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E-business for Nations: A Study of National Level E-business Adoption Factors using the CBTG (Country Characteristics- Business- Technology- Government) Framework

Venkata Vijay Durbhakula
University of Houston-Clear Lake, Durbhakulav9896@uhcl.edu

Dan J. Kim
University of Houston-Clear Lake, kimdan@uhcl.edu

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Venkata Vijay K Durbhakula
Computer Information Systems
University of Houston-Clear Lake
Email: mailto:Durbhakulav9896@uhcl.edu

Dan J. Kim
Computer Information Systems
University of Houston-Clear Lake
Email: kimdan@uhcl.edu

ABSTRACT

Most past studies have analyzed e-business adoption factors from a firm level perspective and also from a single country level perspective. Earlier studies have proposed frameworks which can be used with in their nation only; we in this research propose a unique framework that can be adopted by any country to develop its e-business. We present a theoretical perspective on e-business adoption factors required for a nation. Major goals of this study are (i) to review existing key literature on e-business across the countries and determine key factors affecting e-business adoption, (ii) to propose a research model based on the identified factors, (iii) to perform an empirical analysis on the proposed model using the national level macro economic data from secondary sources, and (iv) to provide practical implications to country administrators, academics and policy makers. The limitations and future directions of the study are also discussed.

Keywords: E-business development, E-business performance, E-business activity, CBTG (Country-Business-Technology-Government)

INTRODUCTION

Global electronic business[1] (e-business hereafter) trade volume is growing at a very rapid pace. According to Yang and Miao (2005), per capita trade volume on the Internet was over 4.8 trillion US dollars and global e-business trade volume was over 5.5 trillion US dollars in 2005. Also, according to Forrester Research (Forrester 2003), the e-business traffic of the US is $3.2 trillion, while the Asia-Pacific is $1.6 trillion and Western Europe region amounts to $1.5 trillion. The remaining regions such as Eastern Europe, Africa, and the Middle East make up their sales volume on e-business to $68.6 billion. As suggested by these reports, e-business growth is high in some countries but some others are still behind the curve. Under these circumstances it would be an interesting and challengeable question – how do some countries do better than others? How do they achieve competitive advantages in this global economy?

E-business is no longer alternative; it is imperative. E-business has a strong influence on the global economy (Ho, Kauffman et al. 2005). The growth of e-business furnishes the overall business environment and productivity-enhancing practices for a country (Amit and Zott 2001; Krovi 2001). E-business is being adopted by countries of different sizes, different cultures, and different economies. Despite variations in these factors among countries, there should be a unique framework and that is what many countries are looking forward to implement.

There has been much research (Phan 2002; Wu, Mahajan et al. 2003; Zhu, Kraemer et al. 2004; Gregorio, Kassicieh et al. 2005; Zhu and Kraemer 2005) on e-business development and factors contributing to its development. Most research on e-business concentrates on either organizational or individual level of analysis for various B2B or B2C activities. There's no unique framework that a nation or country administrator can abide by for developing e-business in his/her country. Thus, in this study, we attempt to fill this gap by answering the questions above.

The goal of this study is fourfold: i) to review existing key literature on e-business across the countries and identify key factors affecting e-business adoption, ii) to propose a research model based on the identified factors, iii) to empirically test the proposed model using national level

[1] In line with Beyono-Davues's definition (Beyono-Davies P., 2004), we define electronic business as the use of the Internet and communication technologies in support of all business activities.

data, and finally, and iv) to provide some theoretical and practical implications to country administrators, academics, and policy makers.

The rest of the paper is organized as follows. The next section presents literature review on e-business framework from a country level perspective. Section three proposes a framework based on the identified factors from previous literature. Then, we explicate the contexts necessary for e-business development to formulate a research model and hypotheses. Finally, we conclude the paper with some expected contributions and limitations, as well as future plan to complete this study.

