

Moderating Information and Communication Technologies Influences on: Socioeconomic Development With Good Governance in the group of OECD and OPEC selected countries

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Abstract

With the increasing globalization of the world economy, there has been a growing interest in the potential contributions of good governance to accelerating the rate of economic and social development in the developing countries, and enhance their smooth integration into the emerging global economy. Simultaneously, developed economies are experiencing an increasing proportion in the contribution of knowledge, information, and telecommunication sectors to their overall gross domestic product. This is placing increased focus on the role and contribution of national information infrastructure to economic productivity, and in extension, to the economic and social development of nations. In this article, the authors explore the link between information and communication technologies (ICTs), governance, and social economic development in the group of OECD and OPEC selected countries. They empirically conclude that contributions of ICTs to social–economic development are influenced by sociopolitical governance leading to national development through more prudent and egalitarian application and use of the ICTs' portfolio. The contingent role of governance on ICTs and national development paves the path towards recognizing the importance of sociopolitical moderators.

Key Words: Information and Communication Technology; Good Governance; Economic Development; Social Development

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Introduction

In 1967, McLuhan's remark that "the new electronic interdependence recreates the world in the image of a global village" popularized the phrase "global village" (McLuhan & Fiore, 2003). The global village suggested a utopian inter-dependence bringing equality around the globe. Nearly half a century later, one wonders whether the phrase was reality or rhetoric. Have information and communication technologies (ICTs) enabled individuals belonging to all types of social systems a voice to express themselves? Specifically, have ICTs led to socioeconomic development? In a statement at the World Summit on the Information Society, the United Nations Secretary-General Kofi Annan noted, "A technological revolution is transforming society in a profound way. If harnessed and directed properly, Information and Communication Technologies have the potential to improve all aspects of our social, economic and cultural life" (ITU, 2002). However, harnessing and directing ICTs is contingent upon good governance. Our aim in this article is to examine the contingent role of governance on ICT-led socioeconomic development. It empirically investigates the relationship between ICTs and accrued social benefits in OECD and OPEC countries.

Here we assess the moderating effects of governance on ICT-led socioeconomic development in the context of OECD and OPEC nations. We begin by examining the role of good governance in national development. Thereafter, the role of governance in socioeconomic development is examined. A research framework relating ICTs to governance is proposed. We then empirically evaluate the research model by conducting a multiple regression analysis using data collected from OECD and OPEC countries (2001-2012). Results and key issues from the empirical study are then discussed and implications are presented in the scope of this research.

Information and Communication Technologies and Good Governance

Previous research in information sciences (Dawes & Pardo, 1999; Fletcher & Westerback, 1999; Morgan & Cong, 2003) and development studies (Jessop, 1998) has connected technology with governance. The concept of governance is relatively young and refers to the collection of processes and institutions that create the conditions for ordered rule and collective action (Jessop, 1998; Kazancigil, 1998). In line with Jessop (1998) and Kazancigil (1998), Kauffmann, Kray, & Massimo (2003) use six aggregated indices for measuring the quality of governance that have been used over the past 3 to 5 years by the United Nations to assess governance quality in its member nation states:

1. Voice and Accountability concerns the civil liberties and political rights of individuals, their freedom of expression, electoral participation, and independence of media.
2. Political Stability and Absence of Violence involves the likelihood of premature overthrow of government (e.g., coup d'état), domestic violence and terrorism, and forced discontinuities in policies.
3. Government Effectiveness includes quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies and the delivery of public goods.
4. Regulatory quality is more focused on the policies themselves. It includes measures of the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burden imposed by excessive regulation in areas such as foreign trade and business development.

5. Rule of Law includes several indicators that measure the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. Together, these indicators measure the success of a society in developing an environment in which fair and predictable rules form the basis for economic and social interactions, and importantly, the extent to which property rights are protected.

6. Control of Corruption measures perceptions of corruption, conventionally defined as the exercise of public power for private gain. The presence of corruption is often a manifestation of a lack of respect of both the corrupter (typically a private citizen or firm) and the corrupted (typically a public official or politician) for the rules that govern their interactions, and hence represents a failure of governance according to our definition.

Governance is thus responsible for creating an environment that enables the participants in all aspects of the economy to easily evolve, learn and adapt while being publicly and openly accountable. Effective governance assures political stability, economic stability, peace, equitable distribution of power and national resources, and an environment conducive to investment and trade (Alcantara, 1998; Doe, 1998; Kazancigil, 1998; Sadowsky, 1996; Stoker, 1998).

Information and communication technologies assist in information flows and provide for a self-regulating communication network for governance. Through such a network, all the diverse interest groups in country can interact and reach consensus on issues of importance that are beyond the unitary control of one particular stakeholder (Antle, 1983; Firestone, 1995; Jackson, 1995; Noam, 1995; Sadowsky, 1993).

The role of ICTs in the development of nations, especially developing countries, is understood as a complex function including social development, economic development, and the contingent role of governance. Figure 1 depicts a model of the relationships among these variables. In this figure, each arrow represents a specific hypothesized relationship. Hypotheses concerning direct effects are shown as solid arrows while those concerning moderating effects are shown as dotted arrows. For example the solid arrow labeled H1 pictorially represents hypothesis one in this study. Therefore, as can be seen in Figure 1, the hypotheses concerning direct effects of a national information infrastructure (NII) on national development are labeled H1, for hypothesis one, and H2 for hypothesis two respectively, while those that concern the direct effects of governance on national development are labeled H3 and H4 to represent, respectively, hypotheses three and four of this study. The hypothesized moderating effects of governance are articulated as H5 and H6 and represent hypotheses five and six, respectively. In the ensuing three sections, we spell out these hypotheses and provide a detailed explanation of each.

