The Relationship between E-Government and National Competitiveness: The Moderating Influence of Environmental Factors

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Abstract:

Using secondary data from 113 countries and the literature on Resource Based View [RBV] and Information Technology [IT] impact as the guiding theoretical lenses, we examine the relationships of e-government development and e-participation with national business competitiveness. E-government development represents the level of functional sophistication of e-government Web sites in a nation whereas e-participation is the level of country's willingness to engage citizens in e-government processes. In addition, we analyze the moderating role of country environment on the relationships between e-government development and business competitiveness and also between e-participation and business competitiveness.

Our results highlight strong association of e-government development as well as e-participation with national business competitiveness. Further, our results also show the moderating role of human capital, public institutions and macro-economic conditions on the relationship between e-government development and business competitiveness of a nation. Human capital and public institutions positively moderate this relationship whereas macro-economic environment marginally moderates the relationship in the negative direction. In contrast to this, the relationship between e-participation and business competitiveness is positively moderated only by national human capital. Further, we also analyze the combined relationship of e-government development and e-participation (e-government maturity) with national business competitiveness and observe that e-government maturity is also significantly related to national business competitiveness. Through this research, we make some important contributions that have implications for research and practice.

Keywords: e-government, resource-based view, national environment, e-participation, information technology, impact, business competitiveness, moderator

I. INTRODUCTION

E-government can be defined as the use of information and communication technologies [ICTs] and the Internet to enhance the access to and delivery of all facets of government services and operations for the benefit of citizens, businesses, employees and other stakeholders. Research on the impact of e-government has highlighted the multifarious benefits it offers for citizens, businesses and governments [Srivastava and Teo 2007a]. For example, e-government has not only helped in improving service delivery [Moynihan 2004; West 2004] and increasing democratization [West 2004; Von Haldenwang 2004], but has also helped in reducing corruption and increasing government transparency [Cho and Choi 2004; Srivastava et al. 2007; Wong and Welch 2004]. The increased service delivery and efficiency, due to adoption and usage of e-government, serves to make the microeconomic environment of the country conducive for business activity, thereby making the nation more competitive [Porter 2005]. Although there are perceptible linkages between e-government and national business competitiveness and the phenomenon is of interest to both governments and businesses, it is surprising that not many studies have analyzed the relationship in detail. This gap in literature is the prime motivation for our current research, which aims to investigate the relationships of e-government development[1] and e-participation[2] with the national business competitiveness.

Moreover, most research on e-government has addressed research questions which are micro in orientation i.e. they are concerned with "particular aspects" of e-government implementation in "specific regions or countries." Macro-level economic studies on e-government are few [Srivastava and Teo 2007b]. This fact is also reflected in the methodologies which have been used for conducting past e-government research. Most studies in the e-government literature are either conceptual [Layne and Lee 2001; Grölund and Horan 2004; Srivastava and Teo 2004; Warkentin et al. 2002], or case studies of e-government implementation within particular countries [Heeks 2002; McHenry and Borisov 2006a; Pan et al. 2004; Srivastava and Teo 2005] and across countries [Grant and Chau, 2005; Holliday 2002; Lee et al. 2005]. Both conceptual research and case-studies address important aspects of academic research. Conceptual studies lay the theoretical foundations for future empirical exploration whereas case-studies capture the richness of context in which the researched object is embedded, but they cannot possibly address the broad macro-level economic issues pertaining to e-government. Further, we see that quantitative empirical studies on e-government are relatively few and are mostly limited to analyzing a particular e-government implementation within a country [McHenry and Borisov 2006b; Ho 2002; Norris and Moon 2005; Teo et al. 2008; Tung and Rieck 2005]. These quantitative studies also do not address macro-level economic issues concerning e-government.

Cross-country quantitative empirical studies, which can be used to study such research questions, are few and those that exist have data from a limited number of countries, for example Wong and Welch [2004] has data from only 14 countries. In a similar vein, there is a paucity of research at national and cross-country levels even in the field of *IT impact* [Melville et al. 2004]. Thus, there is an imperative need to conduct large-scale quantitative empirical studies exploring the *impact of e-government*. Further, Grölund and Horan [2004] have exhorted the information systems [IS] researchers to focus their attention on the important issues concerning e-government. To our knowledge, there is no large-scale empirical study, involving more than a hundred countries, which aims to understand the impact of e-government on national competitiveness. Through this research, we wish to contribute to the e-government research in terms of diversity of research contexts and methodologies, thereby making the field richer. This is another motivation for our research.

In this study, we analyze the relationships of e-government with national business competitiveness so as to address two distinct but related research questions:

- Are e-government development and e-participation related to national business competitiveness?
- Does national environment moderate the relationships between e-government development and national business competitiveness, and between e-participation and national business competitiveness?

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[1] E-government development represents the level of functional sophistication of e-government Web sites in a nation and is measured by Web Measure Index from UN e-government readiness report [UN Report 2004].
[2] E-participation as defined by the United Nations is the "quality, usefulness and relevancy of the information and services and the willingness of countries to engage citizens in public policy making through the use of the e-government programs." [UN Report 2004: 18]

The research model for this study is shown in Figure 1. The rest of the paper is organized as follows. First, using *Resource Based View [RBV]* and *IT impact* as the guiding theoretical frameworks, we explicate the importance of having e-government development for increasing national business competitiveness. Next, following the argument that "actual usage" [Devaraj and Kohlib 2003] of e-government facilities is essential for deriving the intended benefits, we highlight the importance of e-participation for increasing national competitiveness. Then, using the *fit as moderation perspective* [Venkatraman 1989], we hypothesize the moderating role of the three national level complementary resources [environmental variables] namely, social environment [quality of human capital], institutional environment [quality of public institutions] and economic environment [macro-economic conditions] on the relationships between e-government development and business competitiveness and between e-participation and business competitiveness. The quality of human capital indicates how well educated are the citizens in a nation, the quality of public institutions signifies how well developed and corruption free are the judicial, legal, and enforcement systems in a nation, and the macro-economic conditions is a pointer to the economic conditions of the nation. Subsequently, using data from 113 countries [Appendix 1], we test the hypotheses so formulated and finally end the discussion with a set of implications for researchers and public administrators.
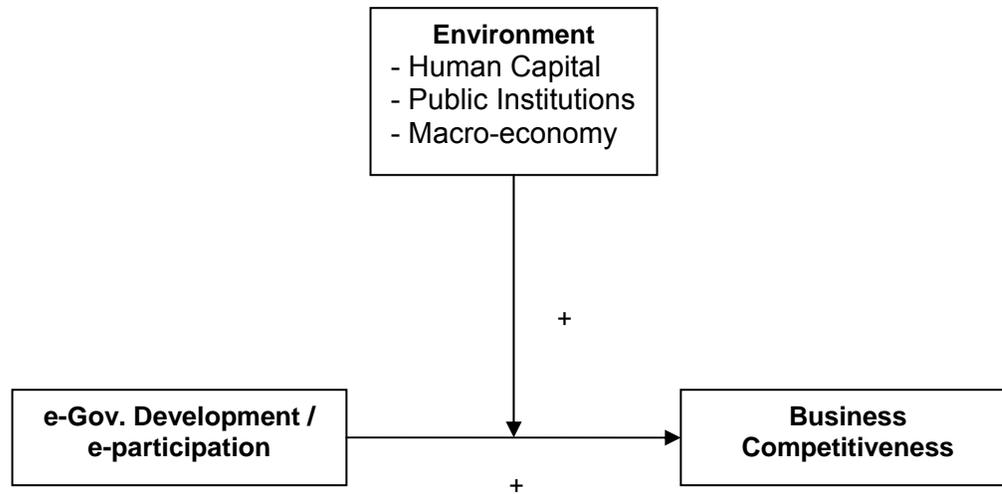