LITERATURE REVIEW

There are many studies (Fang Wu 2003; Wu, Mahajan et al. 2003; Zhu, Kraemer et al. 2003; Zhu, Kraemer et al. 2004; Zhu and Kraemer 2005) that analyze the e-business adoption factors in a business organization level context. Relatively few studies (Gibbs, Kraemer et al. 2003; Simon 2004; Gregorio, Kassicieh et al. 2005; Ho, Kauffman et al. 2005; Srivastava and Teo 2006; Berthon, Pitt et al. 2007) examine e-business from a cross-country perspective. Gibbs and Kraemer et al. (2003) in their paper presents a global perspective of e-business, discussing environmental and policy factors that affect countries' e-business adoption decisions. Their empirical analysis used data from only 10 countries and their main focus was only on environmental and policy factors for e-business adoption. Some other studies (Jutla, Bodorik et al. 2002; Zhu, Kraemer et al. 2002; Zhu, Kraemer et al. 2003; Zhu and Kraemer 2005) also discuss cross-country e-business adoption factors, but are constrained to cross -country firm level studies. Simon (2004) states the critical success factors necessary for electronic services. He presents some factors that a developing country should adhere to for successful e-service. Another cross-country study by Berthon and Pitt et al.(2007) gives a different variant from others-their main crux was the importance of cultural values and corruption in building cross-country e-relationships.

E-business development and the other facilitators contributing to it have been studied profoundly in previous literature. Much of the earlier literature typically adopted the Technological-Organizational-Environmental (TOE) framework to study about e-business (Zhu, Kraemer et al. 2002; Zhu, Kraemer et al. 2003; Zhu and Kraemer 2005; Srivastava and Teo 2006; Srivastava

and Teo 2007). The study conducted by Srivastava and Teo (2006) was the foremost work on the e-business development from a global perspective. Their model was also based on TOE framework and their main focus was on the integration of e-business development and e-government development for enhancing the business competitiveness of a nation. While their study united both e-business development and e-government development from a global perspective, we focus on the aspect of e-business from a country alone. Another study by Gregorio, Kassicieh et al. (2005) also sheds light on global e-business development and the factors necessary for a successful e-business activity. They state Logistics, Path Dependence, Entrepreneurial Activity, and Regional Differences as some of the novel factors contributing to e-business development along with some other well-defined factors. Although their model could be applied to e-business development, their main focus was on e-business activity (measured as a count of the number of websites), which by itself cannot make a reasonable argument for a framework at the global level. Purcell and Toland (2004) give a brief idea about the South Pacific region's e-business development and opportunities that can be adopted for their region. Spremic and Hlupic (2007) focus on the implementation of e-business from the Croatian perspective and suggested some practices and implications. Some other studies (Darley 2003; Moodley 2003; Kannabiran and Narayan 2005; Vincent Maugis 2005; Al-Qirim 2007; Spremic and Hlupic 2007; Cloete and Doens 2008) focused on e-business development in a country from a certain perspective or a sector. For example, Al-Qirim (2007) explains about the adoption of e-business in case of an NGO in Jordan. He uses the TOE framework to study about e-business diffusion for NGO's of Jordan. Another similar study by Wong (2003) also discusses some factors about e-business diffusion in Singapore. Although the above studies focus on e-business from a country level perspective their models are restricted to a country level only.

The above literature review suggests that there are very few studies on global level e-business from a multi-national level. To our best knowledge, there are few cross-country level empirical studies to explain the e-business development from a holistic multi-dimensional perspective. This research aims to propose a unique model for e-business at a multi-national level.

CBTG FRAMEWORK AND HYPOTHESIS

The TOE framework provides three contexts for technological innovation decision making for firms: technological context, organizational context, and environmental context. Some of the

earlier studies extended the TOE framework to study technological innovations at national level. Although the TOE framework has been examined by many number of studies on various IS domains many of these studies use this framework in firm-level context. Drawing from the previous research constructs and theoretical models such as Technological-Organizational-Environmental (TOE), we identified four dimensions for a successful global e-business development: Country characteristics, Business, Technology, and Government dimension. With these four dimensions we propose a framework (see Figure 1) that depicts the necessary constructs required for a successful e-business development within a country.