The Effects of Information and Communication Technologies on Economic and Social Development

According to economic theory, an abundance of quality information yields more competitive economic markets (Berliant et al., 1998). Such markets optimize both the efficiencies and productivity of economic activities evidenced in commerce, trade, agriculture, manufacturing, and other value-creating sectors of the country's economy. Access to information and to the channels for information distribution depends largely on the nature of the nation's ICTs (Dawes & Pardo, 1999; Fletcher & Westerback, 1999) and are therefore linked to the rate of economic development.

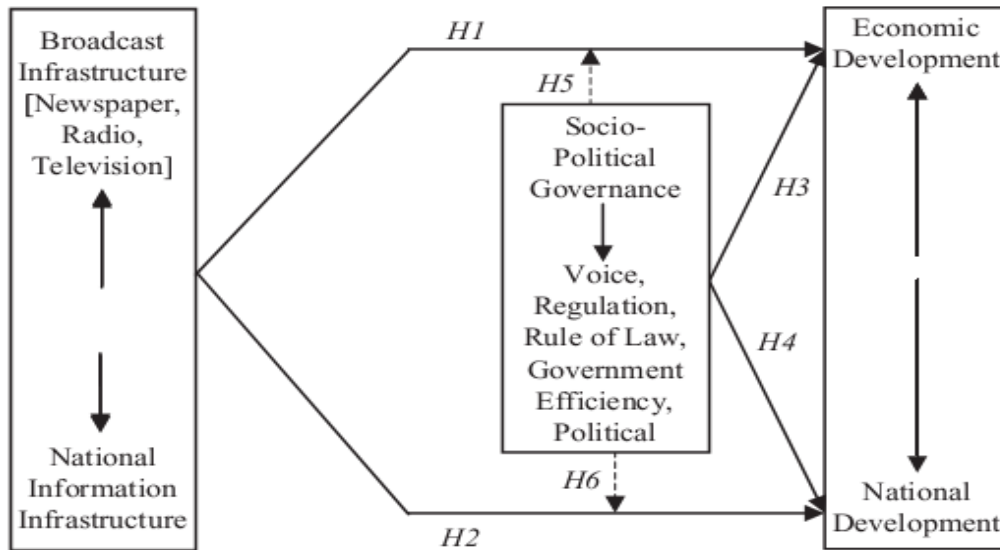


FIG. 1. Research model of direct and moderating effects between ICTs, governance, and national development.

Easy and plentiful access to quality information enhances the quality and levels of educational, health, and habitat services in a nation (Dawes & Pardo, 1999; Fletcher & Westerback, 1999). It enhances the awareness and knowledge of the nation's citizens resulting in higher nutritional, hygiene, habitat, economic engagement, and primary health care standards among the citizens. The net effect is an improvement in the social development of the nation owing to a better educated, healthier, more economically productive citizenry and better standards and conditions of living throughout the nation. Hence, our research questions and corresponding hypotheses:

Research Question 1: Does the reach and scope of a nation's ICTs affect the rate of economic and social development of OECD and OPEC nations?

Hypothesis 1 (H1): Information and communication technologies positively impact the rate of economic development within a nation.

Hypothesis 2 (H2): Information and communication technologies positively impact the rate of social development within a nation.

Effects of Good Governance on National Development

Governance provides direction to the development of social capital and the social underpinnings necessary for effective national development. By its very definition, governance is perceived as "the way in which power is exercised in the management of a country's economic and social resources with a view to development (Senarclens, 1998, p. 93)." Rhodes (1996) stated that governance signifies "a change in the meaning of government, referring to a new process of governing; or a changed condition of ordered rule; or the new method by which society is governed (pp. 652–653)." These new players impact a country's governance in significant ways much as the traditional government did, and influence the

direction of a nation state economic and social progress (Kazancigil, 1998; Office of Economic Cooperation and Development [OECD], 1997; Senarclens, 1998; Stoker, 1998).

Governance also impacts on the nature of political performance within a given country. A study by Kaufmann, Kray, and Zoido-Lobatan (1999a) established that governance influences social and economic development. Where effective governance mechanisms are in place the economic environment is equally and freely accessible by all participants. This enhances both foreign and domestic investment in the economy. Further, the level playing field ensured by effective governance infrastructure enhances competition between the diverse participants, and hence maximizes the efficiency in the distribution use of scarce resources (Kaufmann et al., 1999a; OECD, 1997).

An effective governance infrastructure will ensure stable attainment of equilibrium in the economic and social markets of all goods and services within a country. It will also ensure an effective supply of the desired goods and services. This not only enables prices to be maintained at the most competitive levels, but also ensures that all existing demand is satisfied. Through the participation of multiple institutions, each enjoying unique power positions, effective governance infrastructure enables the economy to be self-regulating. The competing interests of the diverse participants dilute monopolistic and oligopolistic behavior, and enhance the ability of new participants to infiltrate the market easily (Alcantara, 1998; Economic Commission for Africa, 1998; Jessop, 1998; Senarclens, 1998). This leads to our second research question and corresponding hypotheses:

Research Question 2: Does effective governance influence the rate of economic and social development of OECD and OPEC nations?