Figure 1. Research Model

Note on variables:

1. **"E-government" development represents the level of functional sophistication of e-government Web sites in a nation. [Source: UN Report 2004]**

2. **"E-participation" is the level of country's willingness to engage citizens in e-government processes. [Source: UN Report 2004]**

3. **"Human capital" represents the quality of education of citizens in the nation. [Source: UN Report, 2004]**

4. **"Public institutions" represents the quality of judicial, law and order and the level of transparency in the nation. [Source: WEF, 2005]**

5. **"Macro-economy" represents the state of economic conditions of the nation. [Source: WEF, 2005]**

6. **"Business competitiveness" represents the prosperity is a nation which is a measure of conducive business conditions in the nation. [Source: WEF, 2005]**

II. THEORY AND HYPOTHESES

Resource-Based View: E-Government as a National Resource

The resource-based view conceptualizes firms as collections of resources and capabilities. These unique *internal* resources, which are accumulated and learnt over time, are the source of their competitive advantage [Barney 1991; Mahoney and Pandian 1992; Wernerfelt 1984]. The heterogeneity and the causal ambiguity attached to these unique firm specific resources make them inimitable, leading to a sustained competitive advantage for the firm [Peteraf 1993]. Though RBV typically emphasizes the firm specific resources, it is well established that firms do not

operate in isolation from their environment [Wade and Hulland 2004]. Scholars have highlighted the need to synthesize the RBV of the firm with evolutionary economics and entrepreneurship studies to appreciate the extended implications of the RBV for the economy as a whole [Montgomery, 1995; Hitt and Ireland, 2000]

Integrating ideas from the resource-based view of the firm with evolutionary economics and entrepreneurship, Mathews [2002] developed the idea of a "resource economy" within which productive resources are produced and exchanged between firms. This idea is an extension of the conventional RBV of the firm, which views firms developing their resources internally, ignoring the wider aspects of resource exchange. Coombs and Metcalfe [1999] had earlier introduced the concept of "distributed capabilities" implicitly highlighting the importance of considering an extended resource-based perspective, where firms are able to draw on a wide array of external resources. Hence, resources can not only be built by firms *internally* but they can also be *traded,* and it is "the production and exchange of resources is what we describe as the *resource economy*" [Mathews 2002: 3]. In a resource economy, the objects of interest are not the resources existing within a particular firm, but the unique configuration of resources within the economy. The distinctive and heterogeneous resource configurations and the adaptive capacity of such an economy [nation] make it competitive.

Porter, in his seminal work on the competitive advantage of nations, has also highlighted the importance of resource configurations in terms of factor conditions, demand conditions, competitive environment and the presence of supporting industries, for making the economy competitive [Porter 1990]. While describing the factors of production in an economy, Porter [1990] highlights the importance of owning more of "advanced and specialized" factors rather than "basic and general" factors. Basic and general factors may not be rare and valuable and may be easily imitable and substitutable. For gaining a "competitive advantage," economies should move beyond the traditional factors of production [such as unskilled labor, land, foreign capital, etc.] which provide only a "comparative advantage" and focus on the advanced and specialized factors [such as digital communication networks, skilled engineers]. He also highlighted the important role of government in facilitating national competitive advantage. In line with the Porter's [1990] exposition of national competitive advantage, some nations like Singapore, which are devoid of basic and general resources [such as land, unskilled labor, etc.], have become very competitive in the present day world because of a proactive focus on advanced and specialized resources like skilled manpower, and ICT [Teo and Lim 2004]. Hence, at the macro level, countries derive competitive advantage by effectively managing their national resource configurations [Farhoomand et al. 2001; Porter 1990].

In the current era of knowledge economy, IT configurations within the economy are playing an important role in making the nations more competitive [Friedman 2005]. IT readiness and IT usage by different stakeholders in a nation are now considered important factors contributing to the nation's prosperity [Dutta and Jain 2005]. Closely associated is e-government, which is being increasingly regarded as an important national resource helping enhance the national competitiveness [Srivastava and Teo 2006; UN Report 2004]. Studies have shown that e-government development leads to many benefits for countries and their citizens [Accenture 2004; Moynihan 2004; West, 2004].

Complementary Resources: National Environment

Complementarity of resources represents an enhancement of the value of a resource in the presence of another complementary resource [Zhu 2004]. This implies that a resource produces greater returns if certain other resources are present than it would produce by itself. When resources have complementarities, their potential to create value is particularly enhanced [Milgrom et al. 1991]. Also due to the interaction effect between direct resources and complementary resources, it becomes far more difficult to duplicate the resource configurations and the related synergies among them [Collis and Montgomery 1995]. This helps in keeping the resource inimitable.

The presence of a well developed e-government in a nation may be one of the important factors related to business competitiveness, but it may have a greater impact in the presence of certain other enabling factors. In addition to having a well developed e-government, national business competitiveness may be contingent upon the presence of certain other *complementary* national resources. Past studies on e-government have identified many complementary resources which may help governments better leverage the positive impact of e-government. Some of these are citizens' knowledge, political will, economic development, legal and institutional arrangements, etc. [Koh et al. 2005; Srivastava and Teo 2004; Von Haldenwang 2004]. The three most important complementary resources which may influence the impact of e-government are the quality of human capital, quality of public institutions and macro-economic conditions [UN Report 2004].

A sound national human capital base has been identified as a major enabler for realizing the benefits of e-government [Srivastava and Teo 2004; Von Haldenwang 2004]. Bogaert et al. [1994] highlighted that in addition to physical resources, good quality human resource is essential for deriving greater benefits from employed resources.

Educated and IT-literate citizens are in a better position not only to use, but can also to be involved in the implementation of e-government projects by providing useful feedback and suggestions.

In addition to human capital, the importance of sound public institutions for effective e-government implementation cannot be overstated. Moon [2002] found that institutional factors contribute to the adoption of e-government among municipalities. Norris and Moon [2005] highlighted that e-government adoption and sophistication were correlated with certain institutional factors. In a similar vein, McNeal et al. [2003] concluded that legislative professionalism and professional networks were associated with extensive use of e-government leading to greater benefits. Von Haldenwang [2004] and West [2004] also stressed the importance of having a sound institutional base for effective e-government implementation.

Further, in his discussion on e-government, Von Haldenwang [2004] mentioned that advanced countries with better macro-economic indicators are more likely to implement e-government effectively. West [2004] also highlighted the importance of sound economic conditions for effective e-government implementation. Thus, the three complementary resources of human capital, public institutions and macroeconomic conditions, in conjunction with e-government development, may enhance the benefits derived from e-government.

Hence, it is particularly important to realize that *complementary resources* of human capital, public institutions and macro-economic conditions may moderate the impact of direct resource [e-government].

E-Government Impact

Previous research has shown that IT is an important firm level *resource* and may contribute to the enhancement of overall organizational performance [Brynjolfsson and Hitt 1996; Melville et al. 2004; Rivard et al. 2006]. The level of technological readiness of firms has also been shown to impact the business value of organizations [Zhu et al. 2004]. In addition to creating value at the business unit and process level, IT also impacts the performance at the country-level of analysis by improving the efficiency and effectiveness of the nation [Alpar and Kim 1990; Dewan and Kraemer 2000].

