Determinants of eGovernment Maturity in the Transition Economies of Central and Eastern Europe

Princely Ifinedo[1] and Mohini Singh[2]
[1]Cape Breton University, Sydney, Nova Scotia, Canada
[2]RMIT University, Melbourne, Victoria, Australia
princely_ifinedo@cbu.ca
mohini.singh@rmit.edu.au

Abstract: Our research focuses on the possible determinants of eGovernment (E-gov) maturity in the Transition Economies of Central and Eastern Europe (TEECE). E-gov maturity, in this research, refers to the growth levels in a country's online services and its citizens' online participation in governance. Our study of the extant literature indicated that few have discussed the determinants of E-gov maturity in TEECE. Studies from differing parts of the world are needed for theory development. Building on a prior framework, we used the contingency theory and the resource-based view perspective to guide our discourse. In particular, we examined the relationships between macro-environmental factors such as national wealth, technological infrastructure, rule of law, and so forth on E-gov maturity. A 5-year panel data of 16 TECEE selected from two main groupings was used for analysis in conjunction with structural equation modeling technique; the data consisted of 80 observations or data points. The data analysis underscored the relevance of such factors as technological infrastructure, rule of law, and human capital development as possible determinants of E-gov maturity in TEECE. National wealth was found to be an enabler in the research conceptualization. The implications of our study's findings for research and policy making are discussed.

Keywords: Transition Economies of Central and Eastern Europe (TECEE), eGovernment (E-gov), eGov maturity, contingency theory, resource-based view, structural equation modeling

1. Introduction

The United Nations and the World Bank describe eGovernment (E-gov) as the utilization of the Internet and the World Wide Web for delivering government information and services to citizens and other stakeholders in a country (InfoDev, 2004; UN Public Administration Programme, 2010). E-gov allows government's services to be more effective and accessible to citizens (Fountain, 2001; Moon, 2002; West, 2004). Empirical data from international agencies, consulting organizations, and academic research shows that E-gov has become a global phenomenon with nearly all governments around the world adopting it to promote citizen engagement and empowerment (Accenture 2001; West, 2007; UN Public Administration Programme, 2010; Karunasena et al., 2011).

Despite the popularity of E-gov around the world, empirical evidence from both academic research (West, 2007; Siau & Long, 2006; Singh et al., 2007; Gupta et al., 2008; Azad et al., 2010) and international agencies' reports (InfoDev, 2004; UN Public Administration Programme, 2010) indicated that transition economies and developing countries around the world lag behind advanced countries with respect to the deployment and use of E-gov facilities. That is, more economically endowed countries often occupy the upper echelons of innovators or adopters of advanced E-gov initiatives and schemes (West, 2007; Azad et al., 2010). In part, this fact has influenced our research conceptualization. Notably, we worked with a research model indicating that economic considerations or imperatives directly or indirectly influence the advancement of E-gov schemes in emerging parts of the world.

Norris (2001) asserted that the emerging digital divide (in this case, E-gov divide) has three distinct aspects: the social digital divide, the democratic digital divide, and the global digital divide. Gascó (2005) noted that the regional digital divide is a variation of the global digital divide in the sense that it signifies the differences that exist in E-gov initiatives between countries from the same geographical region. With respect to the region of focus in this article, it can be seen that the E-gov index (i.e. an indicator of a country's electronic government adoption) for Eastern European countries averaged 0.5449 in 2010. At the same time, the scores for two countries in the region i.e. Hungary and Belarus were 0.6315 and 0.4900, respectively (UN Public Administration Programme, 2010) to indicate the existence of regional differences. In this regard, we argue that more attention needs to be paid to understanding E-gov issues at the regional level to enrich insight.

To address E-gov issues in Eastern Europe, professionals from that part of the world and elsewhere have gathered every year since 2003 on designated Eastern European E-gov days to discuss issues related to the advancement of E-gov in Central and Eastern Europe (Eastern European e-Gov Days, 2011). Knowledge transfer in the area of E-gov between advanced Western European countries and their counterparts from Central and Eastern Europe is actively encouraged. This paper adds to the growing body of knowledge in this area of interest. More precisely, more needs to be done regarding enriching the academic discourse related to the determinants of E-gov maturity in Transition Economies of Central and Eastern Europe (TECEE).

Our study's focus on TECEE is informed by two considerations. First, researchers such as Roztocki and Weistroffer (2008), Ifinedo &Davidrajuh (2005), and Ifinedo and Ifinedo (2011) have indicated that there is a lack of adequate research related to information systems and technologies (IS/IT) issues in TECEE; they called on researchers to focus on such issues in that part of Europe. Indeed, the academic literature focusing on trans-national E-gov issues in TECEE is sparse, perhaps due to the relative novelty of the subject (Katchanovski & La Porte, 2005). Moreover, research in this area of study tends to employ global E-gov data (Azad et al., 2010; Kovačić, 2005; Katchanovski & La Porte, 2005; Singh et al., 2007; Siau & Long, 2006; Moon et al., 2005) that included some TECEE rather than focus on countries from that region specifically as is the case in our own study. By not focusing on specific regions of the world, it is possible that a deeper understanding of the factors or determinants of E-gov maturity in differing parts of the world is underreported.

Second, TECEE share a common political and cultural history as most countries in the region only recently metamorphosed from centrally planned systems to free market democracies (Ifinedo & Davidrajuh, 2005; Ifinedo & Ifinedo, 2011). Thus, it is pertinent to continue to monitor progress in TECEE especially with regard to IS/IT use for development and governance (Levada, 2004; Alexander, 2004; EU Regional Policy; 2009). Put differently, as E-gov initiatives are implemented to reform administrative services and enhance citizen empowerment, research such as this current one could provide a useful lens through which advancement and positive changes emanating from the use of such technological innovations in governance across TECEE can be assessed or viewed. Moreover, theory development in the area is engendered by views from elsewhere other than the easily available perspectives from the developed Western countries.

With respect to the discourse of E-gov maturity around the world, our research complements the study by Singh et al. (2007) that investigated a similar theme globally by including the effects of political, economic, social, and technological factors on E-gov maturity. Nonetheless, our research differs from Singh et al.'s work in three ways: a) this current study focuses on solely on TECEE for reasons already espoused; b) it underscores the relevance of factors such as rule of law and transparency levels, which were not considered in Singh et al.'s work, c) this study seeks to contribute to the growing body of knowledge regarding the overriding impact of economic imperatives on E-gov maturity and the possible mediating influences of the others factors under focus. That is, this research does more than examining the direct impacts of selected factors on the dependent variable as is usually the case in some previous research (e.g. Kovačić, 2005; Moon et al., 2005).

