Impact of national culture on e-government development: a global study

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Abstract
Purpose – The main purpose of this paper is to examine empirically whether national culture has an impact on e-government development in 84 countries around the world.

Design/methodology/approach – We used statistic methods of correlation and multiple regression to analyze the two sets of indexes – E-government Development Index from the United Nations E-government Survey 2010 and Hofstede’s culture dimension index scores of 84 countries.

Findings – We found that there is a correlation to a differing degree between e-government development and the five culture dimensions defined by Hofstede, although only individualism, power distance and long-term orientation are significantly correlated with e-government development.

Practical implications – The findings of this study and most importantly, the strategies proposed based on the findings by this paper would help government policy and decision makers design and implement policies and strategies to improve e-government services and their overall development.

Originality/value – The study not only provides empirical support and validates the findings of previous research but also extends the scope and updates the results of similar studies in the study field.

Keywords E-government, Cross-cultural studies, Information technology, Hofstede’s culture dimensions

Paper type Research paper

1. Introduction
E-government has developed rapidly around the world over the past decade and is gaining momentum in many countries. A recent United Nations e-government survey found that in the current economic crisis, government web sites surveyed have played a major role in delivering crisis-response information and measures to citizens and businesses, and eliciting feedback from citizens on alternatives for addressing the effects of the economic downturn. The survey also found that there exists a systematic discrepancy between the offer of e-government facilities and the actual citizens’ take-up of the services offered (United Nations, 2010). This indicates that a citizen-centric approach is crucial to the effectiveness and efficiency of e-government (OECD, 2009).

It is widely acknowledged that culture (referred to as national culture in this paper) has a significant influence on consumer behavior and technology diffusion (Martin et al., 2011; Tifferet and Herstein, 2010; Miranda et al., 2009; Dwyer et al., 2005). However, the effect of cultural values on e-government development is often neglected in the world e-government literature and official international surveys. For example, the five consecutive e-government surveys conducted by the United Nations took telecommunication infrastructure and level of education (being part of socio-economic factor) as key determinants to a country’s e-government development index. The surveys found that the level of e-government development is by and large consistent
with the level of economic development of a country, which explains the variation of
e-government implementation and adoption between countries (United Nations, 2010).
However, the surveys did not touch on cultural values, religious belief, social norms,
and social, political and legal systems which may play very important roles in
e-government implementation and adoption. To address the knowledge gap in the
current e-government literature, our study aims to examine empirically the influence of
national culture on e-government development by taking a comprehensive approach,
namely, from both a citizen perspective and a supply perspective as well as from an
international perspective rather than an individual country and/or regional
perspective. The primary research question is: Is there a correlation between
national culture and e-government development?

To answer the research question, we draw on the cultural dimension indexes of 84
countries published in Geert Hofstede’s books (Hofstede, 2001; Hofstede et al., 2010)
and the most recent e-government development indexes of the 84 countries generated
by the United Nations Department of Economic and Social Affairs (United Nations,
2010). We used statistic methods of correlation and multiple regression to analyze the
two sets of indexes and examine whether cultural dimensions are significantly
correlated with cross-country differences in e-government development.

The contributions of this study have both theoretical and practical implications. For
theoretical implications, the study not only provides empirical support and validates
the findings of previous research but also extends the scope and updates the results of
similar studies. For practical implications, the findings of this study and most
importantly, the strategies proposed based on the findings by this paper would help
government policy and decision makers design and implement policies and strategies
to improve e-government services and their overall development.

Following this introduction is a review of the principal literature on national culture
including its impact on information technology adoption, e-government and the
relationship between the two, providing the theoretical foundation for the development
of hypotheses for this study. After a detailed introduction of the variables that we
measure, we present the results of our statistic analysis, followed by a discussion of the
theoretical and practical implications of the results and a proposal of broad strategies
for the improvement of e-government development through addressing cultural issues.
We conclude with a discussion of limitations of this study and suggestions for further
research.

2. Literature review
2.1 National cultures and their dimensions
Culture has been defined in many ways. Hofstede (2001, p9) defines it as “the collective
programming of the mind that distinguishes the members of one group or category of
people from another”. According to this definition, national culture is a set of collective
beliefs and values that distinguish people of one nation from those of another. There
are quite a few sophisticate models developed to analyze cultural differences (Douglas,
1978; Trompenaars and Hampden-Turner, 2000; Hofstede, 2001; Dickson et al., 2003;
House et al., 2004; Inglehart and Welzel, 2005). Among them, Hofstede’s model of
cultural indexes is the most widely used, given the fact that it has topped the Social
Science Citation Index for years (Erumban and de Jong, 2006; ITIM International,
2010). Hofstede (2001), in a seminal empirical study of IBM employees in 40 countries
during the 1960s and 1970s, identified four cultural dimensions: power distance, uncertainty avoidance, individualism versus collectivism, and masculinity versus femininity. A fifth dimension – long-term versus short-term orientation – was added following the research by Michael Bond and colleagues among students in 23 countries in 1991 (Hofstede, 2001). Most recently, a sixth dimension – indulgence versus restraint which was based on Minkov’s World Values Survey data analysis for 93 countries, has been added (Hofstede et al., 2010). The following provides a brief outline of the six dimensions of national cultures (Hofstede, 2001; Hofstede et al., 2010).