Hypothesis 3 (H3): Governance influences the rate of economic development within a nation.

Hypothesis 4 (H4): Governance influences the rate of social development within a nation.

Contingent–Moderating Effects of Good Governance on Information and Communication Technologies’ Infrastructure and National Development

The level of development in the nation’s ICT infrastructure is expected to significantly impact social and economic development in any country. The quality and levels of democracy, political freedom, civil liberties, the accountability and transparency of central and local government units, the increased participation of nongovernment and private sector institutions in the policy formulation, monitoring and implementation, and the levels of political and country specific risk—all of which are integral components of good governance (Nasir, 2001; Wohlmuth, 1998). Using Africa as a platform for analysis, Wohlmuth (1999) finds that good governance enhances easy and plentiful access to information— a prerequisite to providing higher levels of service quality (Jorgenson & Stiroh, 2000). What has generally been over-looked is that sectoral development in national economies is not a sole product of its ICT infrastructure but is contingent upon sociopolitical governance (Wohlmuth, 1998).

The nature of the sociopolitical system and the political performance of a country along with its ICTs are expected to impact its socioeconomic development. When combined, a well-developed ICT infrastructure along with political stability, civil liberties, and democratization of the country as well as the accountability and transparency of sitting government complement each other to add towards national development. Political stability is the measure of the degree of turbulence in a country. Literature on

economic development and international finance indicates that a particular country's level of political stability directly influences the risk associated with investing in that country. The greater the degree of turbulence the more risky it is to invest in the country (Palvia, 1997; Sadowsky, 1993).

It can be argued that the nature of a country's ICT infrastructure along with effective governance mechanisms set in place by public policy can lead to increased levels of transparency and accountability (Park, 2002). Transparency refers to the degree of awareness by local citizens about all the key issues affecting the survival, performance, and well-being of the nation. When the larger majority of citizens are fully informed about these key issues and how they affect their country's future, there is a lower probability that the actions or decisions of any one group or sector will adversely affect the overall performance of the economy (Economic Commission for Africa, 1998). Therefore, increased transparency and accountability are a check against undue influence by any one entity in the determination and management of national interests. A transparent and accountable governance system clearly and publicly identifies parties responsible for particular decisions and actions, generating requisite pressure for high integrity and judicious execution of responsibility by civil servants and public agencies. In so doing, it discourages the engagement of stakeholders and decision makers in such vices as corruption and graft. Further, when the larger majority of citizens are fully informed about the key issues that affect a country's future and actively participate in the determination of these issues, no individual entity can influence the governance system so radically as to alter the prevailing level of political stability in the nation. Given that easy and adequate access to information is made possible by a well-developed national ICT infrastructure, the extent of development of this infrastructure plays a significant role in optimizing the governance system within a given nation. Therefore, we posit that the ICT infrastructure affects the quality of governance.

Within a democratic system of governance, increased transparency forces the government to be more accountable to its citizens regarding issues of national and economic development (Economic Commission for Africa, 1998). In a bid to ensure its continued re-election, the government may seek to become more efficient in its allocation and use of resources. As resources are used more effectively, economic productivity may increase, while the risk associated with investing in the economy may decrease. Thus, the net result may be a growth in the rate of social and economic development. This leads us to our third research question and corresponding hypotheses:

Research Question 3: Are there moderating effects caused by sociopolitical governance on the relationship between ICTs and social development, and between ICTs and economic development of developing nations?

Hypothesis 5 (H5): Governance moderates the relationship between ICTs and economic development.

Hypothesis 6 (H6): Governance moderates the relationship between ICTs and social development.

Methodology

The hypotheses were examined via a cross-sectional analysis of developing nations using secondary data obtained from world development indicators on governance and ICT infrastructure. Details of the research design are as follows.

Information and communication technologies are operationalized as a combination of broadcasting ICT and interactive ICT. As Tapscott (1996) notes, the ICT infrastructure is a gradual convergence of broadcasting content, telecommunications, and computing. Following Tapscott (1996), we consequently refer to newspaper, radio, and television as the broadcast (mass media) ICT infrastructure and computers, telephone, and Internet as the interactive ICT infrastructure. Broadcast ICT infrastructure is quantified as the summated effects of the average newspaper circulation density, radio ownership density, and television ownership density (per 1,000 people) between 2001 and 2012. Assuming that each of these technologies can be equally weighed, interactive ICT infrastructure is quantified as the summation of average computer ownership, Teledensity, and Internet access (per 1,000 people) between 2001 and 2012. We obtained most data from the site of World Bank. Only data relating to broadcast ICT (newspaper, radio, television) has been obtained from the site of International Telecommunication Union (ITU) and the site of UNESCO.

Social development was operationalized using a summation of two indices: average rate of change in life expectancy and literacy between 2001 and 2012. Economic development was operationalized via one variable: average change in gross domestic product (GDP) between 2001 and 2012. Because of the variance spread for both social and economic development, they are normalized by natural log transformation.

In this study we used cross-sectional data in order to testing suggested theories and answering to the questions of research. Theories for elected method in 2001-2012 have been analyzed for two groups of following countries in order to providing opportunity for analyzing different conditions of governance and its effectiveness on national development with information technology and communication.