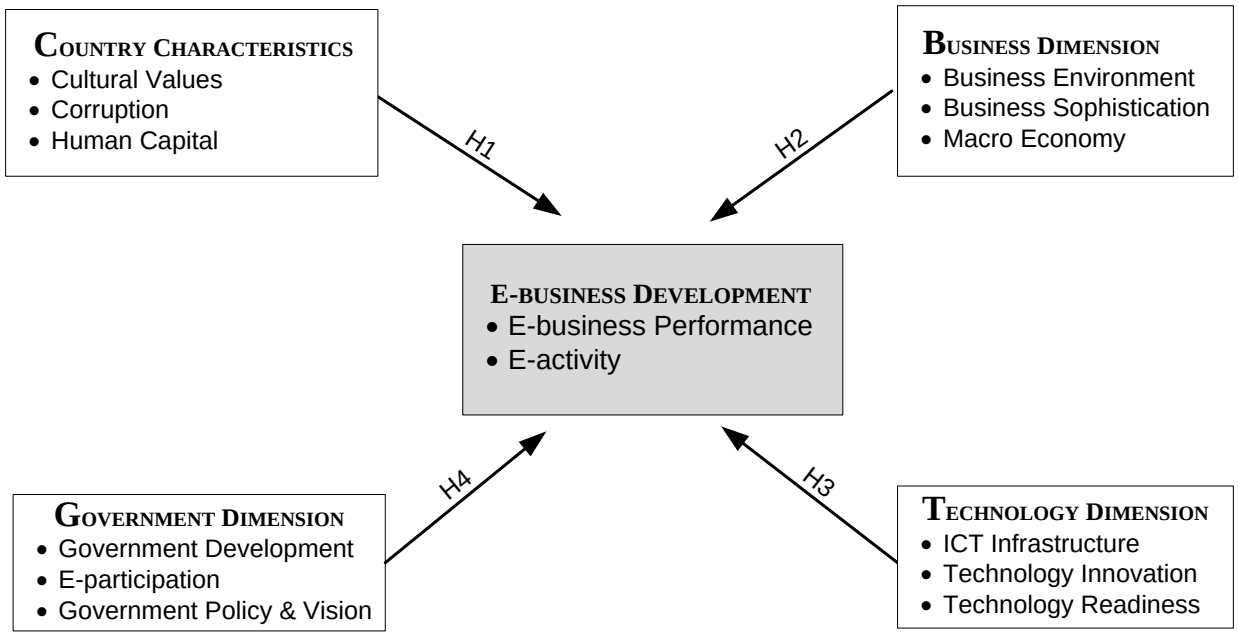

Figure 1: CBTG Adoption Model for Nations E-business Development.

E-business development is defined as the degree of maturity with which a nations business conducts its transactions using the Internet (Gregorio, Kassicieh et al. 2005). Growth in adoption of e-business by businesses would increase their revenue and profits. Concurrently, an upturn in business processes would increase the overall economy of a nation (Gibbs, Kraemer et al. 2003). This kind of economic growth could sustain the nation to an extent in this global competitive world. Therefore, focusing on the aspect of e-business development of a country, we study the factors necessary for e-business development through four dimensions: County Characteristics,

Business, Technology, and Government. In this study, we assess country level e-business development with two indicators: E-business performance and E-activity.

E-business performance can be defined as the effect of electronic business or e-business transactions on the overall economic activity of the country (Gibbs, Kraemer et al. 2003). In this study it is measured as the overall sales volume obtained from e-business as a share of the GDP of a country, which includes both B2B and B2C e-businesses. Gibbs and Kraemer et al. (2003) postulate that a wealthier country (measured as GDP per capita) would adopt and diffuse e-business at a more pronominal rate than a country with a lower GDP. This means that a country with a high GPD or good financial resources along with human resources and infrastructure support will end up with high e-business sales. Thus, we expect that a country with high e-business performance (e-business sales volume) will converge towards a high e-business development in that country. Although we do not completely agree on the statement that GDP directly influences e-business performance, we argue that e-business performance measured with GDP would have an impact on the e-business adoption decision of the country. There are relatively few data sources that collect these kinds of statistics across the countries. Although OECD has published its report with some countries (Dryden 2001), we are still looking forward to collect the data from more countries to make this study more globally applicable.