1. Power distance refers to the extent to which a society accepts the fact that power in institutions and organizations is distributed unequally.

2. Uncertainty avoidance refers to the extent to which members of a society feel uncomfortable in ambiguous and uncertain situations and take actions to avoid them.

3. Individualism versus collectivism refers to the extent to which individuals are supposed to look after themselves or remain integrated into groups.

4. Masculinity versus femininity refers to the distribution of emotional roles between the genders. It contrasts “tough” masculine with “tender” feminine societies.

5. Long-term versus short-term orientation refers to the extent to which a culture programs its members to accept delayed satisfaction of their material, social and emotional needs. Long-term orientation is future-focused and has long-term goals whereas short-term orientations focus on respect for tradition and are oriented toward the past and the present.

6. Indulgence versus restraint refers to the extent to which a society allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. As this dimension is still in its infancy, its validity has not yet been widely tested. We decided not to include this dimension in our correlation and regression tests because the basic concept of this dimension has apparently no direct link with e-government development.

This study adopts Hofstede’s multiple dimension approach to culture and his culture index scores generated by the approach because the approach is the most tested and widely accepted one in cross-culture research and the culture index scores are the most extensive in term of the number of the countries they cover. The indexes provide a quantifiable framework for analysis of national culture differences. However, it should be noted that Hofstede’s conceptualization of culture has been criticized as too simplistic because it ignores the existence of extensive within-country cultural heterogeneity (Sivakumar and Nakata, 2001; Jones, 2007) and assumed that culture is static over time (Ford et al., 2009).

2.2 National culture and information technology adoption
Cultural differences between countries in relation to information technology (IT) adoption are a highly researched subject. Many researchers have found that cultural factors play an important role in ICT/IT/IS adoption (Dwyer et al., 2005; Srite and Karahanna, 2006; Zhang and Maruping, 2008). Hofstede (2001) states that low-uncertainty-avoidance cultures make greater use of a recent technological
innovation, the internet, than do high-uncertainty-avoidance societies. The study of Erumban and de Jong (2006) found that national culture and the IT adoption rate of a country are closely related. They acknowledged that Hofstede’s dimensions are important in influencing IT adoption. In particular, the power distance and the uncertainty avoidance dimensions of national culture seem to be the most important. Likewise, Herbig and Dunphy (1998) consider that suitable environments for innovation are characterized largely by higher individualism, willingness to take risks, readiness to accept change, long-term orientation, and low on power/status/hierarchy (low power distance). However, Dwyer et al. (2005) found that long-term orientation has a negative influence on innovation product adoption. These studies of the effects of national culture on IT and innovation adoption are certainly a useful analogy to our study of culture and e-government as whether citizens use government web sites and e-services are partially dependent on their willingness of adoption of IT.

2.3 E-government implementation and national culture

There are many definitions of e-government in the literature. Among them, we chose that of the World Bank (2008) for the purpose of this study due to its clear objectives and comprehensiveness. The World Bank defines e-government as the use by government agencies of information technologies (such as wide area networks, the internet, and mobile computing) to transform relations with citizens (G2C), businesses (G2B), and other arms of government (G2G). In this study, we limit our discussion to government to citizen only (G2C). The potential benefits of e-government technologies could lead to better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, and more efficient and transparent government management (World Bank, 2008).

Corresponding to the rapid development of e-government is the emergence and increasing expansion of e-government literature. The majority of e-government literature revolves around e-government technology (e.g. the usability of e-government web sites), infrastructure and resources, user behavior and intentions drawing on various technology acceptance models, government policies and strategies regarding e-government, and socio-economic issues such as access issues and digital divide (Aldrich et al., 2002; Carter and Belanger, 2005; Dewan and Riggins, 2005; Kaylor, 2005; Barzilai-Nahon, 2005; Heeks, 2006; Heeks and Bailur, 2006; Gouscos et al., 2007; Boateng et al., 2008; Sang et al., 2009; OECD, 2009). For example, the study of Gant (2008) suggested that the degree of e-government service adoption could be explained in terms of the perceived administrative benefit from adopting e-government services, the political nature of online applications, the government’s organizational capacity in adopting new information technology, and the diffusion effect of e-government service technology.