E-government development is the extent to which the interactive features of the World Wide Web are used to conduct the business of the government [Kunstelj and Vintar 2004; UN Report 2004; West 2004]. Past studies have shown that e-government impacts the efficiency of a nation in a number of ways, thereby improving the national performance [Moynihan 2004; Von Haldenwang 2004; West 2004]. Business competitiveness of a nation, which is indicated by its productivity and living standards, is dependent, inter alia, on the efficiency in the country [Porter 2005]. Following the IT impact imperative, various national systems can be made more efficient by extensive use of e-government. Thus, the business competitiveness of a nation should also be positively associated with the level of e-government development in that nation. This leads to the following hypothesis:

Hypothesis 1: The level of e-government development in a country is positively associated with the level of its business competitiveness.

Devaraj and Kohli [2003] pointed out that the existence of IT by itself does not impact performance. It is the actual *usage* of these technologies [resources] which leads to an impact on the organizational performance. Similarly, at the national level, countries derive competitive advantage by "effectively utilizing" their national resources [Farhoomand et al. 2001; Porter 1990]. The online services offered by the government must not only be usable but must also encourage citizens to participate in the e-government process [Beckerb 2005; Kaylor et al. 2001; UN Report 2004]. E-participation [as given in the UN Report 2004] captures the quality, usefulness and relevancy of the information and services provided, and the willingness of countries to engage citizens in public policy making through the use of e-government programs. Hence, from the perspective of usage of e-government facilities for creating an impact, we hypothesize:

Hypothesis 2: The level of e-participation in a country is positively associated with the level of its business competitiveness.

Complementary Resources as Moderators

E-government in isolation may not bring about the intended transformation; rather it is its interaction with a host of complementary factors like the quality of human capital, quality of public institutions and macro-economic conditions which may influence the relationship of e-government with national business competitiveness.

The concept of fit has served as an important theoretical underpinning for theory construction in different fields of research [Fry and Smith 1987; Van de Ven and Drazin 1985; Venkatraman and Camillus 1984]. Venkatraman [1989]

gave six perspectives of *fit*: fit as moderation, fit as mediation, fit as matching, fit as gestalts, fit as profile deviation, and fit as covariation. Complementary resources in the form of different environmental variables have been used as moderators in many of the previous studies in different fields [Day and Wensley 1988; Delios and Beamish 2001; Gong 2003; Kohli and Jarowski, 1990; Slater and Narver 1994]. Hence, for our analysis, we use *fit as moderation* as the guiding perspective.

We analyze the moderating role of three types of complementary resources on the relationship of e-government with business competitiveness. As already highlighted, the three complementary resources can also be equated to the three types of national environments: social environment [human capital], institutional environment [public institutions], and economic environment [macro-economic conditions]. We posit that technology in isolation may not bring about the intended e-government transformation. Rather, it is its interaction with a host of complementary resources like human capital, public institutions and macroeconomic conditions, which may be related to the business competitiveness of a country. This leads to the next set of hypotheses for e-government development:

Hypothesis 3a: Human capital moderates the relationship between e-government development and business competitiveness. The relationship becomes stronger when the quality of human capital is better.

Hypothesis 3b: Public institutions moderate the relationship between e-government development and business competitiveness. The relationship becomes stronger when the quality of public institutions is better.

Hypothesis 3c: Macro-economic conditions moderate the relationship between e-government development and business competitiveness. The relationship becomes stronger when the macro-economic conditions are better.

In the previous section, we have seen that in addition to the level of e-government development, policies encouraging the usage of developed e-government systems [e-participation] will also be positively related to national business competitiveness. Following a similar line of argument as for the e-government development, we posit that in the presence of enabling complementary resources, the relationship of e-participation with business competitiveness will be stronger. Thus, the relationship of e-participation with national business competitiveness will be stronger if the citizens are better educated [quality of human capital], the country has a well developed judicial system, has enacted cyber laws, has less corruption [quality of public institutions], and has a sound macro-economic conditions [state of macro-economy]. Hence for e-participation, we have the following set of hypotheses:

Hypothesis 4a: Human capital moderates the relationship between e-participation and business competitiveness. The relationship becomes stronger when the quality of human capital is better.

Hypothesis 4b: Public institutions moderate the relationship between e-participation and business competitiveness. The relationship becomes stronger when the quality of public institutions is better.

Hypothesis 4c: Macro-economic conditions moderate the relationship between e-participation and business competitiveness. The relationship becomes stronger when the macro-economic conditions are better.

III. METHOD

Data

In this research, we used secondary sources of country level data for testing the formulated hypotheses. Since for the purpose of our research it was virtually impossible to collect large scale cross-country primary data, we explored numerous reliable secondary data sources which have been used in past academic research. Finally, for the purpose of our research, we used two major data sources: the United Nations Global E-Government Readiness Report [UN Report, 2004] and the World Economic Forum Global Competitiveness Report [WEF, 2005]. These were the two most recent reports available at the time of study. Though WEF has been publishing global competitiveness report for a number of years now, UN started publishing the United Nations Global E-Government Readiness Report only recently in 2003. Hence we used cross-sectional data from the two reports: the UN report [released late 2004] and from WEF Global Competitiveness Report [released early 2005] for our analyses. Both the data reports used in this study were released by the agencies within a period of few months, hence are contemporary and are temporally comparable [although the years are different]. Both, United Nations Global E-Government Readiness Reports and the World Economic Forum Global Competitiveness Reports are considered to be reliable reports and have been extensively used in past academic research. Data from United Nations Global E-Government Readiness Reports has been used by studies such as Siau and Long [2004, 2006], Srivastava and Teo [2006] and data from World Economic Forum Global Competitiveness Report has been used in studies such as Delios and Beamish [1999], Gaur and Lu [2007].

The data from the UN E-Government Readiness Report Cover 191 countries and data from the Global Competitiveness Report cover 117 countries. As the variables used in this study were taken from both these reports, it was essential to consider data only for those countries which were available in both reports. After analyzing for the common data points [countries] across the two reports, we had data from 113 countries for analysis [Appendix 1].

Variables and Measures

From the research model in Figure 1 we see that there are six variables, namely e-government development, e-participation, quality of human capital, quality of public institutions, macro-economic conditions and business competitiveness. All these variables are in the form of indexes reported by the reporting agencies. E-government development, e-participation and quality of human capital were taken from the UN E-Government Readiness Report 2004, whereas the variables of quality of public institutions, macroeconomic conditions and business competitiveness were taken from the Global Competitiveness Report 2005. The indexes were based on a mix of hard objective data as well as survey data. The reporting agencies are reputable agencies and had carried out suitable measures to ensure reliability and validity of the various indexes. Hence, we use these indexes directly for our analyses. The details of variables and a brief note on the measures taken by reporting agencies to ensure their reliability and validity are given in Appendix 2.

IV. RESULTS AND DISCUSSION

Table 1 presents descriptive statistics and correlations for all variables in the model.