Another indicator of e-business development is *E-activity* which is defined as the measure of online activities taking place within a country. It indicates the transaction volume occurring over the websites of the country. It's believed that e-activity in a country is driven by the e-readiness factors, and differences in e-activities in different countries are attributable to adoption of e-business. We can posit that e-business adoption within a country is dependent on the level of e-activity taking place within a country, and this variable can support our definition of a nation's use of Internet for supporting e-business.

Country Characteristics: Some country-level characteristic factors could prosper e-business development within a country. Past studies have identified demography, population, and economic resources as some of the factors that contribute to e-business development (Wong 2003; Purcell and Toland 2004). Earlier studies have focused on a cultural aspect for e-business development. Iyer (2000) predicts that cultural differences can be a primary source for

differences in global e-business development. Berthon and Pitt et al. (2007) state that cultural values act as a driving force for successful e-business adoption in a country. They also suggest that the level of the corruption in a country affects the e-business of the country. Another country characteristic that is to be considered is human capital. Among the national resources that a country possesses, citizens' knowledge appears to be a vital resource for e-business development (Bogaert, Martens et al. 1994). Educated citizens can use and implement e-business as like organizations and nations do. The usage and implementation of e-business by citizens can be in both B2B and B2C channels of business transactions. This kind of utilization of e-business leads to increased business performance thereby increasing e-business of a nation as a whole. Hence from above discussion we can posit that:

H1: The level of E-business development in a nation depends on its country characteristics.

Business Dimension: This dimension indicates the external factors needed for a country to adopt e-business. Businesses need to adopt e-business as they deploy their applications more on a international basis (Drobik 2000). Earlier research (Lee and Kim 2004) shows that e-business has an effect on the performance of the firms. Businesses can interact with each other through e-business and therefore increase benefits to their buyers and suppliers. An increase in use of e-business by individual firms' processes could lead to an increase in the overall productivity of the nation as a whole (Dutta and Jain 2005). In this way, the e-business development in a country expands along with an increase in the economic growth of the nation.

Business dimension has three indicators: business environment, business sophistication, and macro-economy. Business environment pertains to the general business climate within a country. It is mainly concerned with the operations that affect firms in a nation such as government activities, social and economic factors, and technological developments. A better business environment can lead to an increase in e-business development of a country (Spremic and Hlupic 2007). Business sophistication is concerned with the quality of overall business networks within a country and within firms' operations and strategies (WEF 2008). Gunasekaran et al. (2005) states that strategic alliances between the businesses facilitates the development of e-business. When companies within a country are interconnected geographically, efficiency of production is heightened thereby increasing their profits (WEF 2008). We posit that e-business use increases as a greater number of firms grow their quality of business networks. Firms need to make their

online transactions at a high rate as they increase their business networks. This leads to greater adoption of e-business by firms within a country, thereby increasing e-business development of a country as a whole. Macro-economy is another indicator of our business dimension. A country with better macro-economy has more resources and policies for encouraging businesses to adopt e-business. This has been true with some countries like Singapore and Taiwan (Wong 2003). It is expected that e-business development in country depends on macro-economic conditions along with economic growth of a country. From the above discussion we can postulate that

H2: The E-business development in a country is increased with the increase in Business process in a nation.

Technology Dimension: Information technology related constructs such as technology infrastructure, country-level technology innovation, and technology readiness have been demonstrated as the most important factors for e-business development by many past studies (Zhu, Kraemer et al. 2002; Zhu, Kraemer et al. 2003; Srivastava and Teo 2007). Combining variables related to technology, we propose *technology dimension* as one of constructs that affect the national level e-business development. The dimension has three variables: ICT infrastructure, Technological innovation, and Technological readiness. ICT Infrastructure refers to a country's e-business development that relies largely on the ICT Infrastructure of the country. ICT Infrastructure has influence on the volume of a nation's Internet Transactions or on the number of e-business websites in a country (Gregorio, Kassicieh et al. 2005). A better ICT Infrastructure enhances e-business development (ECD-UNCTAD 2004). Technological Innovation refers to nations' needs to innovate new technologies to increase their productivity. Different nations need to adopt different technological innovations to be competitive in a global economy (Global Competitiveness Report 2008-2009). Phan (2002) posits that e-business is always driven by competitive advantages by world nations.