National culture, as a source of acceptable norms and behaviors, may influence online expectations, preferences, and experiences of the public and their attitudes towards e-government. For example, adopting a new concept such as e-government can be regarded as a conflicting attitude against the dominant group norm. Thus, countries with a strong emphasis on the group may show a lower degree of e-government adoption. People from individualistic countries are educated for expressing their own views and are therefore more inclined to innovate and adopt new ideas (Erumban and de Jong, 2006). However, there is a scarcity of empirical and
rigorous research about the importance of national culture to e-government development. Among the few studies which examine the impact of national culture on e-government, most of them focus on individual countries and/or a region such as Europe and Latin America but not on a global scale (Akman et al., 2005; Guijarro, 2007; Carter and Weerakkody, 2008; Aykut, 2009; Miranda et al., Seng et al., 2010). A recent study of 26 European countries found that national culture explains the differences in the level of e-government adoption in the countries studied (Aykut, 2009). Aykut (2009) found that European countries with higher power distance and/or higher uncertainty avoidance cultures tend to have a lower e-government adoption rate. On the other hand, the European countries with high individualism and/or long-term orientation cultures are more willing to adopt e-government than the countries with collective culture and/or short-term orientation culture.

We found only one worldwide study that explores the relationship between national culture and e-government. Kovačić (2005) investigated if differences in worldwide e-government readiness levels can be explained by cultural variables. By using correlation and regression statistic analysis of worldwide e-government readiness indexes elicited from the United Nations Global E-Government Survey 2003 and national culture indexes of 95 countries of Hofstede, the study found that national culture have a moderate impact on the e-government readiness. Among the four cultural dimensions of Hofstede, individualism and power distance were the only significant variables that could be used to explain differences in level of e-government readiness. The study is the first of its kind that used the largest worldwide data sets to test the correlation between culture and e-government readiness. However, Kovačić’s study was done from a supply perspective rather than from a citizen perspective because the United Nations’ survey from which the data set for his study was generated was conducted from the government/supply perspective. Unlike the supply-focused approach which focuses primarily on the needs and perceptions of the implementer, namely, the government, a citizen approach focuses on the actual use of the e-government web sites by the citizens and their perceptions about the quality of online services delivery (Kolsaker and Lee-Kelley, 2006). Over the past few years, there has been a shift in global trends of e-government development from governments to citizens.

While acknowledging the contribution of Kovačić’s study to e-government literature, we would like to clarify the major differences between our study and that of Kovačić. First, unlike Kovačić, we study the influence of national culture on e-government development from both a supply and a demand (citizen) perspective. The shift of the latest United Nations (2010) E-government Survey from a supply focus to a citizen-centric approach allows us to address e-government issues with a balanced approach. Second, in Kovačić’s study, only four cultural dimensions of Hofstede were studied and tested whereas we included the fifth cultural dimension – long-term orientation in our study because we assume that the fifth dimension could be correlated with e-government development. Third, unlike Kovačić, we go beyond the hypothesis testing stage and extend our study to proposing strategies for improvement in e-government development taking into account cultural issues. Finally, we used the results of the latest e-government survey of United Nations (2010) which provides the most update information on e-government development around the world.
Based on our literature review shown above, we have developed five hypotheses to test the impact of national culture in terms of the five culture dimensions of Hofstede on e-government development as follows:

- **H1.** Countries with small power distance tend to have a high level of e-government development.
- **H2.** Countries with low uncertainty avoidance tend to have a high level of e-government development.
- **H3.** Countries with high individualism tend to have a high level of e-government development.
- **H4.** Countries with high masculinity tend to have a high level of e-government development.
- **H5.** Countries with long term orientation tend to have a high level of e-government development.

The main rationale for the development of the hypotheses and testing them is to understand to what extend and how culture impacts e-government development so that strategies can be developed to improve e-government development and areas for future research can be identified for theory building in the field of cross-culture study.

### 3. Variables and statistic analysis

The main aim of this study is to test the aforementioned hypotheses and explore whether national culture operationalized as cultural dimension indexes in this study are significantly correlated with worldwide differences in the e-government development. The study relies on two data sets: the United Nations e-government development index (EGDI) and Hofstede’s national culture index. Both index scores provide an independent and credible source of international comparability in terms of worldwide e-government development and national culture. A brief description of each of the variables that are analyzed statistically for this study is presented below (United Nations, 2010).