Table 1. Descriptive Statistics and Correlations

	Variable	Mean	S.D.	1	2	3	4	5
1	Business Comp.	0.28	0.27					
2	e-Gov. Dev.	0.41	0.25	0.71**				
3	e-participation	0.22	0.24	0.64**	0.86**			
4	Human Capital	0.81	0.16	0.62**	0.61**	0.51**		
5	Public Institutions	4.43	1.00	0.85**	0.65**	0.56**	0.54**	
6	Macro-economy	4.02	0.84	0.82**	0.66**	0.56**	0.51**	0.85**

** $p < .01$ [one-tailed test]

From Table 1, we see that some of the correlations are high [>0.8]. Out of the correlations which are high, two are between moderating variables and a dependent variable, and the other high figure of correlation describes the relationship between the dependent variables in two separate models. Hence these high correlations may not violate the collinearity assumptions of the research models. There is only one correlation between the two independent [moderating] variables of public institutions and macro-economy which is high [>0.8] and may be a cause of concern. But considering the fact that these two variables measure distinct parameters, this high correlation may not seriously affect the results. Despite this fact, we thought it prudent to examine whether the problem of multicollinearity is serious among the independent/moderator variables. We tested for multicollinearity among the independent variables by examining the Variance Inflation Factor [VIF]; the results for which are given in Table 2.

VIF measures the impact of collinearity among the predictors in a regression model on the precision of estimation. In other words, it expresses the degree to which collinearity among the predictors degrades the precision of an estimate. Though there is no universally agreed cut off point for values of VIF, most researchers are of the view that if VIF is below 5 then the problem of multicollinearity does not exist [Pedhazur 1997]. Some researchers suggest that multicollinearity is not a significant problem if the value of VIF is below 10 [Allison 1999; Belsley et al. 1980]. In our case, all the independent and moderator variables in the two research models have a VIF below the conservative value of 5 [Table 2], thereby indicating that there is no significant problem of multicollinearity. However, as a precaution against multicollinearity and to examine the effects of e-government development and e-participation independently, we decided to run separate regression analysis for the two independent variables.

We used "hierarchical regression analysis" for testing the research hypotheses as it is an established method for testing the moderating effects and has been used in many similar studies in the fields of organization studies, international business, and macro-economics. Tables 3 and 4 present the results of hierarchical regression analysis. For Table 3, the independent variable is e-government development and for Table 4, the independent variable is e-participation. We used the centering procedure suggested by Aiken and West [1991] for regression analysis using interaction terms.

Table 2. VIF for Independent Variables	
Independent Variable: E-Government Development	
Independent / Moderating Variables	**VIF**
E-Government Development	2.22
Human Capital	1.70
Public Institutions	3.97
Macro-economic conditions	3.94
Independent Variable: E-Participation	
Independent / Moderating Variables	**VIF**
E-Participation	1.65
Human Capital	1.55
Public Institutions	3.95
Macro-economic conditions	3.83

Table 3. Results of Hierarchical Regression Analyses for Business Competitiveness: Independent Variable - E-Government Development

| Variables	Model 1	Model 2	Model 3
Step 1: Independent Variable			
E-Government Development	0.71***	0.15*	0.72†
Step 2: Environment			
Human Capital		0.14**	0.32***
Public Institutions		0.44***	0.38***
Macro-economy		0.27**	0.26**
Step 3: Interaction Terms			
Human Capital x e-Gov. Dev.			0.20**
Public Institutions x e-Gov. Dev			0.19*
Macro-economy x e-Gov. Dev			-0.72†
R^2	0.50	0.80	0.84
Adjusted R^2	0.50	0.79	0.83
F	114.38***	110.46***	81.28***
ΔR^2		0.29***	0.04***

†$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$ [one-tailed test]

First, we analyze the results for **e-government development** as the independent variable [Figure 1]. The results in Table 3 show that the greater the level of e-government development in a country, the higher the level of its business competitiveness [β=0.71, p<.001]. Hence, Hypothesis 1 received strong support [model 1]. The level of e-government development explains a significant amount of variance [50.7%] in business competitiveness of nations.

In the next step [Table 3, model 2], we added the environmental variables of human capital, public institutions and macro-economic conditions. E-government development remained significant [β=0.15, p<.05]. The moderating

variables of human capital [β=0.14, p<.01], public institutions [β=0.44, p<.001], and macro-economy [β=0.27, p<.01] were significant in model 2.   Further we observe that the overall change in variance in model 2 [Table 3] [$\Delta R^2 = .29$] is significant at p<.001.

In the next step [Table 3, model 3], we added the interaction terms obtained by multiplying the moderator variables with the independent variable. The results show that the interaction terms of human capital with e-government [β=0.20, p <.01] and public institutions with e-government [β=0.19, p <.05] are significantly related to business competitiveness. Hence, hypotheses 3a and 3b are supported. We further observe that hypothesis 3c which states that macro-economic conditions positively moderate the relationship between e-government development and business competitiveness is not supported. In fact, this interaction effect is marginally significant in the negative direction [β= -0.72, p <.10]. Further, we plotted the interaction for high and low levels of human capital [Figure 2], public institutions [Figure 3] and macro-economy [Figure 4]. The high and low distinction was defined as scores on each of the environmental variables of human capital, public institutions and macro-economy, which fell one standard deviation above and below their respective mean scores [Cohen and Cohen 1983].
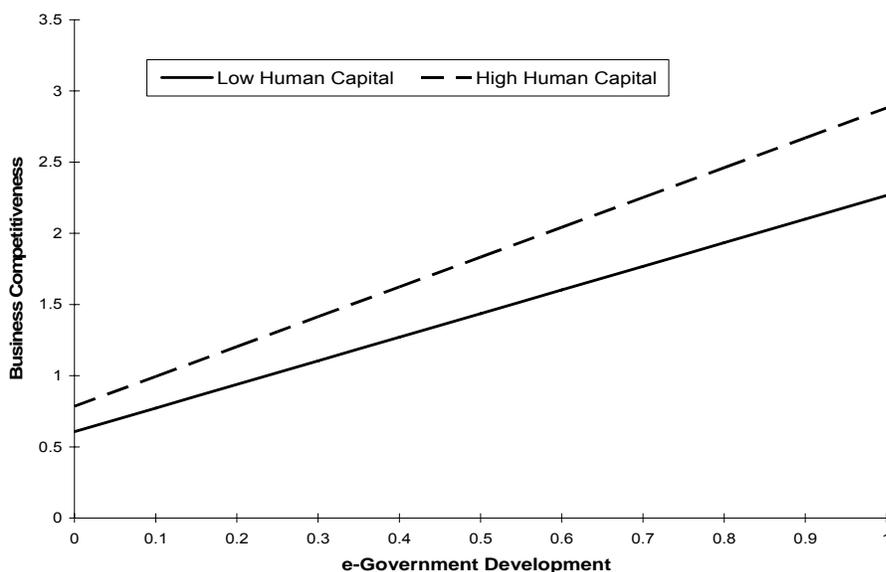
High Human Capital: Business Competitiveness =   0.78 + 2.09 [e-Gov. Dev.]
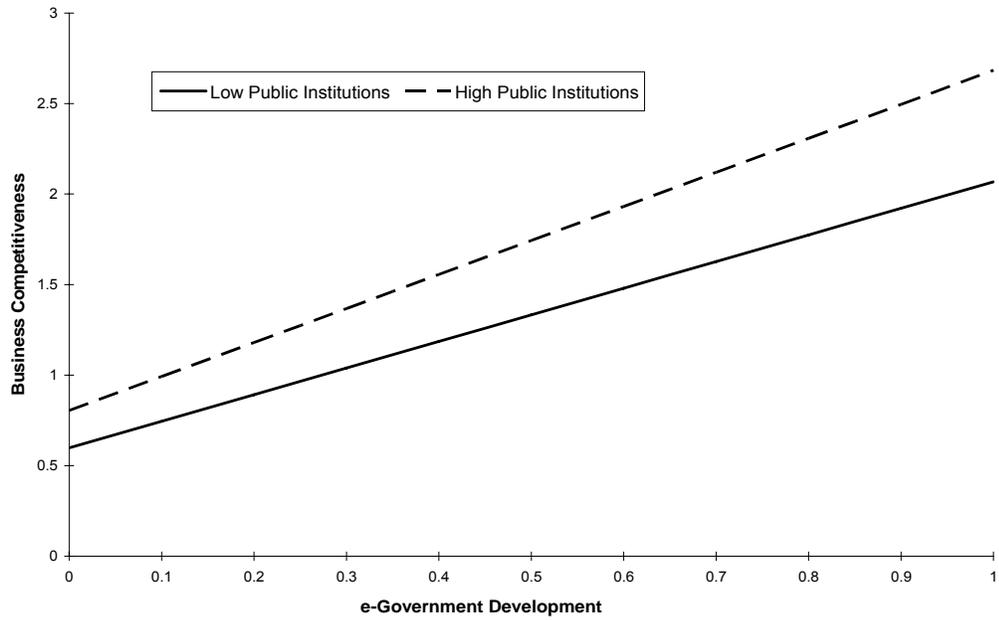Low Human Capital: Business Competitiveness =   0.60 + 1.65 [e-Gov. Dev.]