Technological Readiness "consists of technology infrastructure and IT human resources, and technology infrastructure refers to technologies that enable Internet-enabled businesses and IT human resources refer to IT professionals possessing the knowledge and skills to implement Internet-related applications" (page 27) (Zhu, Kraemer et al. 2004). From this definition, it is reasonable to say that technological readiness is affected not only by physical assets, but also by human resources. Technology infrastructure builds a platform for the e-business; IT human

resource provides knowledge required for e-business applications. Therefore, countries with greater technological readiness are in a better position to adopt e-business. We expect that technological readiness has a strong effect on the e-business development of a country. Apart from the above indicators, many other technological factors like technology availability and technology usage can contribute to e-business development in their countries (EIU 2009). From the above discussion we postulate a hypothesis about technology

H3: The E-business development in a country is positively affected by Technological factors for the country.

Government Dimension: The Government dimension is identified as a key factor in many studies (Papazafeiropoulou and Pouloudi 2000) for a company level e-business adoption decision. Every government should not only make use of the Internet by itself but also actively encourage business and consumers to use Internet (Simon 2004). A government could support industries or research environments by providing subsidies, by procurement, or government itself acting as a trusted third party (Papazafeiropoulou and Pouloudi 2000). Jutla and Bodorik et al. (2002) state that a government should support e-business by using partnership models. Some studies (Damanpour and Damanpour 2001) have also spoken about International Trade Agreement between governments to foster e-business. For example, the Korean government came up with a "u-KOREA Master Plan" in an effort to boost e-business development in its country. Many other countries like Malaysia, China, Singapore, and Chile are also developing strategies to promote e-business in various ways (Simon 2004).

Government dimension has three indicators: E-government development, E-participation and Government policy & vision. As discussed above many governments are bringing forth various projects for developing e-business in their country. Many of these e-government projects are meant to enhance the relationship between the government and its citizens or firms. According to Cohen (2002), government activities in public domain encourages businesses to adopt same kind of activities. Greater usage of ICT by governments is said to have influence citizens and businesses, encouraging them to adopt e-business (Srivastava and Teo 2007). Thus, we expect that e-business development in a country depends on e-government development and the extent to which governments involve themselves in ICT enabled activities.

E-participation is another indicator of Government dimension. E-participation is defined as a level of a country's willingness to engage its citizens in e-government process (UNReport 2008). E-government development is influenced by the citizens' use of their services. Any e-government project should not only be usable to its citizens but also encourage them to participate in e-government service. This kind of participation enhances e-government development (Becker 2005; UNReport 2008). Increase in e-government development spurs e-business development (Srivastava and Teo 2007).

Government policy & vision is the last indicator of our government dimension. EIU (2009) identified Government policy & vision as one of the factor for formulating their e-readiness rankings. They define this indicator as the government rules and strategies which are employed for successful e-business development within a country. The government rules and strategies significantly impact and improve the e-business development in a country (Spremic and Hlupic 2007). Better governments' policies towards ICT development will encourage businesses to adopt e-business at a high rate, thereby increasing e-business development of a nation. From the above discussion we postulate that:

H4: The E-business development in a country depends on the Government support and encouragement for e-business.

RESEARCH METHOD & DATA COLLECTION

Since the unit of analysis of this study is country-level, it is required to use multi-national level data to test the research model and hypotheses. Due to the fact that there is no single database that has all the values required for this study, we use the secondary data from various sources and combine them to make an appropriate data set to test the model and hypotheses. Using secondary data limits our capabilities to using only those variables listed in their databases, but it is a well used practice done in many research areas and previous research papers (Zhu, Kraemer et al. 2002; Zhu, Kraemer et al. 2003; Zhu, Kraemer et al. 2004; Gregorio, Kassicieh et al. 2005; Zhu and Kraemer 2005; Srivastava and Teo 2006; Berthon, Pitt et al. 2007; Srivastava and Teo 2007).