#### 3.1 The United Nations e-government development index (EGDI)

The United Nations Department of Economic and Social Affairs has conducted and published five surveys on e-government development in its Member States since 2003. The 2010 survey introduced significant changes to the previously used survey instrument, “focusing more on how governments are using web sites and web portals to deliver public services and expand opportunities for citizens to participate in decision-making” (United Nations, 2010, p. 59). In other words, the 2010 survey tends to be citizen-centric rather than supply-focused.

E-government development is often hampered by constraints in public sector capacity on the supply side as well as the citizens’ capacity to adopt e-government on the demand side. A country’s economic strength, ICT development and aggregate level of education are the key indicators of the capacity. The EGDI is a composite of the level of the capacities and the state of national online services (United Nations, 2010). The index is based largely on a United Nations survey of the online presence of the 192 member states of the United Nations which was conducted in 2009. The index rates the
performance of national governments relative to one another. It is a weighted average of three normalized scores on three most important dimensions of e-government:

1. scope and quality of online services;
2. telecommunication infrastructure; and
3. human capacity.

The maximum possible value is one and the minimum is zero as follows:

\[
\text{EGDI} = (0.34 \times \text{online service index}) + (0.33 \times \text{telecommunication index}) + (0.33 \times \text{human capital index})
\]

1. **Scope and quality of online services.** The United Nations’ research team assessed each country’s national web site as well as the web sites of the major ministries of a national government such as education, labour, social services, health and finance. Based on the assessment, a set of online service index values were obtained which reflect the scope and quality of online services. The online service survey centered around the four stages of e-government development:
   - an emerging online presence;
   - an enhanced presence;
   - a transactional presence; and
   - a connected presence (see e-participation index below for more detail).
   Almost all questions in the survey called for a binary response of yes or no, with “yes” given one point and “no” zero. A small number of questions asked about the number of forms and e-services that were available. These were worth up to ten points each. The value for a given country was equal to the total number of points scored by that country less the lowest score for any country divided by the range of values for all countries in the survey.

   Taking a citizen-centric approach to assessment of online services, the research team were reported to put themselves in the place of the average users (United Nations, 2010). Compared with the previous surveys, greater emphasis was given to online services and e-participation and what type of services was provided. This included availability of mobile applications, Web 2.0 tools, use of online services by citizens, and the extent to which governments were integrating back-office operations.

2. **Telecommunication infrastructure index.** The telecommunication infrastructure index reflects a country’s economic and ICT development. It consists of five indicators: number of personal computers per 100 persons, number of internet users per 100 persons, number of telephone lines per 100 persons, number of mobile cellular subscriptions per 100 persons and number of fixed broad-band subscribers per 100 persons. The index for each country is derived primarily from the International Telecommunication Union (2009).

3. **Human capital index.** The human capital index indicates a country’s aggregate level of education which consists of two indicators: adult literacy rate and the combined primary, secondary, and tertiary gross enrollment ratio. The data sources from which the human capital index for each country was obtained...

E-participation index. The above three indexes make up the e-government development index which is complemented by an e-participation index. The e-participation index indicates the level of citizen engagement in the connected presence stage of e-government (i.e. the stage 4 of e-government development) with a focus on the use of the internet to facilitate provision of information by governments to citizens (“e-information sharing”), interaction with stakeholders (“e-consultation”) and engagement in decision-making processes (“e-decision making”). A country’s e-participation index value reflects how useful these features are and the extent to which they have been deployed by the government compared to other countries (United Nations, 2010).

GDP per capita. The United Nations (2010) E-Government Survey found that there is strong evidence that high-income countries enjoy the top rankings in the e-government development index in 2010 as in previous years (United Nations, 2010). As economic development of a country may affect the level of e-government development, we include, as a variable, the latest GDP per capita data obtained from the International Monetary Fund (IMF) (2009) in our statistics analysis.

3.2 Hofstede’s national culture index
As mentioned in our literature review, Hofstede’s national culture indexes have been used to measure and quantify differences in the values and behaviors of people in different countries. In our statistic analysis, we used Hofstede’s five dimensions index scores which were generated mainly from his IBM survey data as well as his estimation for countries not in the IBM surveys (Hofstede, 2001). The five dimension indexes are power distance index (PDI), uncertainty avoidance index (UAI), individualism-collectivism index (IDV), masculinity-femininity index (MAS), and long-term orientation index (LTO). Each index represents a cluster of related values (a dimension), and each country receives a single numeric score for each index. The index scores that are currently available and used for this study are for 84 countries for the first four indexes (PDI, UAI, IDV and MAS) and for 76 countries for the fifth index (LTO). Although we do not have cultural index scores for all the countries and regions, what we have are the scores of the countries that are representative of the majority of countries and regions in the world.

Table I presents the basic statistics about the variables analyzed for this study. To test our hypotheses and examine statistically the relationships between all the variables described above, we chose correlation and multiple regression methods and used SPSS software program to carry out the statistic analysis.