Further, the focus of some prior E-gov studies in TECEE (e.g. McHenry & Borisov, 2006) was on a single country wherein the quantitative research method was favored. To some degree, comparative analyses of issues across countries can be negatively impacted through the use of such approaches. In our study, published data from reliable sources such as the United Nations (UN) and the World Bank for 16 TECEE over a 5-year period was used for analysis. Very few (e.g. Wong & Welch, 2004) have used longitudinal or time-series data to capture the development of E-gov around the world. We assert that more information could emerge when E-gov progression, over the years, in TECEE are considered and discussed with reliable data. Specifically, our research is designed to provide an answer to the following question: *Over time, what are the possible determinants of E-gov maturity in TECEE?* The resource-based view (RBV) and the contingent theory (CT) will be employed to provide the necessary conceptual underpinning for our study.

The remainder of the paper is organized as follows: First, information related to the study's underpinning theoretical frameworks and key concepts are provided. Second, the study's research model and the hypotheses are presented. Third, the research methodology and other relevant information are presented. The paper concludes by discussing its findings, implications, limitations, and avenues for further research.

2. Background information

2.1 Theoretical underpinnings

The resource-based view (RBV) is a management tool that has been used by researchers (e.g. Srivastava & Teo, 2007; 2008) to discuss E-gov issues against the background of that concept being seen as a national resource. The RBV posits that the basis for a competitive advantage of a firm lies in the application of the bundle of valuable resources at the firm's disposal (Wernerfelt, 1984, Barney, 1991). Some researchers including Mathews (2002) have extended the RBV to a "resource economy" to include the resources produced and exchanged by firms within a country. According to Srivastava & Teo (2007, p. 76), "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." In that regard, the distinctive resource configurations within an economy or state and its capability to use such resource will serve to enhance its national competitiveness. The availability of wealth or economic factors for national development has since been fundamentally recognized in the relevant literature (McClelland, 1967; Goldthorpe et al., 1968; Friedman 2005). Factors such as human resource development and other facilitating conditions such as the availability of IT resource within an economy makes it more competitive than counterparts lacking such resource (Friedman 2005; WEF, 2010). It would suffice to note that economies with requisite capabilities and endowments to effectively institute E-gov as a national resource might have benefited from the availability of such endowments (Norris, 2001; West, 2004; 2007; Srivastava & Teo, 2007).

The second relevant theoretical framework considered in this research is the contingency theory (CT), which was developed by Lawrence and Lorsch (1967). The CT has often been used at the organizational level, but it can also be extended to the national level. The CT posits that a set of independent or contingent variables are assumed to influence the dependent variable such that higher favorable outcomes result from the direct impact of the independent variables. To some degree, the CT compliments the direct measure approach (Bonoma & Johnson, 1979), which can be used to assess the direct impact of contingent variables (e.g. political rights and/or GDP per capita) on E-gov maturity. Several researchers (e.g. Moon et al., 2005; Kovačić, 2005; Katchanovski & La Porte, 2005; Singh et al., 2007; Azad et al., 2010) have framed their studies in the context of the CT. Others (e.g. Kubicek & Westholm, 2005) have built upon the CT to propose a "contingency model of E-democracy" that examines the impact of relevant socio-economic, political, and technological factors on E-gov development.

2.2 Transition economies: Definition and categorizations

In general, the term transition economy (TE) refers to an economy that is changing from a centrally planned economy to a market economy (IMF, 2000; Samoilenko & Osei-Bryson, 2008). The characteristics of TEs include rapid economic liberalization, legal and institutional reforms, restructuring and privatization, and macroeconomic stabilization (IMF, 2000). Two groups of TECEE can be found in Europe. The group of eight countries that joined the EU on 1 May 2004 (i.e. Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia) is in fact considered as having completed the transition process. The second group comprises such countries as Romania, Russia, Moldova, Croatia, Bulgaria, Belarus, Ukraine, and Georgia that are still transiting. The latter eight were selected from the list of TECEE in IMF (2000) for illustration purposes. It is suggested that the former and latter groups can be categorized *Leader*s and *Followers*, respectively (Samoilenko & Osei-Bryson, 2008; EU Legislation, 2010; World Bank, 2010). The inclusion of the groupings is done to ensure a fair representation of countries in this paper.

2.3 eGovernment maturity

The concept of "maturity" signifies a stage of growth from lower to higher stages or phases in a process (Galliers & Sutherland, 1991; Andersen & Henriksen, 2006). In this research, E-gov maturity refers to the actual level of progress made by a country with respect to the sophistication of the features present on its government websites (Chen, 2002; Andersen & Henriksen, 2006; West, 2007; UN Public Administration Programme, 2010). Accordingly, governments' websites or web presence that have incorporated advanced functionality and features capable of providing more efficient services to their citizens are generally considered to occupy higher stages in the growth model (West, 2007). It is worth pointing out that the focus of our research is on the aspect of E-gov measures related to the extent to which each country in TECEE has advanced in that regard. It does not

address "E-gov readiness" which describes how ready or able a country might be with respect to using technologies in governance (UN Public Administration Programme, 2010). E-gov readiness measures include the telecommunication infrastructure and human capital-indices, which are prerequisites for E-gov engagements; however, these measures do not show how well a country has progressed with regard to its E-gov efforts. Therefore this particular item has not been considered in this research.

Prior E-gov maturity models and measures (e.g. Layne & Lee, 2001; UN Public Administration Programme, 2010) guide the discourse related to the development of E-gov applications and initiatives in a stage-wise manner – from immature (one-way communication) to the mature (digital democracy) stage (Andersen & Henriksen, 2006). By using a stage-wise approach it affords governments and international agencies the opportunity to assess accomplishments over time. Several of the E-gov maturity models tend to have between three to six growth phases. For example, Howard (2001) used a model comprising of three stages i.e. Publish, Interact, and Transact. Layne and Lee's (2001) model consists of four stages i.e. Cataloguing, Transaction, Vertical integration, and Horizontal integration. Chen (2002) proposes a model with the Information–Communication–Transaction continuum. The UN's E-gov maturity model (UN Public Administration Programme, 2010) is a four-stage growth model (Figure 1).

Although there are several E-gov maturity models, our research uses the UN's E-gov maturity model (see Table 1 for its phases and their descriptions) as it provides a global, comparative data on the Web measure/online service index measures for countries around the world. The other E-gov models were not considered as they do not have such data. In brief, the UN's E-gov maturity model indicates that countries that have advanced to higher growth levels on their E-gov projects are the ones with relatively high Web measure/online service index scores.