First group (9 countries): OPEC countries including: Algeria, Indonesia, Iran, Kuwait, Libya, Saudi Arabia, United Arab Emirates, Venezuela, Iraq.

Second group (12 countries): OECD countries including: United States, Japan, Finland, France, Germany, Spain, Sweden, United Kingdom, Australia, Canada, Italy, Portugal.

Data Analysis

The specific multiple regression analysis technique used to empirically examine the direct and moderating effects of ICT infrastructure on governance and national development in this study is the stepwise regression analysis. The soft-ware used for this statistical analysis was SPSS Version 21 and Excell. In this section we briefly discuss the data analytical techniques behind testing moderating effects and the stepwise regression technique in general.

As noted earlier, governance influences national economic productivity as a moderator. As a moderator, governance affects the form of the relationship between ICTS and economic development, complementing the direct bivariate effects leading to the explanation of the relationship. The moderating effect of governance is represented as a compound variable formed by the interaction or cross-product terms. A heuristic is used to ascertain moderating effects. If the estimate from the R^2 of the moderated relationship is statistically more significant than the unmoderated estimate (linear effects only), the moderating role is assumed to be valid. The direct effects and moderated effects regression models are represented below:

Direct effects:

$$\ln \text{EconDev} = b_0 + b_1 \text{BRINF} + b_2 \text{ITINF} + b_{3\dots 9} \text{GOV}_{1\dots 6}$$

and

$$\ln \text{SocDev} = b_0 + b_1 \text{BRINF} + b_2 \text{ITINF} + b_{3\dots 9} \text{GOV}_{1\dots 6}$$

Moderated effects:

$$\ln \text{EconDev} = b_0 + b_1 \text{BRINF} + b_2 \text{ITINF} + b_{3\dots 9} \text{GOV}_{1\dots 6} + b_{10\dots 15} \text{BRINF} * \text{GOV}_{1\dots 6} + b_{16\dots 21} \text{ITINF} * \text{GOV}_{1\dots 6} + e_1$$

and

$$\ln \text{SocDev} = b_0 + b_1 \text{BRINF} + b_2 \text{ITINF} + b_{3\dots 9} \text{GOV}_{1\dots 6} + b_{10\dots 15} \text{BRINF} * \text{GOV}_{1\dots 6} + b_{16\dots 21} \text{ITINF} * \text{GOV}_{1\dots 6} + e_2$$

where,

BRINF = Newspapers + Radios + Televisions

ITINF = Telephones + Computers + Internet

EconDev = Gross Domestic Product

SocDev = Literacy + Life Expectancy

$b_1 \text{BRINF}$ = Linear Effect of Broadcast ICT Infrastructure

$b_2 \text{ITINF}$ = Linear Effect of Interactive ICT Infrastructure

$b_{3\dots 9} \text{GOV}_{1\dots 6}$ = Linear Effect of Sociopolitical Governance Variables (Voice, Political Stability, Regulatory Efficiency, Government Efficiency, Rule of Law, and Corruption Control)

$b_{10\dots 15} \text{BRINF} * \text{GOV}_{1\dots 6}$ = Moderator Effects of Sociopolitical Governance on Broadcast ICT Infrastructure

$b_{16\dots 21} \text{ITINF} * \text{GOV}_{1\dots 6}$ = Moderator Effect of Sociopolitical Governance on Interactive ICT Infrastructure

$\ln \text{EconDev}$ = Natural Log of Rate of Economic Development

$\ln \text{SocDev}$ = Natural Log of Rate of Social Development

The complexity of “governance” as a theoretical construct faces the inclusion of a plethora of variables. However, the role of some of these variables may be redundant, leading to a multiplicity of factors. These factors, when entered into a regression, overestimates fit but do not add any distinct theoretical significance. As the principle of Occam’s razor indicates, theoretically redundant variates should not be multiplied unnecessarily. Stepwise regression allows for the sequential development of a statistically defined nonredundant theoretical model that completely maps the underlying data.

Multicollinearity in the model was assessed by examining the Pearsonian product-moment correlation (r) matrix between antecedents, moderators, and outcomes (Tables 1, 2). According to Grover, Fiedler, and Teng (1999), bias creeps into the regression model when correlations between independent variables

exceed 0.5 and become serious over 0.7. As Tables 1 and 2 indicate, the few high inter variable correlations do seem to attribute to a systematic bias in the multivariate analysis. Here, the use of a stepwise regression technique serves to mitigate the bias by introducing within the statistical model only non redundant significant variables with the most explanation power. Because an assumption behind stepwise regression is that input variables that are redundant (multi collinearity) also suffer from a lack of explanatory effect on the outcome. Following this assumption, stepwise regression eliminates the presence of redundant antecedents and includes only the ones that offer significant explanatory effect in the model. This technique supports non redundant variable selection and eliminates problems stemming from multi collinearity.