4. Results
To identify the relationships among the factors that may contribute to e-government development in general, and to examine, in particular, if national culture plays a role in the variation in e-government development between countries, we used Pearson correlation coefficient to analyze the index scores of several key variables in relation to e-government development published in the United Nations, 2010 survey report (United Nations, 2010) and Hostede’s culture dimension index scores published in his books (Hofstede, 2001; Hofstede et al., 2010). Table II presents the results.
The results show that e-government development index, e-participation index and GDP per capita are significantly correlated with all the variables except UAI, MAS and LTO.

As the e-government development index is a composite score of online services, telecommunication infrastructure and human capital, there is no surprise to see the stronger positive correlations between and among them, ranging from 0.93 to 0.83. Likewise, e-participation index is strongly correlated with e-government development index (0.83), online service index (0.89) and telecommunication infrastructure index (0.73), but less strongly with human capital index (0.55) and GDP per capita (0.44). This finding may suggest that citizens’ participation in the e-government process (i.e. e-information sharing, e-consultation and e-decision-making) can happen with moderate input of human capital and financial resources. Human capital index scores which indicate a country’s aggregate level of education are found strongly correlated with e-government development index (0.83). The results on the correlations between GDP per capita and e-government development index (0.69) and telecommunication infrastructure (0.81) indicate that the level of economic development of a country measured by GDP per capita is one of the key factors affecting the development of e-government and telecommunication infrastructure. For example, if we look at the breakdown data of the top five countries (i.e. Republic of Korea, USA, Canada, UK, and The Netherlands) ranked in the United Nations e-government development index (United Nations, 2010) and compare them with the bottom five countries (i.e. Pakistan, Ghana, Nigeria, Ethiopia and Sierra) in the 84 countries we studied, there is a significantly large gap existing between the top and bottom groups in terms of the indexes in relation to e-government development and participation, and the GDP per capita.

When examining the relationships between the five culture dimension index scores with other variables tested, UAI, MAS and LTO have no significant correlations with any other variables. However, PDI and IDV index scores are significantly correlated with the index scores of e-government development and its components, e-participation and GDP per capita. The results suggest that overall there are three important factors that contribute to a country’s e-government development which include telecommunication infrastructure, socio-economic factors and cultural values, and that the three are interrelated.
<table>
<thead>
<tr>
<th>Variable</th>
<th>E-govt dev</th>
<th>PDI</th>
<th>UAI</th>
<th>IDV</th>
<th>MAS</th>
<th>LTO</th>
<th>E-part</th>
<th>Online service</th>
<th>GDP</th>
<th>Telecom</th>
<th>Human capital</th>
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<td>E-govt dev Pearson correlation</td>
<td>-0.534*</td>
<td>-0.028</td>
<td>0.642*</td>
<td>-0.022</td>
<td>0.150</td>
<td>0.833*</td>
<td>0.892*</td>
<td>0.693*</td>
<td>0.923*</td>
<td>0.834*</td>
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<td>0.797</td>
<td>0.000</td>
<td>0.842</td>
<td>0.196</td>
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<td>PDI Pearson correlation</td>
<td>0.206</td>
<td>-0.619*</td>
<td>0.115</td>
<td>0.008</td>
<td>-0.423*</td>
<td>-0.418*</td>
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<td>0.299</td>
<td>0.945</td>
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<td>UAI Pearson correlation</td>
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<td>-0.044</td>
<td>-0.045</td>
<td>-0.116</td>
<td>-0.065</td>
<td>-0.125</td>
<td>-0.098</td>
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<td>IDV Pearson correlation</td>
<td>0.132</td>
<td>-0.047</td>
<td>0.498*</td>
<td>0.493*</td>
<td>0.632*</td>
<td>0.702*</td>
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<td>LTO Pearson correlation</td>
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<td>0.163</td>
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<td>E-part Pearson correlation</td>
<td>0.890*</td>
<td>0.435*</td>
<td>0.713*</td>
<td>0.549*</td>
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<td>GDP Pearson correlation</td>
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<td>Telecom Pearson correlation</td>
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</table>