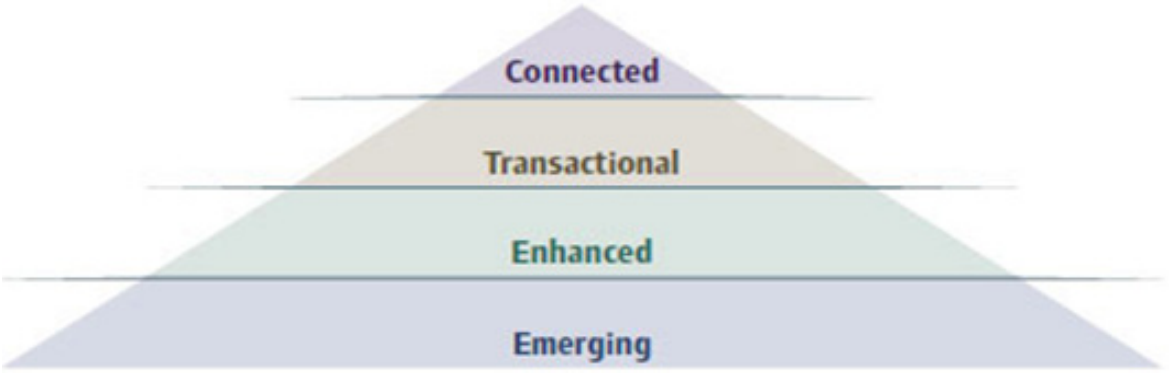


Figure 1: The UN's four stages of online services growth

Table 1: Some of the E-gov maturity models in the literature

Phase	Description	Source/proponent(s)
Phase 1: Cataloguing Phase 2: Transaction Phase 3: Vertical integration Phase 4: Horizontal integration	1. Creating web sites and making government information and services available online. 2. Supporting online transactions between governments and citizens. 3. Focusing on the integration of different systems and functionalities. 4. Focusing on the integration of government services for different functions horizontally; real one-stop center for citizens.	Layne & Lee (2001)
Phase 1: Information Phase 2: Communication Phase 3: Transaction Phase 4: Transformation	1. Government ''information'' is created, categorized, and indexed and delivered to its citizens through the Internet. 2. E-gov services support two-way ''communication,'' with citizens communicating requests through web forms, email, or other Internet media. 3. "Transaction'' services between citizens and governments are supported. Government branches also use the Internet	Chen (2002)

	for transactions among themselves. 4. An opportunity for the ‘‘transformation’’ of government’s practices and services is exploited. Application such as e-voting and e-politics that may alter the democratic and political processes are instituted.	
Phase	Description	Source/proponent(s)
Stage 1: Information Stage 2: Interaction Stage 3: Transaction Stage 4: Integration	1. Government services are delivered online. One-way communication between government and citizens is put in place. 2. Simple interaction between citizens and governments are supported. 3. Services enabling transactions between citizens and government are supported. 4. Integration of services across the agencies and departments of government are put in place.	Chandler & Emanuel (2002)
Phase 1: Publish Phase 2: Interact Phase 3: Transact	1. Information about government’s activities is available online. 2. Enables citizens to have simple interactions through emails with their governments. 3. Provides citizens with full transactions benefits over the internet with services such as purchasing licenses and permits.	Howard (2001)
Phase 1: Cultivation Phase 2: Extension Phase 3: Maturity Phase 4: Revolution	1. Horizontal and vertical integration within government, front-end systems use, and the adoption of intranet. 2. Extensive use of intranet, personalized web interface for customer processes. 3. Abandoning of intranet, accountability and transparent processes, personalized web interface for customer processes. 4. Data mobility across organizations, application mobility across vendors, ownership of data transferred to customers.	Andersen & Henriksen (2006)
Phase 1: Billboard Phase 2: Partial service delivery Phase 3: Full integrated service delivery Phase 4: Interactive democracy with public outreach and accountability	1. Government’s websites (usually static at this stage) are used for information display. 2. Government’s websites have more capabilities and functionalities to include sorting and searching of information. 3. One-stop centre is created with full integrated online services. 4. Government website develops into a system-wide political transformation with executable and integrated on-line services. Customized information service is available.	West (2004)
Phase 1: Web presence Phase 2: Interaction Phase 3: Transaction Phase 4: Transformation	1. Government uses the web to provide basic information. 2. Government provides a website equipped with search engines, documents downloading capability and emails. 3. Citizens can carry out enhanced online transactions. 4. All government services and processes are integrated, unified and personalized.	Gartner’s group model in Baum & Maio (2000)
Phase 1: Information publishing Phase 2: Official two-way transactions Phase 3: Multi-purpose portals Phase 4: Portal personalization Phase 5: Clustering of common services Phase 6: Full integration and enterprise transformation	1. Government creates websites (static) to provide information to its citizens. 2. Enables customers to have electronic interaction with government services such as television licenses renewal. 3. Enables customers to obtain government services and information from a single point. 4. Government provides customers and its agencies with opportunities to customize portals according to their needs.	Deloitte & Touche (2001)

	5. All government services and processes are clustered so as to provide unified and seamless services to citizens. 6. Government changes its structure to enable the provision of more sophisticated, integrated and personalized services to its citizens.	
Phase	Description	Source/proponent(s)
Phase 1: Emerging Phase 2: Enhanced Phase 3: Transactional Phase 4: Connected	1. Government provides information and basic services on its web site. 2. Government websites deliver enhanced one-way or simple two-way communication between government and citizens through the use of downloadable forms. 3. Government websites uses advanced two-way communication between government and its citizens. The websites process transactions such as e-voting, filling of taxes, and licenses and certificates applications. 4. Government websites changes the way it communicates with citizens; they are proactive in requesting opinions and information from their citizens; they create and "empowered" citizens with more voice in decision making.	UN Public Administration Programme (2010)

3. Hypotheses formulation

The pertinence of economic imperatives (i.e. national wealth) as a possible foundation for the advancement of E-gov maturity across nations, including TECEE has been succinctly noted above. Consistent with the tenets espoused in the RBV and the CT, the research model in Figure 2 is designed to highlight the relationships between relevant factors or issues and the dependent variable i.e. E-gov maturity. The mediating influences of the other factors are also delineated in the research conceptualization. Discussions on each of the hypothesized paths are presented below.