TABLE 1. Interveriable correlation matrix of OECD countries.

correlation	Voice	Political Stability	Government efficiency	Regulatory Quality	Rule of law	Corruption control	Telephone	Computers	Internet	News paper	Radio	Television	Economic dev	Social dev
Voice	1													
Political Stability	0.47**	1												
Government efficiency	0.74**	0.44**	1											
Regulatory Quality	0.72**	0.21*	0.78**	1										
Rule of law	0.73**	0.44**	0.92**	0.81**	1									
Corruption control	0.79**	0.5**	0.93**	0.81**	0.94**	1								
Telephone	0.28**	-0.022	0.36**	0.3**	0.38**	0.39**	1							
Computers	0.037	-0.065	0.071	0.23**	0.23**	0.104	-0.11	1						
Internet	0.31**	0.093	0.42**	0.53**	0.57**	0.47**	0.13	0.88**	1					
Newspaper	0.54**	0.47**	0.44**	0.36**	0.45**	0.52**	0.22**	0.12	0.32**	1				
Radio	0.47**	0.36**	0.42**	0.2*	0.39**	0.42**	0.34**	0.16	0.27**	0.79**	1			
Television	0.52**	0.48**	0.41**	0.26**	0.38**	0.44**	0.14	0.14	0.29**	0.92**	0.92**	1		
Economic dev	-0.22**	0.28**	0.08	-0.18	0.1	0.07	0.05	0.14	0.28**	0.08	0.17*	0.15	1	
Social dev	0.37**	0.11	0.38**	0.43**	0.37**	0.36**	-0.16	0.38**	0.53**	0.21**	0.14	0.28**	0.02	1

**Correlation is significant at the 0.01 level (two-tailed).

*Correlation is significant at the 0.05 level (two-tailed).

TABLE 2. Intervariable correlation matrix of OPEC countries.

correlati on	Voice	Political Stability	Govern ment effi cien cy	Regulatory Quality	Rule of law	Corruption control	Teleph one	Compu ters	Intern et	Newsp aper	Radio	Televis ion	Econo mic dev	So cial dev
Voice	1													
Political Stability	0.05	1												
Govern ment efficien cy	0.43**	0.7**	1											
Regulato ry Quality	0.45**	0.62**	0.85**	1										
Rule of law	0.25**	0.81**	0.88**	0.84**	1									
Corrupti on control	0.31**	0.77**	0.88**	0.81**	0.91**	1								
Telepho ne	0.05	0.6**	0.57**	0.3**	0.51**	0.58**	1							
Compute rs	-0.13	-0.01	-0.04	-0.05	-0.18	0.06	-0.04	1						
Internet	0.15	0.58**	0.66**	0.57**	0.58**	0.65**	0.5**	0.45**	1					
Newspa per	0.54**	-0.19*	0.12	0.08	-0.08	-0.13	-0.13	-0.23*	-0.17	1				
Radio	0.01	0.16	0.22*	0.33**	0.26**	0.23**	-0.14	-0.09	0.01	-0.18	1			
Televisi on	-0.14	0.38**	0.22*	0.35**	0.33**	0.26**	-0.02	-0.03	0.07	-0.35**	0.91**	1		
Economi c dev	0.07	-0.34**	0.07	-0.11	0.13	-0.13	0.02	-0.19*	-0.19	0.52**	-0.42**	-0.63**	1	
Social dev	-0.19*	0.08	-0.17	-0.19	-0.1	-0.15	0.31**	0.02	0.19*	-0.16	-0.08	0.06	-0.37**	1

**Correlation is significant at the 0.01 level (two-tailed).

*Correlation is significant at the 0.05 level (two-tailed).

Firstly, there is high correlation between the rule of law and government effectiveness in both our statistical community. In other words, the increasing of rule of law and government effectiveness indicates that legal pressure and the quality of bureaucracy cause the control of corruption. In OECD countries, there is high correlation among voice accountability and government effectiveness and rule of law and control of corruption that indicates with increasing rule of law the thought of people would be strengthen and voice accountability results government effectiveness and control of corruption. In OPEC countries there is high correlation among rule of law and regulatory quality and government effectiveness, so this indicates that by increasing rule of law, the legal relationship of market and its policies would be improved. And with government obligation by commitment its policies results to further government effectiveness. Finally in both groups of countries, Internet has significant correlation with other governance indicators.

Second. In both groups of countries there is positive relation among voice accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption. The positive relation proves this theory that each of political process is complementary for other one. This makes regressive relation among socio- political factors that increases the effectiveness of political process in country.

Finally, in OECD countries there is a regressive relation among ICT sections (newspaper, radio, television) although this relation among telephone, computer and internet is significant relation only between computer and internet. And in addition, there is positive relation between ICT infrastructure and increasing governance indicators, whereas in OPEC countries, among ICT indicators, telephone and Internet have most correlation with governance indicators. And newspaper has most correlation with voice accountability. And this indicates the importance of newspaper in OPEC countries as a tool for improving the indicator of voice accountability.

TABLE 3. Regression coefficients of direct and moderated effects proposed in hypotheses H1–H6 in OECD countries.

Hypotheses	BRINF	ITINF	POLITICAL	GOVERNMENT	ITPOLITICAL	ITGOVERNMENT	Excluded variables	Constant	R ²	F
H ₁ ECONDEV	0.101 (0.04)	0.24 (0.00)	-	-	-	-	Voice and Accountability, Regulatory Quality, Control of Corruption	9.45	0.56	8.42 (0.00)
H ₂ SOCDEV	-	0.41 (0.00)	-	-	-	-		4.82	0.16	27.14 (0.00)
H ₃ ECONDEV	-	-	0.39 (0.00)	-	-	-		9.07	0.71	9.61 (0.00)
H ₄ SOCDEV	-	-	-	0.27 (0.00)	-	-		4.77	0.22	20.07 (0.00)
H ₅ ECONDEV	0.11 (0.00)	0.38 (0.00)	-	-	0.36 (0.00)	0.26 (0.00)		9.97	0.43	21.93 (0.00)
H ₆ SOCDEV	-	0.4 (0.04)	-	-	-	0.48 (0.00)		4.86	0.23	43.79 (0.00)

TABLE 4. Regression coefficients of direct and moderated effects proposed in hypotheses H1–H6 in OPEC countries.