Note: *Correlation is significant at the 0.01 level (two-tailed). E-govt Dev = E-government Development Index; PDI = Power Distance Index; UAI = Uncertainty Avoidance Index; IDV = Individualism Index; MAS = Masculinity Index; LTO = Long-term Orientation Index; E-part = E-participation Index; Online service = Online Service Index; GDP = GDP per capita; Telecom = Telecommunication Infrastructure Index; Human capital = Human capital index.
As the primary focus of this study is to examine empirically whether national culture has an impact on e-government development (measured by online service index, telecommunication index and human capital index), we explore further the relationship between the two identified through Pearson correlation matrix in Table II, while acknowledging GDP per capita has a strong correlation with e-government development as shown in Table II. We conducted multiple regression analysis. We used hierarchical multiple regression so that we can enter variables in order on the basis of our theoretical knowledge about the variables. We first entered IDV into the regression, because previous research (Kovačić, 2005; Erumban and de Jong, 2006; Akyut (2009) and our statistical result shown in Table II indicate that IDV has stronger correlation with e-government development than the other culture dimensions. Followed by that, we entered the other four culture dimensions of PDI, UAI, MAS and LTO into the second step of the model. Table III shows the results of the hierarchical regression analysis. To address the potential problem of multi-collinearity in our multiple regression analysis, we examined the variance inflation factors (VIF) and found that none of the factors exceeds 10.0, indicating that multicollinearity is not an issue in this analysis (see Appendix (Tables AI and AII for detail).

By carrying out a multiple regression analysis, we found from the Model Summary (see Appendix (Tables AI and AII) for detail) that the five cultural dimensions accounted collectively for about 49 per cent of variation ($R^2 = 0.488$ in Model 2) in e-government development patterns. But when looking at the $R$ square change in Model 1 and Model 2, we can see that IDV explains 41.4 per cent of the variation in e-government development and the other four culture dimensions (PDI, UAI, MAS and LTO) explain collectively only 7.4 percent of the variation. Table III gives further detail about the level and the direction of correlations of each of the five culture dimension indexes with e-government development index. At Step 1, IDV’s beta score is 0.643 with a $p$-value of 0.000 which is highly significant. At Step 2, when we entered all five culture dimension indexes, we can see clearly that IDV receives the highest number in the beta ($\beta = 0.563$) for e-government development, which is significant at the 0.001 level. Consistent with the results of our correlation analysis shown in Table II, PDI receives the second highest number in the beta ($\beta = -0.183$) which shows a negative correlation with e-government development and suggests that larger power distance

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Standardized $\beta$</th>
<th>$p$-value</th>
<th>VIF</th>
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<tr>
<td>IDV</td>
<td>0.643**</td>
<td>0.000</td>
<td>1.00</td>
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</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Standardized $\beta$</th>
<th>$p$-value</th>
<th>VIF</th>
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<td>1.821</td>
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<tr>
<td>PDI</td>
<td>-0.183</td>
<td>0.117</td>
<td>1.820</td>
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<tr>
<td>UAI</td>
<td>0.116</td>
<td>0.186</td>
<td>1.037</td>
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<tr>
<td>MAS</td>
<td>-0.076</td>
<td>0.401</td>
<td>1.101</td>
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<tr>
<td>LTO</td>
<td>0.176*</td>
<td>0.044</td>
<td>1.012</td>
</tr>
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</table>

Table III. Results of hierarchical regression analysis of E-Government Development Index and Five Culture Dimension Indexes

Notes: * $p < 0.05$; ** $p < 0.001$. $R^2 = 0.414$ for Step 1; $\Delta R^2 = 0.074$ for Step 2
may lead to lower level of e-government development. But this result fails to meet the significant test \( p > 0.05 \). LTO receives a slightly smaller beta score \( \beta = 0.176 \) but at the significant level \( p < 0.05 \). MAS and UAI receive marginal beta scores \( \beta = -0.116 \) for UAI, \( \beta = 0.076 \) for MAS) and both fail to meet significant level test.

Based on our statistical analysis using Pearson correlation matrix, our \( H1 \) and \( H3 \) are sustained:

- Countries with small power distance tend to have a high level of e-government development \( (H1) \).
- Countries with high individualism tend to have a high level of e-government development \( (H3) \).

Based on our statistical analysis using hierarchical multiple regression, our \( H3 \) and \( H5 \) are sustained:

- Countries with high individualism tend to have a high level of e-government development \( (H3) \).
- Countries with long-term orientation tend to have a high level of e-government development \( (H5) \).

Our \( H2 \) and \( H4 \) are rejected by the results of either of statistic analysis:

- Countries with low uncertainty avoidance tend to have a high level of e-government development \( (H2) \).
- Countries with high masculinity tend to have a high level of e-government development \( (H4) \).

5. Discussions

Our findings show that overall, national culture influences e-government development and explains the variations between countries in e-government development \( R^2 = 0.488 \). When it comes to the individual effect of five dimensions of national culture on e-government development, our findings demonstrate that the countries with a national culture that favors individualism, and/or small power distance, and/or long term orientation perform better in e-government development. However, the statistic evidence in our findings shows that uncertainty avoidance have a minimal and statistically insignificant effect on e-government development. This finding does not support the assumptions and findings of Hofstede and others which suggest that low UAI countries tend to embrace more recent technological innovation, the internet, and/or e-government than do high UAI societies (Hofstede, 2001; Erumban and de Jong, 2006; Aykut, 2009). Like other researchers, we did not find any significant correlation between masculine culture and e-government development (Kovačić, 2005; Aykut, 2009).