Figure 2. Effects of Interaction of E-Government Development and Human Capital on Business Competitiveness

As seen in Figure 2, we find that the slope of the regression line of business competitiveness on e-government development for high level of human capital is steeper than for low level of human capital. From this, we conclude that the relationship between e-government development and business competitiveness becomes stronger in the presence of a higher level of human capital. Thus, human capital is a significant moderator for this relationship. This result reiterates the important role which the level of human capital [namely, literacy] in a country plays for increasing the business competitiveness in the presence of e-government facilities.

From the interaction plot in Figure 3, we observe that the slope of the regression line of business competitiveness on e-government development is greater at higher levels of public institutions. The result implies that in countries having better public institutions like a sound legal system, less corruption etc., the relationship of e-government development with business competitiveness is stronger. Thus, public institutions are a significant moderator for this relationship.
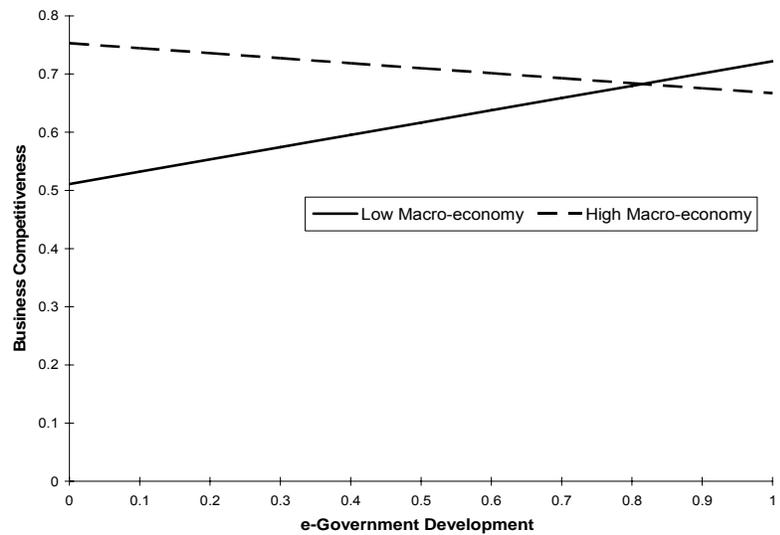
From the results in Table 3, we observe that the relationship of the interaction of e-government development and macro-economy, with business competitiveness is only marginally significant and that too in the negative direction. Interaction plots of business competitiveness and e-government development for high and low levels of macro-economy are shown in Figure 4. This interaction plot is interesting because it exhibits different results for different levels of macro-economy. The plots indicate that at higher levels of macro-economy, e-government development

may not affect business competitiveness [it might affect in negative direction]. The positive relationship of the interaction of e-government development and macro-economy on business competitiveness is exhibited only at lower levels of macro-economy. The result implies that e-government development is more strongly related to the business competitiveness of nations with lower levels of macro-economy. Thus, it becomes imperative for the governments of developing countries [with lower levels of macro-economy] to seriously consider implementing e-government systems. For nations with high levels of macro-economy the interaction effect does not come into picture. It also implies that after achieving a certain level of macro-economy, the role of the interaction of macro-economy with e-government development for describing business competitiveness becomes less.

High Public Institutions: Business Competitiveness =   0.80 + 1.87 [e-Gov. Dev.]
Low Public Institutions: Business Competitiveness =   0.59 + 1.47 [e-Gov. Dev.]

Figure 3. Effects of Interaction of E-Government Development and Public Institutions on Business Competitiveness

High Macro-economy: Business Competitiveness =   0.59 – 0.08 [e-Gov. Dev.]
Low Macro-economy: Business Competitiveness =   0.51 + 0.21 [e-Gov. Dev.]

Figure 4. Effects of Interaction of E-Government Development and Macro-Economy on Business Competitiveness

To sum it up, in our analysis we find that e-government development has a significant direct relationship with national business competitiveness. In addition to this, environmental variables like human capital and public institutions positively moderate the relationship between e-government development and business competitiveness. The marginally significant moderating role of macro-economy is different at different levels of macro-economy. From the interaction plots in Figure 4, we observe that the effect of moderation is positive at lower levels of macro-economy and negative at higher levels of macro-economy.

Table 4. Results of Hierarchical Regression Analyses for Business Competitiveness: Independent Variable - E-Participation

Variables	Model 1	Model 2	Model 3
Step 1: Independent Variable			
E-Participation	0.64***	0.14**	-0.05
Step 2: Environment			
Human Capital		0.16**	0.37***
Public Institutions		0.44***	0.40***
Macro-economy		0.28**	0.26**
Step 3: Interaction Terms			
Human Capital x E-Participation			0.27**
Public Institutions x E-Participation			0.08
Macro-economy x E-Participation			-0.10
R^2	0.41	0.80	0.82
Adjusted R^2	0.40	0.79	0.81
F	77.34***	112.40***	72.04***
ΔR^2		0.39***	0.02**

†$p < .10$, *$p < .05$, **$p < .01$,***$p < .001$ [one-tailed test]

Next, we analyze the results for **e-participation** as the independent variable [Table 4]. Hypothesis 2 received strong support [β=0.64, p<.001] [Table 4, model 1]. Further, we find that the level of e-participation explains a significant amount of variance [41.1 percent] in business competitiveness.

In the next step [Table 4, model 2], we added the environmental variables of human capital, public institutions, and macroeconomic conditions. We find that the overall change [ΔR^2 = .39] in variance for model 2 [Table 4] after adding all the three variables is significant. E-participation remained significant [β=0.14, p<.01]. The environmental variables of human capital [β=0.16, p<.01], public institutions [β=0.44, p<.001], and macro-economy [β=0.28, p<.01] were significant in model 2.

In the next step [Table 4, model 3], among the interaction terms, we observe that the overall change in variance [ΔR^2 = .021] for model 3 [Table 4] is significant at p<.01. This significant change in variance is because of a significant relationship of the interaction term of human capital and e-participation, with business competitiveness [β=0.27, p<.01]. Thus we find support for hypothesis 4a. This significant relationship establishes the moderating effect of human capital. We further observe that hypothesis 4b and hypothesis 4c were not supported. Thus, public institutions and macro-economic environment do not moderate the relationship between e-participation and business competitiveness.