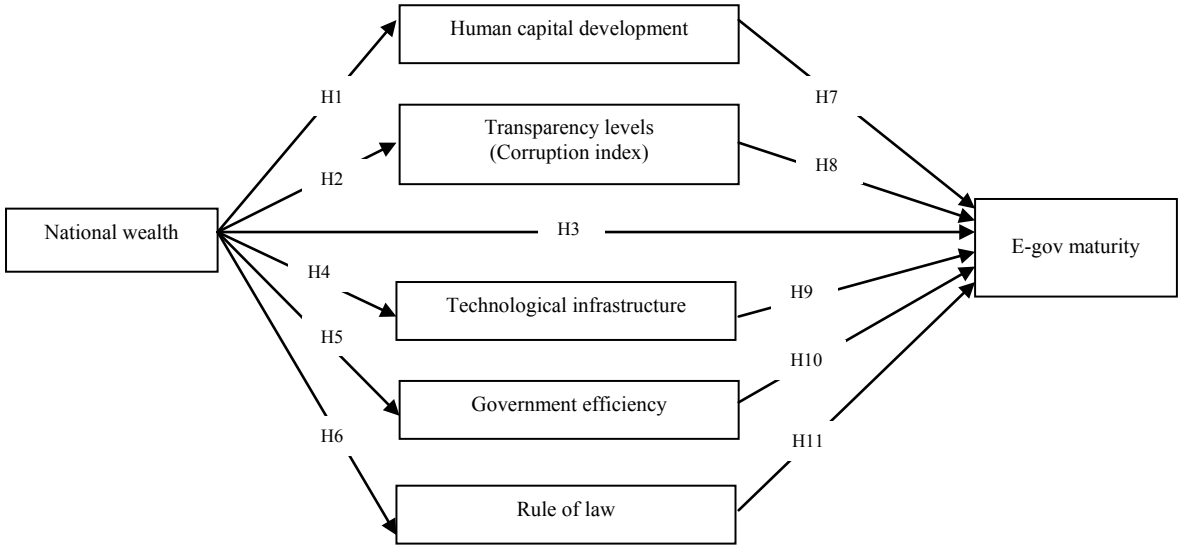


Figure 2: The research model (and highlighted hypotheses)

Evidence shows that wealthier nations tend to have higher levels of human capital resource (Kiiski & Pohjola, 2002; UN Public Administration Programme, 2010; World Bank, 2011). According to the RBV, such economically endowed countries are more likely to be advantaged in providing needed resources for human capital development in their contexts (Goldthorpe et al., 1968; Barker, 2005). It is reasonable to expect that economic endowments in TEECE – as would be expected for parts of the world - will be positively related to its human capital development. We predict that:

H1: In the context of TECEE, national wealth will be positively related to human capital development

Empirical data suggests the existence of a positive relationship between the availability of economic endowments and the perceptions of transparency levels across countries (Transparency International, 2010; WEF, 2011). The findings from past studies by Wong and Welch (2004), Torres et al. (2005), and Tolbert et al. (2008) affirm this viewpoint, to some extent. Likewise, prior research has shown that the diffusion of innovative technologies is significantly influenced by the availability of wealth (Caselli & Coleman, 2001; Norris, 2001; Moon et al., 2005; Singh et al., 2007; WEF, 2011). More affluent countries with better financial resources than counterparts lacking in such often make more progress regarding the types and scope of quality features and services provided or seen on their government websites (Singh et al., 2007; West, 2007). We predict that:

H2: In the context of TECEE, national wealth will be positively related to transparency levels

H3: In the context of TECEE, national wealth will be positively related to E-gov maturity

Global data suggests that wealthier countries are far more likely to be advantaged in committing resources to enhancing their technological infrastructure than relatively poorer nations (Torres et al., 2005; WEF, 2011). McClelland (1967) and Goldthorpe et al. (1968) also observed the existence of a positive association between national affluence and the capability to use of technological innovations to engender social change and progress across nations. We predict that:

H4: In the context of TECEE, national wealth will be positively related to the availability of technological infrastructure

There is an association between the economic well-being of nations and their attitudes toward the national institutional variables such as government efficiency (InfoDev, 2004; Accenture, 2001; Kiiski & Pohjola, 2002; North, 1999; West, 2007; Singh et al., 2007). Such findings have implied that the efficiency of governance in countries with superior financial capability tend to be higher in comparison to those lacking in such resource (Wong & Welch, 2004; Srivastava & Teo, 2008). This is because the efficient management of governance structures, at all levels, requires substantial investments in manpower development and infrastructure acquisition (Caselli & Coleman, 2001; Kiiski & Pohjola, 2002; Norris, 2001; Singh et al., 2007; Torres et al., 2005). We predict that:

H5: In the context of TECEE, wealth will be positively related to government efficiency

Along the same line of reasoning as the preceding hypothesis, academic researchers and international agencies have also shown the existence of a positive relationship between the economic well-being of nations and the national governance variable of rule of law (InfoDev, 2004; Accenture, 2001; North, 1999; West, 2007). That is, the wealthier a country is, the more likely it is for its rule of law to be conducive for governance and business (Norris, 2001; Shih et al., 2005). We predict that:

H6: In the context of TECEE, wealth will be positively related to favorable rule of law climate

Researchers such as Norris (2001), Barker (2005), Caselli and Coleman (2001), Karunasena et al. (2011), and the WEF (2011) found that low level of educational attainment and illiteracy negatively impacts social change and the growth of an information society. The UN human capital index, which encompasses average years of schooling (across the three main levels) in populations, as well as literacy rates, captures this social measure across countries. Moon et al. (2005) and Singh et al. (2007) found the human capital index to be positively related to E-gov maturity across countries. The findings in their studies are suggesting that the capability to utilize innovation such as E-gov for development purposes is relatively high for countries with quality human capital resource. That is, top-end features on government websites may be appreciated, demanded, and supported by individuals in countries with a pool of quality human capital compared to where such are lacking. We predict that:

H7: In the context of TECEE, human capital development will be positively related to E-gov maturity

The Transparency International (2010) publishes the Corruption Perceptions Index (CPI) of countries around the world by comparing the degree “to which corruption is perceived to exist among public officials and politicians.” Corruption and a lack of transparency denote abuses related to a lack of openness and abuse of entrusted power. In general, more open societies with a more enlightened public sector governance structure affording more transparency to government operations would

appreciate a need to take their E-gov schemes to levels where citizen participation, engagement and empowerment are encouraged (Kovačić, 2005; Islam, 2008). Previous studies have shown that corruption/transparency perceptions are significantly associated with E-gov progress and diffusion across nations (Azad et al., 2010; Bertort et al., 2005; Cho & Choi, 2004; Kovačić, 2005; Islam, 2008). We predict that:

H8: In the context of TECEE, transparency levels (i.e. low corruption perceptions) will be positively related to E-gov maturity