Our findings about the effect of IDV and PDI on e-government development support the conclusion of the similar research by Kovačić (2005). But Kovačić did not test the fifth dimension – long term orientation – in his study. Our finding that a positive correlation exists between LTO and e-government development fills the knowledge gap. Our explanation for the finding is that as countries with LTO culture tend to have a longer vision and a forward-thinking mindset, they are more willing to develop and take-up e-government because they see it as their country’s future and can see the long-term benefits that e-government will bring to them.
5.1 Implications and strategies

The findings of this study indicate that smaller PDI, higher IDV and LTO would contribute to greater e-government development. Hofstede's study found that there is a correlation between PDI and IDV \((r = -0.68***)\), although they are conceptually different (Hofstede, 2001, p. 216). The countries with small power distance tend to be collectivistic and the ones with large power distance tend to be individualistic. Given the adaptive nature of culture, we consider that the relationship between culture and e-government development is not merely one-way but two-way. In other words, culture can be changed in the process of e-government development. For example, effective implementation of e-government can help change the power structure of a society by allowing citizens to reach governments anywhere and anytime, thus shortening the power distance (PDI). In addition, as long-term orientation has a positive influence on e-government development, strategic planning and thinking is crucial to e-government. Based on the findings of our study, we propose the following broad strategies for governments and e-government service providers to address the cultural issues through:

- Taking a citizen-focused or citizen-centric approach and getting citizens involved in the decision-making process in the design and development of e-government services (“e-decision making”). This inclusiveness approach not only addresses power distance and e-democracy issues but also improves the effectiveness, transparency and accountability of government services.

- Making best use of interactive technologies to bridge and reduce power distance between the government and its citizens and to interact with its citizens through e-consultation. For example, using social networking sites to solicit and respond to citizens’ views and inputs with regards to government policies and services. As shown in the literature review section of this paper, e-participation concerns not only e-information sharing but also e-consultation and e-decision making. There are currently only a few countries that have created integrated online discussion forums and blogs according to the recent United Nations e-government survey (United Nations, 2010).

- Developing and promoting m-government and taking advantage of mobile technology for public service provision and delivery. As the United Nations E-government Survey 2010 found that one of the most resilient developments over the past few years has been mobile phone use and services in particular in the developing countries and even in the least developed countries. The rapidly expanding popularity of mobile phones is likely to promote e-government development rapidly in highly collectivist countries as people in a collectivist culture tend to follow trends more quickly than in an individualistic culture.

- Taking a strategic management approach in e-government development as it fosters long-term orientation as well as forward and systemic thinking. Success in e-government projects requires well-thought and well-planned e-government strategy which is clearly aligned with long-term and current and future development of a nation. The key elements of a strategic management approach include having a clear vision, setting clear and prioritized goals for the next three to five years, specifying strategic initiatives and expected outcomes and having a detailed implementation plan.
6. Conclusion
6.1 Limitations and further research
Although Hofstede’s multiple culture dimension framework and the country index scores generated based on the framework have been widely used, cited and tested in the literature, it has some limitations as far as this study is concerned. First, the country index scores of Hofstede that we used for this study are outdated as they were generated mostly on the basis of his IBM surveys carried out around 1968 and around 1972 respectively (Hofstede, 2001). Quite a few recent studies replicating Hofstede’s framework found that significant changes have occurred in the index scores since Hofstede’s surveys, given the fact that culture is not static and changes over time (Abdullah et al., 2008). Second, the validity of Hofstede’s framework is not without question, given the nature of culture which is difficult to isolate, define and measure, and that the local culture within a country is often diverse (McSweeney, 2002). To address the limitation, our proposed strategies are not developed for a specific country but rather any places and countries with relatively larger power distance and/or lower individualism and/or short-term orientation.

Another limitation of this study lies in the availability of culture index scores of Hofstede which cover only a limited number of countries. In spite of our inclusion of the index scores published in Hofstede’s most update edition of his book (Hofstede et al., 2010), we have the first four index scores for 84 countries only, of which 76 countries have the fifth index scores. This limitation to our sample size may affect the accuracy of our analysis and the results as well.