In order to measure a country-level e-activity, we develop our own data measurement using the yahoo directory service. E-activity is measured by a number of websites reported in yahoo

directory service within a country that is divided by the population of the country to make its relative scale in terms of the population size of countries.

E-business performance is the vital dependent variable of the proposed framework. As discussed, we use e-business sales volume (i.e., the share of e-business transactions in the total GDP of a country) as a proxy of e-business performance. It is hard to collect directly these types of data as they cannot be accessed from any single database. Although some studies have proposed frameworks for measuring e-business at the global level (Colecchia 2000; Tehan 2003), there are only a few countries that publish their National E-stats. We are still in the process of collecting data from as many countries as possible, and we hope that there will be more numbers of countries for our study. As an alternative to the above defined secondary data for e-business performance, we also plan to use the number of Internet "hosts" in a particular country domain for measuring e-business performance. This secondary data has been used by Oxley and Yeung (2001) in their paper for measuring e-business in a country. Although the number of internet hosts is not a direct measure of e-business performance, in absence of reliable data we plan to use this kind of indirect measures.

The Country Characteristics dimension has three indicators: Human Capital, Corruption and Cultural Values. Human capital is taken from the UN e-Government Readiness Report 2008 as the Human Capital Index. The data for the Human Capital Index is from UNDP education index, which is a composite weight of the adult literacy rate and the combined primary, secondary and tertiary gross enrollment ratio with two-thirds weight given to adult literacy and one-third to gross enrollment ratio (UNReport 2008). Corruption is measured from the work of Transparency International (CPI 2005), which has published "Corruption Perceptions Index" (CPI) from many years. The CPI is essentially a "poll of polls" derived from multiple sources: the general public, resident and non-resident business people, and country experts. Countries are scored on a 0 to 10 scale, where the least corrupt countries have the highest scores, and the most corrupt the lowest scores. Cultural Values are chosen from the World Values Survey database, as it is by far the largest database of cultural values and the only survey with current data from majority of the countries in the world.

The Business Dimension has three indicators: Business Environment, Business Sophistication and Macro Economy. Business Environment is taken from the EIU E-readiness rankings 2009. EIU calculated the business environment with 74 sub-indicators to provide a comprehensive view of every country's attractiveness as a trading economy and as a destination for business investment. Business Sophistication is obtained from the Global Competitiveness Report 2008 as the business sophistication pillar. It is defined as the quality of a country's overall business networks as well as the quality of individual firm's strategies and operations. Macro Economy is indicated by the Macro-Economic Environment Index from the Global Competitiveness Report 2008; it uses a mix of hard data as well as surveys from executives and indicates the state of macroeconomic condition in the country (WEF 2008).

The Technology Dimension has three variables. ICT Infrastructure is measured by the Telecommunication Infrastructure Index from the UN e-Government Readiness Report 2008. The Telecommunication Infrastructure Index is a composite weighted average index of six primary indices based on basic infrastructural indicators, which define a country's ICT Infrastructure capacity (UNReport 2008). Technology readiness is taken from Global Competitiveness Report 2008 as the Technological readiness pillar. The Technological readiness measures the agility of an economy to adopt existing technologies and to enhance the productivity of its industries. Technology Innovation is also taken from the Global Competitiveness Report 2008 as the Innovation pillar. The Technological Innovation measures the Innovation capability of the country and the environment that is conducive to innovative activity, supported by both the public and private sectors.

The Government Dimension also has three indicators: E-government development, E-participation and Government Policy & Vision. The construct of e-government development is indicated by the Web Measure Index from the UN e-Government Readiness Report 2008. 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. The Web Measure Index is an indicator of the sophistication and development of the e-government websites of that particular country. E-participation is taken from the UN e-Government Readiness Report 2008 as the E-participation Index. E-participation is defined as the level of a country's willingness to engage citizens in e-government process. The Government policy & vision indicator is taken from the

EIU E-readiness rankings 2009. EIU defines Government policy & vision as one of the category indicators to calculate e-readiness of a country. This indicator analyzes the availability of digital channels to individuals and businesses for accessing public services, engaging their citizens to both obtain government information about civic issues and consultation with government officials (EIU 2009).