Prior researchers such as Singh et al. (2007), Norris (2001), Moon et al. (2005), and Azad et al. (2010) showed that innovative technologies spread where enabling technological infrastructure are present. In the context of the diffusion of E-gov globally, Moon et al. (2005) found that the more technologically advanced (i.e. a higher level of technological infrastructure) a country is, the more likely it is for the country to advance its E-gov projects and agenda. Likewise others, Singh et al. (2007) and Azad et al. (2010) found that the availability of technological infrastructure positively influences E-gov maturity across nations. We predict that:

H9: In the context of TECEE, the availability of technological infrastructure will be positively related to E-gov maturity

When governments adopt E-gov, they tend to do so to improve public administration efficiency (Fountain, 2001; UN Public Administration Programme, 2010; West, 2004; Wong & Welch, 2004; Srivastava & Teo, 2008). The availability of fully connected, integrated services between governments and their citizens enhance government operations as well as engender citizens' satisfaction (Fountain, 2001; Moon, 2002; UN Public Administration Programme, 2010). Srivastava and Teo (2008) and Singh et al. (2007) revealed that there is a significant association between government efficiency and E-gov development and maturity. These researchers found that efficient governments easily appreciate the need to use advanced E-gov features to improve governance in their contexts. We predict that:

H10: In the context of TECEE, government efficiency will be positively related to E-gov maturity

Rule of law refers to the sound political institutions, impartial systems, and legal protection of property rights in a country (Shih et al., 2005). Prior studies have shown that it impacts the diffusion of e-commerce and E-gov (Oxley & Yeung, 2001; Welch & Wong, 2004; Katchanovski & La Porte, 2005). It has been suggested that countries from emerging parts of the world lag behind advanced countries in technological innovations such as E-gov because of weak and or non-existent national governance institution factors such as rule of law (Azad et al., 2010). It is reasonable to expect that where favorable rule of law exists, there will be little or no problems in instituting advanced features that facilitate citizen participation and empowerment in governance. Conversely, where a serious rule of law issues exist, such progress may be curtailed; discussions on this issue have been presented in the context of some TECEE (please see for example, Alexander, 2004; Levada, 2004; Katchanovski & La Porte, 2005; McHenry & Borisov, 2006). Welch and Wong (2004) and Kovačić (2005) indicated that the authorities of countries with poorer "rule of law" may have little or no interest in providing advanced features on their websites that would encourage citizen engagement and empowerment as such enhancement may be deemed to engender dissent. We predict that:

H11: In the context of TECEE, rule of law will be positively related to E-gov maturity

4. Research method

4.1 Data sources and measures

We used data sourced from reputable world organizations such as the United Nations and the World Bank. Previous comparable research that has used data from such sources include Azad et al. (2007), Katchanovski & La Porte (2005), Kovačić (2005), Singh et al. (2007), and Siau & Long (2006). The human capital index that was obtained from the UN Public Administration Programme (2010) is derived from measures related to the educational attainment and literacy levels across the selected countries. The rule of law and government efficiency variables were obtained from Kauffman et al. (2009) who composed their data from both qualitative and quantitative sources. The rule of law and government efficiency scores ranged from +2.5 and -2.5 with higher scores indicating better

values. The data for the transparency levels variable came from the Transparency International (2010) for which the scores ranged from 0 to 10 with higher numbers indicating less corruption and more transparency societies.

The GDP per capita was obtained from the World Bank's Development Index (World Bank, 2010). The GDP per capita variable was transformed and normalized with a logarithmic function. Each country's technological infrastructure level was assessed using a weighted index comprised of Internet users/1000 persons, PCs/1000 persons, telephone lines/1000 persons, online populations, mobile phones/100 persons, and TVs/1000 persons (UN Public Administration Programme, 2010). Each country's technological infrastructure level was assessed using a weighted index comprised of Internet users/1000 persons, PCs/1000 persons, telephone lines/1000 persons, online populations, mobile phones/100 persons, and TVs/1000 persons (UN Public Administration Programme, 2010). The description of the variables is provided in the Appendix.

For the dependent variable, we used two variables i.e. the Web/online services and E-participation indices from the UN Public Administration Programme (2010). We did not aggregate the aforementioned indices in operationalizing the E-gov maturity variable as was the case in Singh et al. (2007). Our use of the structural equation modeling technique is capable of handling both indices as latent constructs, in our research model. In order to have a fair representation of countries from TECEE, E-gov scores at all levels i.e. above and below scores for the region's average as well as scores close to the average were considered from the UN Public Administration Programme's data source. The selected TECEE in the research and some of the indicators used in the research are shown in Table 2.

Table 2: Selected TEECE and some of the indicators used in the study

Country	***Leaders TECEE***			
	GDP per capita (2003)	GDP per capita (2010)	Web measure (WM)/Online services index (2003)	Web measure (WM)/Online services index (2010)
Czech Republic	$15,300	$24,900	0.349	0.454
Estonia	$10,900	$18,500	0.642	0.502
Hungary	$13,300	$18,800	0.312	0.505
Latvia	$8,300	$14,400	0.266	0.416
Lithuania	$8,400	$15,500	0.524	0.483
Poland	$9,500	$17,900	0.541	0.387
Slovakia	$12,200	$21,100	0.380	0.346
Slovenia	$18,000	$27,700	0.441	0.400
Mean	$11,987.50	$19,850	0.432	0.437
Standard deviation	3437.79	19850.00	0.129	0.058
	Followers TECEE			
Bulgaria	$6,600	$12,500	0.537	0.410
Romanian	$7,400	$11,500	0.419	0.416
Russian Fed.	$9,300	$15,100	0.223	0.330
Ukraine	$4,500	$6,300	0.349	0.346
Belarus	$8,200	$12,500	0.122	0.302
Croatia	$8,800	$17,500	0.424	0.422
Rep. of Moldova	$2,500	$2,300	0.070	0.295
Georgia	$3,100	$4, 400	0.048	0.248
Mean	$6,300	$10, 263	0.274	0.346
Standard deviation	2630.00	5355.89	0.184	0.065

4.2 Procedure and the estimation model

Our data was composed of items collected over a 5-year data period (2003-5, 2008, and 2010) in a span of 7 years. Accordingly, the data used for analysis is a panel data (also known as longitudinal or cross-sectional time-series data). This procedure is appropriate in capturing the development of E-gov maturity in the selected countries over time. The advantage in using a panel data lies in the fact that it accommodates variations regarding changes in used variables; a single year study (cross-sectional

analysis) may not reflect such changes. For the data set of 16 countries, 80 points or observations were obtained, which is adequate for a study such as this one.