Further, we made interaction plots of e-participation with low and high levels of human capital, to see its impact on the relationship with business competitiveness. As seen from Figure 5, at high level of human capital, the slope of the regression line is higher than that for low level of human capital. From this, we conclude that the relationship between e-participation and business competitiveness becomes stronger in the presence of a higher level of human

capital. Thus, human capital is a significant moderator for this relationship. This result has important implications as it indicates that the relationship between e-participation and human capital becomes significantly stronger at higher levels of human capital. Hence policy makers should take into consideration the important role played by human capital. A mere improvement in e-participation will not yield as much benefit as an improvement in e-participation coupled with a literate population. Thus, the quality of human capital emerges as one of the vital antecedents for business competitiveness.
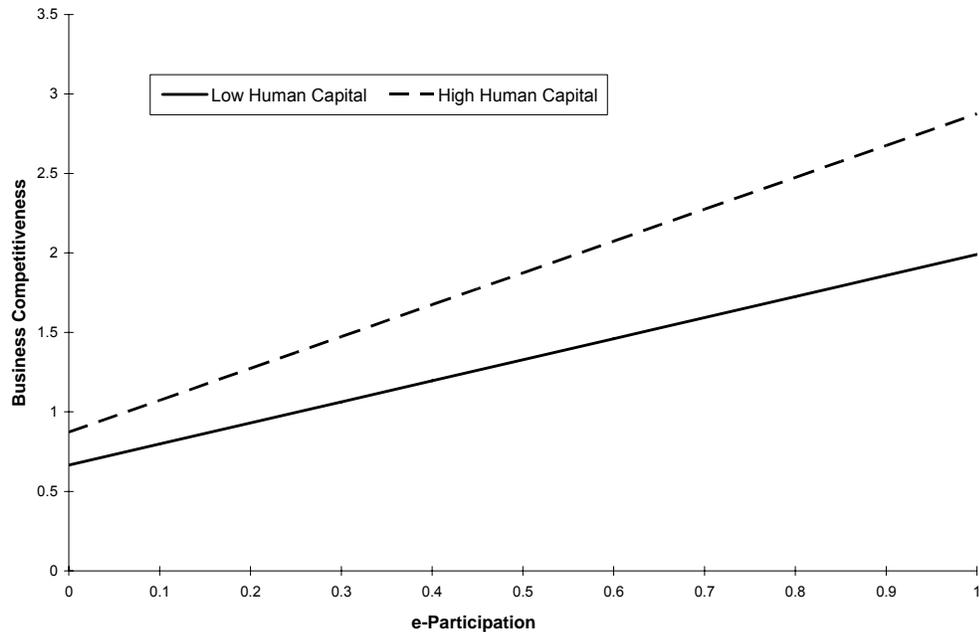
High Human Capital: Business Competitiveness =   0.87 + 2.00 [e-participation]
Low Human Capital: Business Competitiveness =   0.66 + 1.32 [e-participation]

Figure 5. Effects of Interaction of E-Participation and Human Capital on Business Competitiveness

To sum it up, in our analysis, we find that e-participation has a significantly strong direct positive relationship with business competitiveness [p<.001]. In addition to this, human capital moderates the relationship between e-participation and business competitiveness [p<.01].

A comparison of results in Tables 3 and 4 provides some interesting insights into the similarities and differences in the nature of the two independent variables: e-government development and e-participation. First, both e-government development and e-participation have a strong significant relationship with business competitiveness. Second, we observe a moderating role of all the three environmental variables [human capital, public institutions and macro-economic conditions] in the relationship between e-government development and business competitiveness. In contrast to this, for the relationship between e-participation and business competitiveness, we observe the moderating role of only human capital. Human capital is a significant moderator for both the hypothesized research models; hence it requires special attention by the practitioners and policy makers for having a greater impact of e-government implementation.

A summary of results is given in Table 5.

Another concern that needs to be tested is that of possible reverse causality and endogeneity[3]. Although all the hypotheses are formulated so as to signify a "relationship" rather than a "causation" between the e-government variables and national business competitiveness, there is an implicit implied causality. Hence we tested for possible endogeneity. For doing this we conducted two-stage least squares (2SLS) regression with two additional instrumental variables of "quality of ICT infrastructure" and the "level of technology development in the nation." The hypothesized relationships for both e-government development [β=0.69, p<.001] as well as for e-participation

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[3] We thank the associate editor for suggesting us to do this analysis, which has now helped us in making the results robust.

[β=0.88, p<.001] still remained significant, thus providing evidence for robust results. The test also eliminated the possible concern of endogeneity in the results [Srivastava et al. 2007].

Table 5. Summary of Results

Hypothesis	Result
E-Government Development	
Hypothesis 1: The level of e-government development in a country is associated with the level of its business competitiveness.	**Strongly supported**
Hypothesis 3a: Human capital moderates the relationship between e-government development and business competitiveness. The relationship becomes stronger when the quality of human capital is better.	**Supported**
Hypothesis 3b: Public institutions moderate the relationship between e-government development and business competitiveness. The relationship becomes stronger when the quality of public institutions is better.	**Supported**
Hypothesis 3c: Macro-economic conditions moderate the relationship between e-government development and business competitiveness. The relationship becomes stronger when the macro-economic conditions are better.	**Not supported** **[marginally supported in the negative direction]**
E-Participation	
Hypothesis 2: The level of e-participation in a country is associated with the level of its business competitiveness.	**Strongly supported**
Hypothesis 4a: Human capital moderates the relationship between e-participation and business competitiveness. The relationship becomes stronger when the quality of human capital is better.	**Supported**
Hypothesis 4b: Public institutions moderate the relationship between e-participation and business competitiveness. The relationship becomes stronger when the quality of public institutions is better.	**Not supported**
Hypothesis 4c: Macro-economic conditions moderate the relationship between e-participation and business competitiveness. The relationship becomes stronger when the macro-economic conditions are better.	**Not Supported**

Although the two e-government variables (e-government development and e-participation) used in this study are very closely intertwined, they are conceptually different. One signifies the extent of development of e-government Web sites in a nation whereas the other signifies the extent of government encouragement through the e-government Web sites for citizens to use them. We also observe from Table 2 that there is a high correlation between e-government development and e-participation. Although in this paper we have conceived e-government development and e-participation as two separate variables so that we have greater granularity in the results (especially for the interaction effects), it will be interesting to analyze the combined effect of the two e-government variables on national business competitiveness. For doing this we tested the models again using hierarchical regression with a single index called e-government maturity[4] (formed by combining e-government development and e-participation). The relationship between 'e-government maturity' and 'national business competitiveness' was significant in the first step [β=0.70, p<.001] as well as in the second step of hierarchical regression [β=0.16, p<.01] after adding the environmental variables of human capital, public institutions, and macro-economic condition. Thus, e-government maturity which in this paper we have conceptualized as a combination of e-government development and also e-participation is significantly related to the national business competitiveness. Future research can further enhance and develop the concept of e-government maturity by combining other relevant e-government variables.

Limitations

There are two key limitations of this study linked to the use of secondary data for analyses. First, we have to depend on the indexes as formulated by the reporting agencies. Primary survey data might have given us a better control

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[4] We thank the associate editor for making this suggestion.

over the definition of variables. But considering the fact that these indexes have been formulated by reputable agencies, taking into consideration all checks for ensuring reliability and validity, and also that it is almost impossible for a small group of researchers to undertake a large scale cross-country data collection, dependence on these secondary sources provides a good way for conducting our study. Second, we analyze data only from those countries which were present in our secondary data source, for example, we could not include countries like Hong Kong and Taiwan in our analysis as data for these countries were not available in the UN report. However, taking into consideration the fact that we have large scale data from 113 countries, omitting some of the countries may not make a substantial difference in the results. Despite these potential limitations, our study is one of the first to understand the relationship of e-government development and e-participation with business competitiveness from a cross-country perspective.