Although, statistically, generation can be made about the correlation between national culture and e-government development as shown in this paper, there are quite a few cases which defy the correlation. For example, Republic of Korea, ranked number 1, and Bahrain ranked 13th in the e-government development in the United Nations (2010) E-government Survey. According to Hofstede’s culture index, Korea was higher in power distance (PDI = 60) and very low in individualism (IDV = 18). Likewise, Bahrain was very high in power distance (PDI = 80) and lower in individualism (IDV = 38). Therefore, caution should be taken when using culture (e.g. value, belief, religion) to explain the variation in e-government development between countries.

Korea embarked officially on its e-government infrastructure development in 1987. After 14 years’ efforts, Korea has achieved its vision of becoming the world best digital government (ranked 1st in both e-government development index and e-government participation index in the United Nations (2010) E-government Survey. The major success factors are the substantiate support from the President and the Government as well as Korea’s long-term strategic planning and management in e-government diffusion. Government’s spending on major e-government projects increased from $89 million in 2003 to $308 million in 2007. It is noted that a clearly articulated strategic plan for 20 years for e-government is in place which leads Korea e-government in the right direction (Korea’s e-government, 2011).

Bahrain, one of the Arab countries in the Middle East, is the only Arab country that gets into the top 15 countries in e-government development index rankings in the United Nations (2010) E-government Survey. The country started officially its e-Government Program in 2007 only. Within a short time frame, Bahrain has achieved the major goals of its e-Government Program in terms of the scale of e-government diffusion and the digital integration among government ministries and departments.
The success is seen largely due to “the wise leadership, the clear vision of the program and the well-structured plans with specific KPI, in addition to the valued input of human resources and cooperation between all” (eGovernment Authority, Kingdom of Bahrain, 2011).

The cases of Korea and Bahrain indicate that there are more contextual issues affecting e-government development than economic and cultural ones. Political, legal and social systems are certainly key factors contributing to e-government development. For example, some studies show that a democratic political system is in favor of e-government diffusion and is committed to providing efficient and transparent online services to its citizens and overcoming barriers to e-government development including digital divides. Kovačić (2005) found that more democratic countries are ranked higher in terms of e-government diffusion than the less democratic countries. He found by using Freedom House index that there was a significant positive correlation between e-government implementation and democracy. It is also found that trust, security, and transparency are the major issues for e-government adoption from the citizen perspective. Given the focus of this study and the limited space of this paper, we cannot delve into any deeper each of these issues here.

Given the limitations of this paper, we suggest that some further research be carried out:

- to validate the findings from our study against those from other studies that explore the correlations between national culture and e-government development using different culture frameworks such as Grid and Group Cultural Theory (Douglas, 1978);
- to investigate in an integrative and holistic way all the key factors that may contribute to the development of e-government from both a quantitative and a qualitative perspective, which may lead to a better understanding of relationships between culture and other factors;
- to identify leading practices of e-government in various countries with different cultural backgrounds, for example, Korea, an Eastern country (ranked number 1 in e-government development index), USA, a Western country (ranked 2nd) and Bahrain, an Arab country, (ranked 13th), which may help develop culture-bound e-government strategy for countries sharing similar cultural tradition; and
- to explore and explain in-depth how and why national culture influences e-government implementation on a supply side as well as e-government adoption on a demand side, which will help governments design more effective e-government strategy and respond to their citizens in a more proactive way. For example, a thorough understanding of a culture at the national and/or local level may help in designing effective strategy to promote and market e-government and its services in line with the country’s culture.

As shown in the literature review, e-government is becoming a powerful tool for human development and has “transformative power in revitalizing public administration, overhauling public management, fostering inclusive leadership and moving civil service towards higher efficiency, transparency and accountability”
Governments at all levels are facing two mutually reinforcing tasks in developing e-government:

1. the improvement in e-government systems themselves, including more widespread access, faster operating and transmission speeds, and the increasing capabilities; and

2. convincing the public to take up e-government services.

To accomplish the two tasks successfully, in particular, the second one, governments need to take a citizen-centric approach which requires a better understanding of their culture, namely, the norms and behavior of their citizens. As culture can affect the needs, values and expectations of people in embracing e-government, each country should design its e-government development strategy in line with its culture. This is the message that our paper is endeavoring to send to governments.

References


International Monetary Fund (IMF) (2009), World Economic Outlook Database, IMF, Washington, DC.


Appendix. Model summary and coefficients (SPSS outputs)

### Table AI. Model summary

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<tr>
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<th>( R^2 )</th>
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<th>( F ) change</th>
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<th>df2</th>
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Notes: a Predictors: (Constant), IDV; b Predictors: (Constant), IDV, LTO, MAS, UAI, PDI. Dependent Variable: E-government Development Index

### Table AII. Coefficients

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<th>Model</th>
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Note: Dependent Variable: E-government Development Index

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Fang Zhao can be contacted at: fzhao@aus.edu

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