovačić, Z. (2005), "The impact of national culture on worldwide eGovernment readiness", *Informing Science*, Vol. 8, pp. 143-158.

Krishnan, S., Teo, T.S. and Lim, V.K. (2013), "Examining the relationships among e-government maturity, corruption, economic prosperity and environmental degradation: a cross-country analysis", *Information & Management*, Vol. 50 No. 8, pp. 638-649.

Lee, C.P., Chang, K. and Berry, F.S. (2011), "Testing the development and diffusion of e-government and e-democracy: a global perspective", *Public Administration Review*, Vol. 71 No. 3, pp. 444-454.

Lu, L.C., Chang, H.H. and Yu, S.T. (2013), "Online shoppers' perceptions of e-retailers" ethics, cultural orientation, and loyalty: an exploratory study in Taiwan", *Internet Research*, Vol. 23 No. 1, pp. 47-68.

Luna-Reyes, L.F., Gil-Garcia, J.R. and Romero, G. (2012), "Towards a multidimensional model for evaluating electronic government: proposing a more comprehensive and integrative perspective", *Government Information Quarterly*, Vol. 29 No. 3, pp. 324-334.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:31 09 November 2016 (PT)

McLoughlin, C. and Lee, M.J. (2007), "Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era", *ICT: Providing Choices for Learners and Learning, Proceedings Ascilite, Singapore, December*, pp. 664-675.

Mäkinen, M. and Kuira, M.W. (2008), "Social media and postelection crisis in Kenya", *The International Journal of Press/Politics*, Vol. 13 No. 3, pp. 328-335.

Margetts, H. and Dunleavy, P. (2013), "The second wave of digital-era governance: a quasi-paradigm for government on the Web", *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, Vol. 371 No. 1987. doi: 10.1098/rsta.2012.0512.

Martínez-López, F.J., Rodríguez-Ardura, I., Gázquez-Abad, J.C., Sánchez-Franco, M.J. and Cabal, C. C. (2010), "Psychological elements explaining the consumer's adoption and use of a website recommendation system: a theoretical framework proposal", *Internet Research*, Vol. 20 No. 3, pp. 316-341.

Mossberger, K., Tolbert, C.J. and McNeal, R.S. (2008), *Digital Citizenship*, MIT Press, Cambridge.

Moulton, B.R. (2000), *GDP and the Digital Economy: Keeping Up With The Changes. Understanding the Digital Economy: Data, Tools, and Research*, MIT Press, Cambridge and London, pp. 34-48.

Nograšek, J. and Vintar, M. (2014), "E-government and organisational transformation of government: Black box revisited?", *Government Information Quarterly*, Vol. 31 No. 1, pp. 108-118, (forthcoming).

Organization for Economic Cooperation and Development (2008), *Handbook on Constructing Composite Indicators: Methodology and User Guide*, Organization for Economic Cooperation and Development, Paris.

Orlikowski, W.J. and Iacono, C.S. (2002), "The truth is not out there: an enacted view of the digital economy", in Brynjolfsson, E. and Kahin, B. (Eds.), *Understanding the Digital Economy: Data, Tools and Research*, The MIT Press, Cambridge, pp. 352-380.

Pew Research Center (2012), "Older adults and internet use", available at: http://pewinternet.org/~/media/Files/Reports/2012/PIP_Older_adults_and_internet_use.pdf and "Change in internet access by age group 2000-2009", available at: www.pewinternet.org/Infographics/2010/Internet-acess-by-age-group-over-time.aspx (accessed 3 February 2010).

Phang, C.W., Sutanto, J., Li, Y. and Kankanhalli, A. (2005), "Senior citizens' adoption of e-government: in quest of the antecedents of perceived usefulness", paper presented at the 38th Hawaii International Conference on System Sciences, Big Island, January 3-6.

Rodríguez Domínguez, L., García Sánchez, I.M. and Gallego Álvarez, I. (2011), "Determining factors of e-government development: a worldwide national approach", *International Public Management Journal*, Vol. 14 No. 2, pp. 218-248.

Rogers, E.M. (1995), *Diffusion of Innovations 4*, The Free Press, New York, NY.