Hypotheses	BRINF	ITINF	VOICE	GOVERNMENT	BRVOICE	BRGOVERNMENT	ITCONTROL	Excluded variables	Constant	R ²	F
H ₁ ECONDEV	-0.339 (0.00)	-0.423 (0.00)	-	-	-	-	-	Political Stability, Regulatory Quality, Rule of Law	15.23	0.501	16.92 (0.00)
H ₂ SOCDEV	0.225 (0.025)	0.863 (0.00)	-	-	-	-	-		4.227	0.329	17.032 (0.00)
H ₃ ECONDEV	-	-	1.06 (0.00)	-	-	-	-		10.638	0.39	22.424 (0.00)
H ₄ SOCDEV	-	-	-0.19 (0.045)	-	-	-	-		4.48	0.037	4.101 (0.045)
H ₅ ECONDEV	0.487 (0.003)	-0.091 (0.00)	-0.372 (0.041)	-	0.876 (0.00)	0.882 (0.00)	0.356 (0.002)		11.932	0.658	23.853 (0.00)
H ₆ SOCDEV	-	0.669 (0.00)	-	0.234 (0.018)	0.194 (0.00)	-	-		4.36	0.74	76.82 (0.00)

Tables 3 and 4 show that the results of step to step for assumptions. There is no difference between the moderated effectiveness of model than direction effectiveness in OECD countries in terms of statistical significant. But in OPEC countries have most statistical significant. In OECD countries the effects of moderated governance variables, indicate reduced R² conditions for H₅ and H₆, but in OPEC countries indicate increasing R² conditions. Testing H₁ assumption illustrates the relation between ICT development and development of national economy. This assumption is acceptable in OECD countries but this assumption is not supported in OPEC countries. Also in both groups of countries the power of correlation is good. In OECD countries both broadcast infrastructure and ICT interactive infrastructures have positive relation with economic development.(b₁=0.101 and b₂= 0.24 respectively). In OPEC countries both ICT infrastructures have negative relation with economic development (broadcast infrastructure b₁= -0.339 and interactive infrastructure b₂= -0.423), that it can be due to economic tissue of these countries that achieved economic development in recent years in spite of increasing oil price, whereas ICT infrastructures suffer from many problems.

The H₂ assumption examines relation between ICT development and social development. This assumption is acceptable in both countries, although the power of correlation in group of OECD countries is 0.16, that this indicates ICT infrastructure only aren't enough to determination of rate social development. But in the group of OPEC countries, the power of correlation is mean (R²= 0.329). In group of OECD countries, ICT infrastructures are only significant (b=0.41). And have positive impact on the rate of social development. But in the group of OPEC countries both broad infrastructure and ICT

infrastructure ($b_1=0.225$ and $b_2=0.863$ respectively), have positive impact on the national social development.

These results indicate that ICT infrastructure is pertaining to increasing of the rate of social development. The impacts of governance on national economy and social development have been evaluated by H_3 and H_4 respectively. The results of testing is acceptable in both groups of countries for economic development, but for social development prove only the assumption for group of OECD countries and for group of OPEC countries, only the indicator of voice accountability has been significant, that indicates no position relation with social development. And also because of having low power correlation ($R^2=0.37$), we can rely on its results. In group of OECD countries high R^2 has been proved between economic development and indicator of good governance (political stability), $R^2= 0.71$ and for the group of OPEC countries, the power of correlation is mean ($R^2= 0.39$). And in both groups of countries the indicators of governance have positive relation with economic development (in group of OECD countries, indicators of political stability is $b= 0.39$ and in group of OPEC countries indicator of voice accountability is $B=1.06$) this shows that indicators of governance can be one of the conditions for economic development acceleration. Also for social development in group of OECD countries, there is positive relation between indicators of governance (government effectiveness $B=0.27$) And social development that enjoy $R^2=0.22$ And for OPEC countries enjoy of $R^2=0.037$. And the coefficient of governance indicator is -0.19 (voice accountability), this indicates that good governance can be one of the conditions for social development acceleration.

Governance as a moderating variable in the group of OPEC countries, has ganged the negative impacts on of ICT broadcasting infrastructure on economic development (H_5) to positive impacts ($b=-0.339$ to $B=0.487$). And decreased negative impacts of interactive infrastructure on economic development from $B= -0.423$ to $B= - 0.091$. Although in respect to interactive infrastructure, its negative impact reduced but this service indicates the lack of development indicators. Nevertheless changing from the negative impacts of ICT broadcast infrastructure to positive impact on economic development is significant, in respect to OECD, the ICT infrastructure impacts on economic development has increased. (broadcast infrastructure from $B=0.101$ to $B= 0.11$ and interactive infrastructure from $B=0.24$ to $B=0.38$). Overall, the results from testing testify the regression of H_5 assumption. The impact of broadcast infrastructure on social development in both groups of countries in H_6 assumption is not concrete. And also the impacts of interactive infrastructure on social development in H_6 in both group of countries (OECD from $b=0.41$ to $b=0.4$ and OPEC from $b=0.863$ to $b=0.669$) has decreased that not prove H_6 assumption.