Additionally, a panel data takes the fixed-effects (FE) into consideration (Hedges & Vevea, 1998). With FE, it is assumed that each independent variable has its own individual characteristics that may or may not influence the dependent variable. Importantly, the FE removes the effect of those time-invariant characteristics from the predictor variables so that the predictors' net effect can be assessed. Thus, the pooled time series data enables precise estimates and test statistics with more power in the regression to be obtained. Having said that, this study's analysis will use the structural equation modeling technique, which is similar to the ordinary regression model (Chin, 1998). The main advantage of this technique is that it allows latent constructs to be used, and it enables the results of paths to be assessed simultaneously.

4.3 Analysis and results

The Partial Least Squares (PLS) approach of structural equation modeling technique, which utilizes a principle component-based for estimation, was used for analysis. The approach is suitable for validating predictive models (Chin, 1998). The PLS assesses the psychometric properties of the measurement model, and estimates the parameters of the structural model. The specific tool used was SmartPLS 2.0 (Ringle et al., 2005). The requisite information related to measurement model i.e. the average variance extracted (AVE) and composite reliability were not provided as the study's variables have items that were mainly operationalized by single-item variables). However, the item loadings for the two items used to represents the dependent variable were 0.907 (Web/online services) and 0.892 (E-participation) to underscore their reliability. The descriptive statistics and inter-correlations among the variables from the PLS analysis is presented in Table 3.

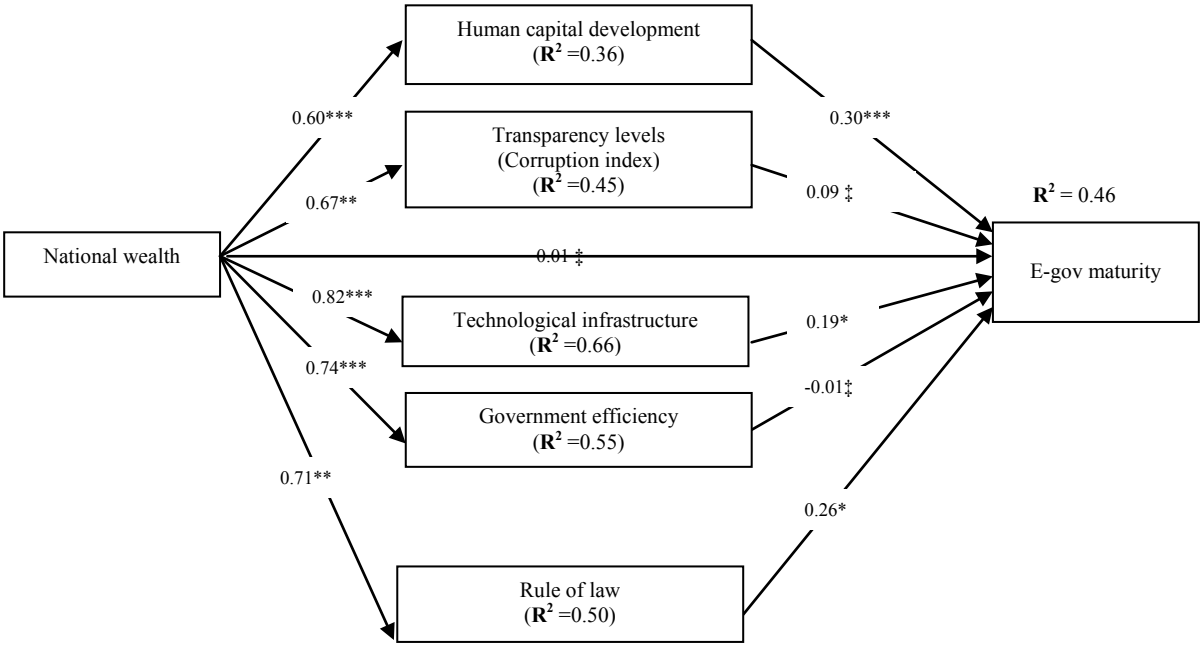
Table 3: Descriptive statistics and the inter-construct correlations (N = 80)

Variable	Mean	S.D.	1	2	3	4	5	6	7
1:EGovernment maturity i.e. Web measures index & E-participation index	0.34	0.15	1						
2:Human capital development	0.93	0.03	0.51	1					
3:Technological infrastructure	0.30	0.13	0.61	0.53	1				
4: Govt. efficiency	0.25	0.68	0.56	0.32	0.80	1			
5: Rule of law	0.05	0.71	0.57	0.33	0.79	0.95	1		
6:Transparency levels	3.95	1.25	0.56	0.41	0.78	0.81	0.82	1	
7: Wealth (GDP per capita $USD)	12310	6081.27	0.56	0.60	0.81	0.74	0.71	0.67	1

S.D. = Standard deviations

The structural model presents information related to path coefficients (β) and the squared R (R^2). The strength of the relationship is indicated by the β, which can be interpreted exactly like standardized regression coefficients. The R^2 shows the percentage of variance in the model to give an indication of its predictive power. The SmartPLS 2.0 results for the βs and the R^2 are shown in Figure 3. The path significance levels (t-values) are estimated by the bootstrapping method (Chin, 1998).

The data provided significant support for hypothesis H1, which predicted that in the context of TECEE, national wealth would be positively related to human capital development (β = 0.60). Hypothesis H2 that suggested that the national wealth of TEECE would be positively related to their transparency levels was affirmed by the data (β = 0.67). Hypothesis H3 indicating that the national wealth of TECEE would be positively related to E-gov maturity was however unsupported by the data (β = 0.01). The data showed that TECEE with higher levels of economic wealth tends to have higher technological infrastructure (β = 0.82) to support hypothesis H4. The data analysis provided support for hypothesis H5, which suggested that in the context of TECEE, national wealth would be positively related to government efficiency (β = 0.74). Hypothesis H6 was strongly supported as well to affirm the view indicating that in TEECE, national wealth was positively related to favorable rule of law climate (β = 0.71).



Note: * = significant at p < 0.05; ** = significant at p < 0.01; *** = significant at p < 0.001; ‡ = not significant

Figure 3: The hypothesized paths with results from SmartPLS 2.0

In the context of TECEE, human capital development will be positively related to E-gov maturity (H7), the hypothesis was confirmed by the data (β = 0.30). For TEECE, their transparency levels would be positively related to their E-gov maturity levels (H8) was unconfirmed by the path significance (β = 0.09). Support was provided for the prediction made in hypothesis H9 suggesting that in the context of TEECE, the availability of technological infrastructure would be positively related to E-gov maturity (β = 0.19). Hypothesis H10 that was formulated to ascertain the nature of the relationship between the variables of government efficiency and E-gov maturity was unsupported by the data (β = -0.01). The data provided significant support for hypothesis H11, which predicted that in the context of TECEE, rule of law would be positively related to E-gov maturity (β = 0.26).The summary of the results is presented in Table 4.