Rufín Moreno, R., Molina, C.M., Figueroa, J.C.S. and Moreno, M.R. (2013), "Gender and e-government adoption in Spain", *International Journal of Electronic Government Research*, Vol. 9 No. 3, pp. 23-42.

Sang, S., Lee, J.D. and Lee, J. (2009), "E-government adoption in ASEAN: the case of Cambodia", *Internet Research*, Vol. 19 No. 5, pp. 517-534.

Schellong, A. (2007), "Extending the technology enactment framework", PNG Working paper No. PNG07-003, Program on Networked Governance, John F. Kennedy School of Government, Harvard University,Cambridge, MA, pp. 1-9.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:31 09 November 2016 (PT)

Shareef, M.A., Kumar, V., Kumar, U. and Dwivedi, Y.K. (2011), "E-Government adoption model (GAM): differing service maturity levels", *Government Information Quarterly*, Vol. 28 No. 1, pp. 17-35.

Shultz, K.S., Hoffman, C.C. and Reiter-Palmon, R. (2005), "Using archival data for IO research: advantages, pitfalls, sources, and examples", *The Industrial-Organizational Psychologist*, Vol. 42 No. 3, pp. 31.

Straub, E.T. (2009), "Understanding technology adoption: theory and future directions for informal learning", *Review of Educational Research*, Vol. 79 No. 2, pp. 625-649.

Tapscott, D. (1996), *The Digital Economy: Promise and Peril In The Age of Networked Intelligence Vol. 1*, McGraw-Hill, New York, NY.

Tapscott, D. and Agnew, D. (1999), "Governance in the digital economy", *Finance and Development*, Vol. 36 No. 4, pp. 34-37.

Taras, V., Rowney, J. and Steel, P. (2009), "Half a century of measuring culture: review of approaches, challenges, and limitations based on the analysis of 121 instruments for quantifying culture", *Journal of International Management*, Vol. 15 No. 4, pp. 357-373.

Taylor, S. and Todd, P.A. (1995), "Understanding information technology usage: a test of competing models", *Information Systems Research*, Vol. 6 No. 2, pp. 144-176.

Thompson, R.L., Higgins, C.A. and Howell, J.M. (1991), "Personal computing: toward a conceptual model of utilization", *MIS Quarterly*, Vol. 15 No. 1, pp. 125-143.

United Nations (2012), *United Nations E-Government Survey 2012: E-Government for the People*, United Nations, New York, NY.

Van Deursen, A. and Van Dijk, J. (2011), "Internet skills and the digital divide", *New Media & Society*, Vol. 13 No. 6, pp. 893-911.

Venkatesh, V., Morris, M., Davis, G. and Davis, F. (2003), "User acceptance of information technology: Toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-478.

Weill, P. and Woerner, S.L. (2013), "The future of the CIO in a digital economy", *MIS Quarterly Executive*, Vol. 12 No. 2, pp. 65-75.

Wigand, R.T., Wood, J.D. and Mande, D.M. (2010), "Taming the social network jungle: From Web 2.0 to social media", *Americas' Conference on Information Systems (AMCIS) 2010, 12-15 August, Lima, Proceedings, Paper No. 416*.

Wimmer, M., Codagnone, C. and Janssen, M. (2008), "Future e-government research: 13 research themes", *The eGovRTD2020 Project Proceedings of the 41st Hawaii International Conference on System Sciences, Waikoloa*, pp. 1-11.

World Bank (2008), "Definition of e-government", available at: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0, contentMDK:20507153~menuPK:702592~pagePK:148956~piPK:216618~theSitePK:702586,00.html (accessed 15 May 2009).

World Bank (2011), "GNI per capita, Atlas method (current US$)", available at: http://data.worldbank.org/indicator/NY.GNP.PCAP.CD (accessed 9 October 2013).

World Bank (2013), "Worldwide governance indicators", available at: http://info.worldbank.org/governance/wgi/index.aspx#doc (accessed 20 January 2014).

Yildiz, M. (2007), "E-government research: reviewing the literature, limitations, and ways forward", *Government Information Quarterly*, Vol. 24 No. 3, pp. 646-665.