These results indicate the impact of good governance for formatting of ICT infrastructures on national rate of social and economic development. In this regard, ICT policies for national development include measures that increase the level of governance. This matter results from the penetration of good governance that induces ICT infrastructure be impressive on national development.

In using stepwise regression we allowed to eliminate some of the surplus governance variables in this study in order to settling. These variables in group of OECD countries include voice accountability, regulatory quality and control of corruption and in group of OPEC countries include political stability, regulatory quality and rule of law. In the group of OECD, political stability and government effectiveness have been significant in both direction and moderated impacts and only governance variable included in direction impacts test. In addition to government effectiveness and voice accountability variables, control

of corruption has also been significant as moderating variables. As results show in OECD countries, ICT interactive infrastructure with political stability and government effectiveness have positive impacts on economic development ($b_1=0.36$ and $b_2=0.26$ respectively). Also ICT interactive infrastructures with government effectiveness have positive impact on social development ($b=0.48$). in OPEC countries ICT broadcast infrastructures with voice accountability and government effectiveness have positive impacts on economic development ($b_1=0.876$ and $b_2=0.882$ respectively) and ICT interactive infrastructures with control of corruption have positive and significant impacts on economic development ($b=0.356$). and so voice accountability mentioned signification and positive moderating of relation between ICT broadcast infrastructures and social development that this indicates ICT broadcast when combined with effectiveness of governance are more effective. In addition to having a negative impact on development, when the ICT interactive infrastructures are isolated, impact of positive signification is created, when this is in correlation with governance indicator, there is enough documents for impacts of positive governance penetration, that make influence the ICT infrastructures on national development.

Conclusion

The discussion of good governance has emanated in academic research from time to time and governance has continued to play a discerning role for donors and investors in the context of development cooperation. Much of this research, however, has been in the development sciences rather than in the information and computer sciences. In an extensive study on factors anteceding development, Wohlmuth rightly notes,

The importance of the [governance] concept for...development is related, first of all, to the necessity to create the basic extra-economic conditions that are important for the growth of... economies, as for example, an effective public administration, a functioning legal framework, efficient regulatory structures, and transparent systems for financial and legal accountability. Secondly, good governance refers to the developmental potentials of the democratic challenge...as accountability [and] rule of law [are essential elements of these countries'] renewal. (1998, p. 10)

As revealed by the findings, rule of law, voice, and political stability are the principal moderating variables used to explain governance. As the results indicate, rule of law lies at the crux of national developmental efforts. A legal frame-work, to create an effective judiciary to administer the law, forms a quintessential part of governance. Further, it provides a legal platform and framework to which participants in the governance processes can consult when resolving demanding situations, without marginalizing the security of these participants. Rule of law evidences corruption control leading to increased local and foreign inflows of economic inputs. Increased access to information through an interactive ICT infrastructure combined with a robust legal infra-structure induces further economic activities. Activities such as innovations, for example, serve to increase economic development but fail to achieve potential in the absence of legal protection for intellectual property. Once the rule of law is established to set up an ethos of intellectual property protection, it unambiguously spurs innovation (Kanwar & Evenson, 2003) leading to economic development.

Political stability has long been an influencing factor in economic development. Information and communication technologies provide a pathway to link to the world. For politically stable economies, this provides unprecedented opportunities to attract foreign direct investment (FDI) leading to economic development. A study by Yean and Heng (2001) on Malaysian industries confirmed the claim that

political stability adds to macroeconomic stability—further leading to increased investments, capital formation, and development. In a politically stable climate, broadcast ICT infrastructure provides a medium for informing the general population of goods and services, thus inducing demand, potential consumption, and economic growth. In this climate, the interactive ICT infrastructure spurs social development by “informing, enlightening, and educating” the population through established modes of communication, streamlined content delivery, and uncensored information. For example, the politically stable climate of India has allowed for the use of the interactive ICT infrastructure to focus on telemedicine and remote (tele-) education efforts, leading to social development through awareness and participation (Warschauer, 2003).

The role of voice on economic development is not without precedent. As Manville and Ober (2003) reflect, it was direct voice of the citizens of Athens that elevated it to its status as a city–state some 2500 years ago. Direct voice that led to increased information flow and participative communication pushed Athens to become an economic force. Justifiably, this study finds that voice, combined with an existing interactive ICT infrastructure leads to increased economic development. While the interactive ICT infrastructure enables communication potential, the ability of citizens to directly voice their opinions would lead to a more active and streamlined information flow, hence increasing economic efficiency (Manville & Ober, 2003).

Our findings suggest that our assumptions about ICT infrastructure and its impact of economic development are justifiably induced by governance as a part of public policy. As a key catalyst, governance has the ability to precipitate development. Further, understanding the pivotal role of governance on economic development allows for further improvement.

The findings from our study revealed the following:

1. A nation’s ICT infrastructure does contribute to the enhancement of the rate of social development.
2. Governance contributes towards shaping the influences of ICT infrastructure on a nation’s economic and social development.
3. While good governance in and of itself is not a sufficient determinant of national development, it may however, be one of the conditions for accelerated national development.