VI. IMPLICATIONS

Through this research, we make some important contributions which have implications for research and practice.

Implications for research

First, most studies on the impact of IT are limited to organizational or individual level of analysis. There is a need for understanding the impact of IT at the national as well as global level [Melville et al. 2004]. By studying the relationship of e-government development and e-participation with national business competitiveness, our study contributes to the sparse literature on the impact of IT at the national level from a global perspective. Future researchers can analyze other aspects of the macro-level impacts of IT.

Second, resource-based view, as a theoretical lens has mostly been used for analyzing competitive advantage of firms. Drawing from the literature on "resource economy" [Mathews 2002] and "competitive advantage of nations" [Porter 1990] we use the RBV for understanding the relationship of e-government with national business competitiveness. We also show the importance of considering the moderating influence of various national level complementary resources [environmental variables] for analyzing the impact of e-government development and e-participation on national business competitiveness. An analysis without the moderators will only tell an incomplete story.

Third, most studies on e-government are either conceptual or case studies. Though conceptual research and case studies serve a very important purpose in academic research, they may not be a suitable for analyzing the macro national level impacts of e-government. Norris and Moon [2005] also highlighted a dearth of quantitative empirical studies on e-government. Through our empirical study, which uses secondary data to analyze e-government from a cross-country perspective, we study relatively unexplored macro-level contexts. Further, we make an innovative use of publicly available databases to enhance our understanding about the impact of e-government. Currently, there are very few studies on e-government which use rich sources of secondary data for cross-country studies. Our study is a case in point and exhorts future researchers to make use of other cross-country secondary data sources to make inferences about e-government from a global perspective. Future research can also analyze the effect of other environmental variables on the relationship between e-government development and e-participation with business competitiveness, for example, cultural dimensions of power distance, uncertainty avoidance, level of integration, etc. [HofstedeB 1991, 1994; Shane 1994].

Fourth, in this research we also tested for the combined effect of e-government development and e-participation by combining them in a single index called e-government maturity. Results indicate that e-government maturity is significantly related to national business competitiveness. Although in this research we were more interested in the granular interaction effects of the e-government variables with the various country level environmental variables, future research can further develop and refine the e-government maturity variable. Future research can also test some of the possible relationships indicated in this research that might have significance for e-government research e.g. between public institutions and macro-economic conditions, macro-economic condition and e-government development and also between e-government development and e-participation.

Implications for Practice

Our research offers several implications for practitioners, policy makers, and public administrators. *First,* it is important for firms [especially multinational firms] to understand the antecedents of national business competitiveness not only to help them make their entry decisions [whether to do business in a particular nation or not] but also for the conduct of their routine business. Past research has identified a host of factors affecting national business competitiveness, for example, demand conditions, political economy, country risk, infrastructure, etc. To our knowledge the relationship of e-government with national business competitiveness has not been analyzed in any of the past studies. Through this research we highlight the important role of e-government, which multinational companies must seriously consider. Senior management of multinational companies [MNCs] involved with the

decisions for firms to enter a particular nation should explore the possibilities offered by e-government systems in that nation. In addition to other factors considered in the past, MNCs should take into account the level of e-government development and e-participation in a nation, as it is related to business competitiveness.

Second, our study suggests that both e-government development and e-participation have positive relationships with national business competitiveness. This finding has implications for governments and policy makers across the world. They should make concerted efforts for not only developing the e-government facilities in the nation but also focus on encouraging citizens and businesses to use these developed systems as the use of e-government systems is associated with the business competitiveness of nations. This finding also validates the past findings at the organizational and individual levels which indicate that "actual usage" of the developed IT systems is important for creating an impact on performance [Devaraj and Kohli 2003].

Third, this research examines various interaction effects given less attention in previous e-government studies and brings forth the importance of national human capital for business competitiveness. Our research provides empirical evidence for the moderating role of human capital on the relationships between e-government development and business competitiveness and also between e-participation and business competitiveness. This implies that the presence of a literate human capital makes the relationships between e-government development and business competitiveness and between e-participation and business competitiveness stronger. The development of human capital [along with e-government development and e-participation] should be paid increased attention as it has a significant positive association with business competitiveness.

Fourth, our research also shows that public institutions and macro-economy moderate the relationship between e-government development and business competitiveness but not between e-participation and business competitiveness. But the nature of the two moderators is very different. From the interaction plots we see public institutions positively moderate the relationship between e-government development and business competitiveness whereas macro-economy is a slightly significant moderator of this relationship but in the negative direction. This interesting result is reflected clearly in the interaction plots [Figures 3 and 4]. Policymakers and public administrators should realize the positive role of public institutions interacting with e-government development on business competitiveness. But for the case of macro-economy, the implication from the plots is that interaction of macro-economy with e-government development is beneficial for nations with lower levels of macro-economy. Hence developing countries with lower levels of macro-economy will benefit more from e-government development than the developed nations with high levels of macro-economy.

Lastly, the positive relationship of e-government with business competitiveness of a nation provides empirical evidence to public administrators and policy makers to justify investments in potential e-government investments in their nations. Measuring the impact and justifying IT investments have been a perpetual challenge for CIOs and public administrators [Brynjolfsson and Hitt 1996; Mukhopadhyay et al. 1995]. Our study provides a basis to IT policy makers [especially in the government] to garner support for investments in new e-government initiatives.

VII. CONCLUSIONS

The nature and impact of e-government development and e-participation is vital for the effective implementation and administration of e-government plans [UN Report 2004; Von Haldenwang 2004]. E-government development and e-participation represent the two vital aspects required by countries for successful e-government implementation, namely their *ability* and *willingness*. E-government development represents the *ability* of the countries' e-government Web sites in terms of their functionality with reference to the five stages of e-government evolution: emerging presence, enhanced presence, interactive presence, transactional presence, and networked presence. E-participation, on the other hand is an indicator of the qualitative aspect of the e-government Web sites, as to how far the countries are *willing* to encourage their citizens' participation in the government processes online. It measures, if the e-government Web sites are encouraging citizens just to get information online, or they are involving citizens more deeply through e-consultation and e-decision making. The impact of these two important aspects of e-government has not been studied in the past literature. In this study, we analyze the relationships of e-government development and e-participation with national business competitiveness. Apart from the direct relationships, we also analyze the *moderating* role of the three national level environmental variables of human capital, public institutions and macro-economic conditions on these relationships. Our results indicate a positive association of e-government with national business competitiveness and also highlight the importance of considering various moderating environmental variables, especially quality of human capital.

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APPENDIX 1: LIST OF COUNTRIES ANALYZED

Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cambodia, Cameroon, Canada, Chad, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guyana, Honduras, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea Republic, Kuwait, Kyrgyzstan, Latvia, Lithuania, Macedonia FYR, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritius, Mexico, Republic of Moldova, Mongolia, Morocco, Mozambique, Namibia, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Serbia and Montenegro, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uruguay, Venezuela, Vietnam, Zimbabwe

Total Number of Countries Analyzed = 113

APPENDIX 2: DESCRIPTION OF MEASURES EMPLOYED

E-Government Development

The variable of e-government development is indicated by the Web Measure Index from the UN E-Government Readiness Report 2004. The Web Measure Index is based upon a five-stage model, ascending in nature, and building upon the previous level of sophistication, of a country's online presence. For countries which have established an online presence, the model defines stages of e-readiness according to a scale of progressively sophisticated citizen services [UN Report 2004]. Countries are coded in consonance with what they provide online and the stage of e-government evolution they are presently in. The five stages of e-government on which the country Web sites were coded were based on the UN's five stage e-government evolution model[5] in which the stages are: emerging presence, enhanced presence, interactive presence, transactional presence and networked presence. The Web Measure Index is an indicator of the sophistication and development of the e-government Web sites of that particular country and has been used in past studies as a measure of e-government development [Siau and Long 2004, 2006; Srivastava and Teo 2006, 2007b].