Table 4: Summary of results

Hypothesis	path coefficient (β)	Result
National wealth → Human capital development (H1)	0.60	Supported
National wealth → Transparency levels (H2)	0.67	Supported
National wealth → E-gov maturity (H3)	0.01	Not supported
National wealth → Technological infrastructure (H4)	0.82	Supported
National wealth → Government efficiency (H5)	0.74	Supported
National wealth → Rule of law (H6)	0.71	Supported
Human capital development → E-gov maturity (H7)	0.30	Supported
Transparency levels → E-gov maturity (H8)	0.09	Not supported
Technological infrastructure → E-gov maturity (H9)	0.19	Supported
Government efficiency → E-gov maturity (H10)	-0.01	Not supported
Rule of law → E-gov maturity (H11)	0.26	Supported

Information related to the variances explained by the study's constructs is presented in Figure 2. It is worth noting that all the research' constructs explained 46% of the variation in the research model to indicate that the theorized conceptualization has relevance. Specifically, Chin (1998) noted that R^2 values of 0.67, 0.33, and 0.19 for the percentage of variance in a model are substantial, moderate and weak, respectively. Thus, the obtained R^2 in this study with a value of 0.46 suggests that the percentage of variance in the research model is above moderate levels.

5. Discussions

Research findings presented above present information related to the determinants of E-gov maturity in TECEE. While IS, public administration researchers, and practitioners around the world have provided relevant information related to the possible impacts of a variety of macro-environmental factors on the diffusion and adoption of E-gov initiatives globally, the review of the extant literature

showed that studies discussing the determinants of E-gov maturity in TECEE are not well represented. This current research is primarily designed to fill this gap in the literature. Discussions on unconfirmed hypotheses are presented first followed by the ones that were supported. It is also important to assert that our discussions will be made in the context of the results obtained from our study. We accept that due to the limitations imposed on this study, realities across the countries in Central and Eastern Europe with regard to E-gov maturity may differ somewhat from what is being presented herein.

Our research model did not provide evidence in support of the positive, direct associations between national wealth and E-gov maturity, in the context of TEECE. Also, the transparency levels and government efficiency variables were not found to be positively related to E-gov maturity in our study. These unconfirmed hypotheses do not, in any way, affirm that such factors have no bearings on E-gov maturity issues in TECEE and elsewhere. For instance, the lack of support for the relationships between rule of law and E-gov maturity are counterintuitive propositions, which need further investigation. One plausible reason for the unconfirmed predictions in our research may be due to incomplete and missing data of some of the measures used in the research. Another explanation could be that socio-political factors of government efficiency and transparency levels may actually have little or no impact on the concept of E-gov maturity across countries complying with findings in Singh et al. (2007. It could also be possible that the variable of transparency levels may not be conceptually related to E-gov maturity (Azad et al., 2010; Kovačić, 2005; Singh et al., 2007). However, more studies are needed to debunk or reify insights on the relevance of the foregoing construct on E-gov issues.

Contrary to widely held beliefs among some E-gov experts suggesting that notable progress in E-gov development, diffusion, and maturity appear to have taken place in relatively richer societies (e.g. Norris, 2001; Moon et al., 2005; West, 2007; Azad et al., 2010), the analysis with data from TEECE - with two distinct groupings being used - seem to indicate that the availability of national wealth *per se*, may not be sufficient a factor to occasion growth with respect to E-gov maturity in the region. To some degree, our result is congruent with new insights noting that remarkable progress have in fact been recorded in relatively poorer countries around the world (Accenture, 2001; InfoDev, 2004; InfoDev, 2004; UN Public Administration Programme, 2010). The data analysis seems to uphold the notion indicating that some of the determinants considered in our study mediate the relationships between national wealth and E-gov maturity.

With respect to the supported hypotheses, we offer the following comments: our research's conceptualization does not imply causation in the model. Where national economic wealth is sufficiently available, the human capital development of such societies tends to be relatively higher as the data analysis has shown. This result is consistent with the RBV. Our data confirmed that higher levels of national wealth are positively related to the pervading transparency levels in TEECE. The data confirmed the notion indicating that economic resources are likely to be vitally important to governments and their citizens in their bids to acquire requisite technological products (e.g. hardware and software) to further enhance E-gov initiatives. We found that higher levels of national wealth have positive relationships with both government efficiency and rule of law. Consistent with the CT and the RBV, higher levels of national wealth in TECEE suggest that such countries are more likely to have the capacity to develop their human capital resource, have an enabling technological infrastructure, and a favorable rule of climate in their contexts. With such foregoing resources, it is easy to argue that a platform for engendering social change and progress through E-gov advancement can be instituted.

The data showed that higher pools of quality human capital resource have positive effects on E-gov maturity. In that regard, our result in this aspect implies that quality human resource in TECEE seems to augur well for the deployment and use of advanced E-gov features in their contexts. Greater capabilities and knowledge can permit a better understanding and appreciation of advanced technological products like those present in websites with higher-end features. Prior research has shown that human capital development boded well for E-gov expansion (Norris, 2011; Wong & Welch, 2004; West, 2007). The data strongly confirmed that the selected TECEE with more technological amenities were the ones that had more favorable E-gov maturity scores. It is reasonable to believe that citizen engagement and empowerment through sophisticated technology-enhanced platforms can only thrive where the necessary, enabling infrastructure is available (Norris, 2001; Azad et al., 2010; Moon et al., 2005; West, 2007). As well, where favorable rule of law climate exists, the political institutions in such TECEE may have a belief that citizen engagement and empowerment through

sophisticated technology-enhanced governance augurs well for their society (Katchanovski & La Porte, 2005; Azad et al., 2010; Kovačić, 2005; Wong & Welch, 2004).

5.1 Implications for research and practice

Our research presents some useful implications for both research and practice. With regard to research, we have attempted to answer the call for researchers to focus on E-gov development issues in emerging economies of the world, including TECEE to deepen our understanding of the phenomenon. Our paper has contributed to the theories of CT and RBV by extending their applications to E-gov maturity. Future research in the area could draw from and expand on the foregoing theoretical underpinnings and concepts in discussing comparable issues. Our findings provide support to espoused views and observations indicating the significance of factors such as national wealth, human capital, technological infrastructure, rule of law, and transparency levels on E-gov diffusion, development, and maturity in the literature (e.g. Azad et al., 2010, West, 2007, Moon, 2002; Moon et al., 2007; Singh et al., 2007; Wong & Welch, 2004; Kovačić, 2005; Katchanovski & La Porte, 2005).