As variables are taken from multiple studies, we only consider the country data that are common from all the reports. After analyzing the common data points (countries) we had data from over 23 countries. This number can increase or decrease in future studies. We plan to include many countries to make this study applicable globally. Table1 below summarizes the detailed description of our secondary data collection

Table1. Secondary Data Sources

Variable	Measure	Source
E-business Development		
(i) E-business Performance	e-business share of GDP	
(ii) E-Activity	Count of number of websites in a country divided by population of the country	YAHOO Directory Service http://dir.yahoo.com
Country Characteristics		
(i) Cultural Values	Cultural values from WVS database	World Values Survey 2005 (WVS 2005) www.worldvaluessurvey.org
(ii) Corruption	Corruption Perceptions Index	Transparency International Website (CPI 2005) www.transparency.org
(iii) Human Capital	Human Capital Index	UN E-government Report 2008 (UNReport 2008)
Business Dimension		
(i) Business Environment	Business Environment Category	EIU E-readiness ranking 2009 (EIU 2009)
(ii) Business Sophistication	Business Sophistication Values	Global Competitiveness Report 2008 (WEF 2008)
(iii) Macro Economy	Macroeconomic Stability Values	Global Competitiveness Report 2008 (WEF 2008)
Technology Dimension		

(i) ICT Infrastructure	Infrastructure Index	UN E-government Readiness Report 2008 (UNReport 2008)
(iii) Technology Innovation	Innovation Pillar	Global Competitiveness Report 2008 (WEF 2008)
(iv) Technology Readiness	Technological Readiness Pillar	Global Competitiveness Report 2008 (WEF 2008)
Government Dimension (i) E-government Development	Web Measure Index	UN E-government Readiness Report 2008 (UNReport 2008)
(ii) E-participation	E-participation Index	UN E-government Readiness Report 2008 (UNReport 2008)
(iii) Government policy & vision	Government policy & vision Category	EIU E-readiness Ranking 2009 (EIU 2009)

DATA ANALYSIS

For testing our hypothesis we plan to use PLS (Partial Least Square) as it allows modeling our constructs either as formative or reflective indicators. PLS also imposes minimal demands for sample sizes to validate a model when compared to alternative structural equation modeling techniques. We will use the secondary data collected from many sources for data analysis.

EXPECTED CONTRIBUTIONS AND LIMITATIONS

Understanding facilitators for e-business development is vital for effective implementation and usage of e-business by a nation. E-business development in our study represents the maturity of the nations to conduct their transactions online. Facilitators for this aspect of e-business have not yet been studied in detail in the past literature. This study is expected to contribute in this field of research.

The foremost limitation of the study is that we will use secondary data from different sources. From this, we will analyze data only from a few countries which are represented from secondary databases. As we are still working on the secondary data we can't predict the number of countries that can be included for this study, we are skeptical that we might need to exclude some of the major countries such as Korea, Hong-Kong etc. Taking into account that this study

has more countries than any other study in this research domain, we hope that it does not make a substantial difference in terms of numbers of countries.

Through this research, we expect to make some implications to country administrators, academics, and policy makers. For country administrators, this research can help them adopt a unique model for e-business. Country administrators who desire to see their country competitive in the global economy can adopt this model. The research framework has four dimensions as discussed above. These dimensions provide administrators to analyze the deficient variables for that country.

For researchers, this model can help to develop more studies at the global level. There is a dearth for these kinds of studies and any contribution to this key global study will be a good resource for literature. Researchers can take our model to further enhance it by adding more dimensions and variables. Our analysis might include data from a few countries; we expect that a study with large number of countries can contribute much to the literature.

CONCLUSION

In this study, we propose a CBTG (Country-Business-Technological-Governmental) based e-business adoption model for nations. The research model includes four dimensions for development of the e-business in a nation. It is expected that the proposed model will be tested empirically in the future. Further research can attempt to understand e-business more at a global level and test the model with more of countries. Another stream of research can explore the development of e-business by identifying more intermediate variables and adding more dimensions.

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