Zhang, X. and Maruping, L.M. (2008), "Household technology adoption in a global marketplace: incorporating the role of espoused cultural values", *Information Systems Frontiers*, Vol. 10 No. 4, pp. 403-413.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:31 09 November 2016 (PT)

Zhao, F. (2011), "The impact of national culture on e-government development: a global study", *Internet Research*, Vol. 21 No. 3, pp. 362-380.

Zhao, F. and Khan, S. (2013), "An empirical study of e-government service adoption: culture and behavioral intention", *International Journal of Public Administration*, Vol. 36 No. 10, pp. 710-722.

Zhao, F., Collier, A. and Deng, H. (2014a), "A multidimensional and integrative approach to study global digital divide and e-government development", *Information Technology and People*, Vol. 27 No. 1, pp. 38-62.

Zhao, F., Shen, K.N. and Collier, A. (2014b), "Effects of national culture on e-government diffusion: a global study of 55 countries", *Information and Management*, Vol. 51 No. 8, pp. 1005-1016, available at: www.sciencedirect.com/science/article/pii/S0378720614000810 (accessed 5 July 2014).

Further reading

Bandura, A. (1989), "Social cognitive theory", in Vasta, R. (Ed.), *Annals of Child Development. Vol. 6. Six Theories of Child Development*, JAI Press, Greenwich, CT, pp. 1-60.

Carter, L. and Weerakkody, V. (2008), "E-government adoption: a cultural comparison", *Information Systems Frontiers*, Vol. 10 No. 4, pp. 473-482.

Frost, D., Goode, S. and Hart, D. (2010), "Individualist and collectivist factors affecting online repurchase intentions", *Internet Research*, Vol. 20 No. 1, pp. 6-28.

Gefen, D., Rose, G., Warkentin, M. and Pavlou, P. (2006), "Cultural diversity and trust in IT adoption: a comparison of potential e-voters in the USA and South Africa", *Journal of Global Information Management*, Vol. 13 No. 1, pp. 54-78.

Tifferet, S. and Herstein, R. (2010), "The effect of individualism on private brand perception: a cross-cultural investigation", *Journal of Consumer Marketing*, Vol. 27 No. 4, pp. 313-323.

Appendix 1

Sweden	Austria	Slovenia	Turkey	Egypt
Denmark	Japan	Chile	Jamaica	India
USA	Ireland	Czech Republic	Bulgaria	Russia
Finland	Germany	United Arab Emirates	Argentina	Ecuador
Netherlands	Switzerland	Greece	Romania	Nigeria
Norway	France	Lithuania	Trinidad & Tobago	Vietnam
Hong Kong	Belgium	Hungary	Thailand	Sri Lanka
Singapore	Bermuda	Malaysia	Colombia	Ukraine
Australia	Malta	Latvia	Jordan	Indonesia
New Zealand	Spain	Slovakia	Saudi Arabia	Pakistan
Canada	Estonia	Poland	Peru	Kazakhstan
Taiwan	Israel	South Africa	Philippines	Algeria
South Korea	Italy	Mexico	Venezuela	Iran
UK	Portugal	Brazil	China	Azerbaijan

Source: Economist Intelligence Unit (2010)

Table AI.
A list of 70 economies ranked by the EIU (2010)

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Appendix 2

Variables	Key indicators
1. Connectivity and technology infrastructure	Broadband penetration, mobile-phone penetration, Internet user penetration
2. Business environment	Macroeconomic environment, market opportunities, the labour market
3. Social and cultural environment	Educational level, degree of entrepreneurship and innovation, Internet literacy
4. Legal environment	Effectiveness of traditional legal framework, laws covering the Internet
5. Government policy and vision	Government spend on ICT as a proportion of GDP, digital development strategy
6. Consumer and business adoption	Use of the Internet by consumers, use of online services by citizens and businesses

Source: Economist Intelligence Unit (2010)

Table AII. A summary of measures used by the EIU for digital economy ranking

Appendix 3

Variables/Measures	Key indicators
E-government development Index (EGDI)	A composite index
1. Online service index	Scope and quality of e-government services offered
2. Telecommunication index	Number of personal computers, internet users, telephone lines per 100 persons
3. Human capital index	Adult literacy rate, the combined primary, secondary, and tertiary gross enrolment ratio

Source: United Nations (2012)

Table AIII. A summary of measures used by the United Nations for e-government development ranking

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