E-Participation

E-participation is measured by the e-participation index[6] and this is also from the UN E-Government Readiness Report 2004. The e-participation index assesses the quality, usefulness and relevancy of the information and services, and the willingness of countries to engage citizens in public policy making through the use of e-government programs. The goal of e-participation initiatives is to improve the citizen's access to information and public services; and participation in public decision-making [UN Report 2004].

Human Capital

The variable of human capital is taken from the UN E-Government Readiness Report 2004 as the Human Capital Index. The data for the Human Capital Index relies on the UNDP "education index" which is a composite of the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratio with two-third weight given to adult literacy and one-third to gross enrolment ratio [UN Report 2004].

UN Report defines adult literacy, "as the percentage of people aged 15 years and above who can, with understanding, both read and write a short simple statement on their everyday life". As per the UN, combined primary, secondary and tertiary gross enrolment ratio is indicated by the total number of students enrolled at the primary, secondary and tertiary level, irrespective of age, as a percentage of the population of school age for that level [UN Report 2004]. This index has been used in past academic studies like Siau and Long [2004], Srivastava and Teo [2006, 2007b].

Public Institutions

The variable of public institutions has been taken from the Global Competitiveness Report 2005. Institutional environment is indicated by the Public Institutions Index.[7] The index is formulated on the two dimensions of public institutions: the execution of contracts and law and the state of corruption in the country. The index is based on a World Economic Forum's Executive Opinion Survey [WEF 2005]. This index has been used in past academic studies like Srivastava and Teo [2006, 2007b].

Macro-Economic Conditions

The measure for macro-economic conditions is also taken from the Global Competitiveness Report 2005 and is indicated by the Macro-Economic Environment Index,[8] which uses a mix of hard data as well as survey of executives and indicates the state of macro-economic conditions of the country. It consists of three major components: macro-economic stability, institutional investor country credit rating and government waste variable [WEF 2005]. These indexes have been used in past academic studies like Srivastava and Teo [2006, 2007b].

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[5] The full description of the model is available at http://www.unpan.org/egovernment3.asp.

6 In total, 21 citizen informative and participatory services and facilities were assessed across various countries in e-information, e-consultation, and e-decision making across six general, economic and social sectors. Each country was assessed on a scale of 0-4. The index was constructed by standardizing the scores.

[7] The public institutions index = ½ contracts and law sub index + ½ corruption sub index.

[8] Macro-economic environment index = ½ macro-economic environment stability sub-index + ¼ country credit rating + ¼ government waste

Business Competitiveness

Porter [2005] suggested that "to understand competitiveness the starting point must be the underlying sources of prosperity." The sources of prosperity determine the standard of living, which in turn is related to its productivity. Productivity depends on both: the value of nation's products and services, measured by the prices they can command in open markets and also the efficiency with which they are produced [Porter 2005]. In this study, we use Porter's productivity paradigm for operationalizing national business competitiveness. The business competitiveness of a nation is an indicator of the micro-economic capabilities of its constituents. Competitiveness is thus related to a nation's standard of living and prosperity [Porter 2005] and is measured by the GDP per capita adjusted for purchasing power parity, the values for which are taken from the Global Competitiveness Report 2005. This has been used as a measure of business competitiveness in other studies like Srivastava and Teo [2006].

Note on Reliability and Validity of Data Used

The Global Competitiveness Report 2005 and the UN E-Government Readiness Report 2004 have been prepared by two leading agencies [namely World Economic Forum and United Nations] which have a long experience and expertise in collecting and interpreting global data. The data from both reports had two components, hard data and survey data. Some indices like human capital index, ICT infrastructure index, and business competitiveness rely completely on hard data compiled by UN; other indices like macro-economic index, public institutions index, and e-government development emerge from a mix of survey as well as hard data. For ensuring reliability and validity of all the variables, it is important to have an overview of the methods undertaken by the two agencies.

The country level data was collected by WEF through a number of partner institutes who were given a uniform set of guidelines which were strictly adhered to. Some of these guidelines included taking responses only from CEOs or equivalent rank company officials, facility for the respondents to answer in their preferred language [30 language versions were presented; the reliability of expression was ensured by the partner institutes], etc. A stratified random sampling procedure was adopted to ensure representation of the spectrum of companies in the country. In all, 10,993 respondents participated in the survey which corresponds to an average of 94 respondents from each country. A renowned leader in the field of survey, Gallup International was associated at the early stages and all suggestions given by them were adhered to. The data from respondents within the country was checked for internal consistency by analyzing the standard deviation in the responses. Apart from ensuring internal consistency, it was important to tackle the issue of "perception bias" i.e., "a systematic positive or negative bias found among all respondents in a given country; for example, some might believe that people in a certain country are generally more positive about their own economic environment than people in another country, who might be pessimistic" [WEF 2005]. To minimize chances of perception bias, two techniques were adopted. *First,* the questions were framed in a way that asks the respondents to compare their own country to world standards, rather than thinking in absolute national terms. *Secondly,* wherever possible, the survey data was compared with hard data on similar issues.

UN also followed similar procedures for ensuring validity and reliability for their survey. The most important issue in the case of UN survey was the training of the researchers who actually carried out the Web survey. Multiple researchers were used to rate the Web sites according to the stages of e-government web development. Detailed guidelines were provided for choosing the Web sites and features for classification and analysis. In all, a total of over 50,000 online features and services from 178 countries across six sectors were assessed ensuring a wide coverage with reliable and consistent methods [UN Report 2004]. Since the two agencies [namely World Economic Forum and United Nations] followed rigorous procedures, as described above, for ensuring the reliability and validity of the indices, data from these reports was used directly for analyses.

ABOUT THE AUTHORS

Shirish C. Srivastava is an assistant professor at HEC School of Management, Paris. He obtained his Ph.D. from the School of Business, National University of Singapore, and his MBA from the Management Development Institute (MDI), Gurgaon, India, where he was awarded the Prime Minister's Medal. His research has been published or accepted for publication in several international refereed journals and books such as *MISQ Executive, Journal of Management Information Systems, Journal of Information Technology, Communications of the AIS, Journal of Global Information Management, Information Resources Management Journal, Electronic Government, International Journal of Information & Communication Technology Education,* and *Encyclopedia of Information Science and Technology.* He has also presented his research in key international refereed conferences like International Conference on Information Systems (ICIS), Academy of Management (AOM), Academy of International Business (AIB), Institute for Operations Research and the Management Sciences (INFORMS), and Americas Conference on Information Systems (AMCIS). He has been thrice nominated for the prestigious Carolyn Dexter Award at the Academy of Management (AOM) Meetings 2005, 2007, and 2008 and was a finalist for the award at AOM 2007. Recently he was a winner at the Society for Information Management (SIM) Paper Award Competition, 2007. His research interests include IT-enabled offshore sourcing, e-government, IS strategy and e-business strategy.

Communications of the Association for Information Systems

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