We also deepen insight related to the impact of national wealth in stimulating growth in E-gov initiatives across countries. Likewise, we provided empirical analysis highlighting the roles of transparency levels and government efficiency on E-gov maturity, at least in the context of TEECE. In general, our research efforts benefit the accumulation of knowledge in this area of study. It is worth noting that previous research on E-gov issues in TECEE has used a single nation or a few countries in their analysis. By using a panel data of 16 TEECE, our effort provides a richer and robust insight into E-gov issues. Other researchers may be enticed to follow our approach in this regard, which is not entirely novel. By not focusing attention solely on the direct relationships between the independent and dependent variables in our study, we have avoided one of the commonly known mistakes in the use of CT for research studies (Ifinedo, 2007). Our work adds to Singh et al.'s (2007) model.

With regard to practice, our study also offers implications for policy makers, international agencies, and public administrators. Governments of TEECE are alerted to the salient factors that could serve as possible determinants of E-gov progress in their contexts. Accordingly, more attention may be placed on such noted factors to enhance E-gov maturity in their settings. The attention of international agencies and public administrators are drawn to the fact that national economic considerations and imperatives may not be a direct driver of E-gov maturity. Rather, such a factor constitutes an enabler in the background. In other words, if public administrators are able to properly marshal economic resources available to them in improving the quality of their human resource as well as procuring required technological infrastructural facilities; it is likely that positive outcomes on the E-gov development front will ensue. To that end, financial support from relevant sources may be called upon to accelerate investments in infrastructural acquisitions that relatively poorer nations in the region may be lacking in order to improve their E-gov capabilities.

Regarding the impacts arising from selected socio-political influences, policy makers need to know that while favorable rule of law climate may be conducive to E-gov maturity and advancement, an efficiently run government does not necessarily guarantee progress with regard to how it fares in incorporating advanced E-gov features aimed at improving citizen engagement and empowerment. Adequate focus and well-defined national IS/IT policy as well as benchmarking progress in comparable countries could be beneficial in pointing the way for policy makers (Accenture, 2001; InfoDev, 2004; UN Public Administration Programme, 2010; Eastern European e-Gov Days, 2011). Likewise, E-gov maturity does not hinge on how transparent or corrupt a country is. In fact, results in the E-gov survey of UN Public Administration Programme (2010) showed that E-gov maturity were higher in some corrupt societies than more transparent ones, which exists in TEECE as well. Policy makers and governments in comparable regions of the world such as South East Asia and elsewhere may benefit from this information.

5.2 Limitations and directions for future study

Our research has its limitations. Our research relied on secondary data sources; as such, it is difficult to ascertain with certainty the reliability and validity of items used in composing the various measures. Our dependant variable i.e. the E-gov maturity indicator largely used the assessment of efforts on governments' websites; the views of citizens are not represented. Thus, this might be limiting given that citizens' perceptions and expectations of E-gov initiatives may be dissimilar from those of their

governments'. The lack of an internationally recognized 'E-gov maturity' indicator may have its drawbacks. Some of the items we used had missing entries for some of the countries and some data were not up-to-date; these might have negatively impacted the data analysis. In selecting the countries for this research we used the UN Public Administration Programme's (2010) E-gov scores to guide the selection. Notwithstanding, selection bias cannot be ruled out in our research. In fact, we caution against the generalization of our findings to all countries in Central and Eastern Europe.

The amount variation explained in our dependent variable i.e. 46% suggests that other relevant factors such as cultural norms and values, political actors' actions, citizen awareness and resistance not included in our study could be relevant. Future studies should endeavor to work with a more comprehensive framework that includes such factors. Our study was limited to a five-year observation period; it is advised that as more data become available, a much longer observation period should be considered to enhance insight. Other researchers could replicate this study in other comparable contexts such as the Middle East, South Asia, Sub-Saharan Africa, and Latin America. Accumulated body of knowledge on the possible determinants or drivers E-gov maturity across the regions of the world is welcoming to theory development. Case studies in TEECE and elsewhere could also be considered to deepen our understanding in the area.

6. Conclusion

We used the contingency theory and the resource-based view to guide our discourse of the determinants of E-gov maturity in TEECE. We employed a panel data of 16 countries in the region to provide insight. Our data analysis showed that that resources (e.g. national wealth, human capital development, technological infrastructure, and rule of law) matter in accelerating a country's the ability and willingness to advance its E-gov initiatives with features that promote citizens' participation and engagement. The confirmed hypotheses are congruent with similar prior studies and serves to enhance our understanding of the factors that could be perpetuating the progress of E-gov in selected TEECE. The unconfirmed predictions open up an opportunity for further investigations. The attention of policy makers in the region is drawn to factors or issues deserving of further attention as progress is being made in the area. The replication of this study in other emerging and developing parts of the world will be useful to improve knowledge related to the factors impacting E-gov maturity (or lack thereof) in such contexts.

7. Appendix: The research's data sources

Variable	Assessment/definition	Source	Notes
E-gov maturity	The Web measures and online services index provides scores for the online services available in each country's web pages. The E-participation index assesses the extent to which ICT-supported participation in processes of governance is enabled.	UN Public Administration Programme (2010)	The Web measures/online services index was added to the E-participation index. The data analyses with the two variables' average produced an analogous result to the one discussed herein.
GDP per capita	The value of all goods/services produced within a country in a given year divided by the country's population for the same year.	World Bank (2010)	Each country's data is expressed in the US dollar ($).
Technological infrastructure level	Assessed by a weighted index comprised of Internet users/1000 persons, PCs/1000 persons, telephone lines/1000 persons, online populations, mobile phones/100 persons, and TVs/1000 persons	UN Public Administration Programme (2010)	
The human capital development index	Derived from measures related to the educational attainment and literacy levels across countries	World Bank (2010)	
Rule of law	The extent to which sound political institutions as well as	Kauffman et al. (2009)	Composed by data from more than 20

	legal protection of property rights is permitted in a country.		sources, including qualitative and quantitative sources. The scores for each country ranged from +2.5 and -2.5 with higher scores indicating better values.
Government efficiency	The extent to which governments use available mechanisms and to promote and support their functions.	Kauffman et al. (2009)	The scores for each country ranged from +2.5 and -2.5 with higher scores indicating better values.
Corruption/transparency perceptions	The degree to which corruption is perceived to exist among public officials and politicians of a country.	Transparency International (2010)	The scores ranged from 0 to 10 with 10 indicating less corruption and more transparency.

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