These findings have paramount implications for research and practice.

References

- *Easterly, W., & Levine, R. (2003). Tropics, germs, and crops: how endowments influence economic development. *Journal of Monetary Economics*. 50 (1): 3-39.
- *Assane D., & Grammy, A. (2003). Institutional framework and economic development: International evidence. *Appl Econ* 35:1811-1817.
- *Polterovich Victor and Popov Vladimir. (2006). Democratization, quality of institutions and economic growth. Working paper.

- *Marnewick, C (2012), An investigation into the governance of information technology projects in South Africa, university of Johannesburg, South Africa.
- *Pradip, T. (2009), Bhoomi, Gyan Ganga, ICTs And development, e-governance and the right to information: university of Queensland.
- *Shirazi, F,(2008). The contribution of ict to freedom and democracy: az empirical analysis of archival data the middle, ejisd(2008) 35,6,1-24.
- *DewanSanjeev and Kenneth L. Kraemer. (2000). Information Technology and productivity: preliminary Evidence from Country- level data: Management Science, April, 46:4, pp. 458-562.
- *Pohjola, M.(2002). The New Economy: Facts, Impact and Politics; Information Economics and Policy, No. 14, 133-144
- *Lee, H-Hong, and YougeshKhatri. (2003). Information Technology and Productivity Growth in Asia; Washington: International Monetary Fund, wp/03/15.
- *Nour, S. (2002). The Impact of ICT on Economic Development in the Arab world: A Comparative study of Egypt and the Gulf Countries, The United Nations University (UNU), Institute for New Technologies (INTECH).
- *EssariArani, A. and AghaeKhondae, M. (2008). The effect of Information and Communication Technology (ICT) on Economic growth of Organization of the petroleum Exporting Countries (OPEC), Quarterly Iranian Economic Research, No. 2, pp. 63-82. (in Persian).
- *Nejjarzadeh, R., AghaeKhondae, M., and Talati, M. (2008). The Effect of Information Communication Technology (ICT) on Economic growth of Organization of the Islamic Conference (OIC) Countries, Quarterly Trade research, No. 44, pp. 49-78. (in Persian)
- *Asghar Poor, H., Mohamadzadeh, P., Jalil Poor, S. (2011). Studying the Impact of Developmental Indicators on ICT Use in Selected Asian Countries, Journal of Regional Economic and Development, No. 1, 2011. (in Persian).
- *Alcantara, C.H. (1998). Uses and abuses of the concept of governance. International Social Science Journal, 155(3), 105–113.
- *Antle, J.M. (1983). Infrastructure and aggregate agricultural productivity: International evidence. Economic Development and Cultural Change, 31(3), 609–619.
- *Balancing Act. (2002). Cameroon slashes import duty on computers. Panafican News Agency. Retrieved September 2005, from <http://www.balancingact-africa.com/newws/back/balancing-act48a.html>.
- *Doe, L. (1998). Civil service reform in the countries of the West African Monetary Union. International Social Science Journal, 155(3), 125–143.
- *Easterly, W., & Levine, R. (1997). Africa's growth tragedy: Policies and ethnic divisions. The Quarterly Journal of Economics, 112(11), 1203–1250.

- *Ehikhamenor, F.A. (2002). Socio-economic factors in the application of information and communication technologies in Nigerian print media. *Journal of the American Society for Information Science & Technology*, 53(7), 602–611.
- *Firestone, C.M. (1995). The search for the holy paradigm: Regulating the information infrastructure in the 21st century. In *Steering Committee on the Changing Nature of Telecommunications/Information Infrastructure*, Computer Science and Telecommunications Board, Commission on Physical Sciences, Mathematics, and Applications, National Research Council (Eds.), *The changing nature of telecommunications/information infrastructure* (pp. 34–62). Washington, DC: National Academy Press.
- *Fletcher, P.D., &Westerback, L.K. (1999). Catching a ride on the NII: The federal policy vehicles paving the information highway.*Journal of the American Society for Information Science*, 50(4), 299–285.
- *Grover, V., Fiedler, K., &Teng, J. (1999). The role of organizational and information technology antecedents in reengineering initiation behavior. *Decision Sciences*, 30(3), 749–782.
- *Gurbaxani, V., Kraemer, K.L., King, J.L., Jarmar S., Dedrick, J., Raman, K.S., et al. (1990). Government as the driving force toward the information society: National computer policy in Singapore. *The Information Society*, 7(2), 155–185.
- *Jackson, C.L. (1995). Telecommunications infrastructure from the carrier’s point of view. In *Steering Committee on the Changing Nature of Telecommunications/Information Infrastructure*, Computer Science and Telecommunications Board, Commission on Physical Sciences, Mathematics, and Applications, National Research Council (Eds.), *The changing nature of telecommunications/information infrastructure*. Washington, DC: National Academy Press.
- *Jessop, B. (1998). The rise of governance and the risk of failure: The case of economic development. *International Social Science Journal*, 155(3), 29–45.
- *Jorgenson, D.W., &Stiroh, K.J. (2000). Raising the speed limit: U.S. economic growth in the information age. *Brookings Papers on Economic Activity*, 12(2), 125–235.
- *Kanwar, S., &Evenson, R. (2003). Does intellectual property protection spur technological change? *Oxford Economic Papers*, 55(2).
- *Kaufmann, D., Kray, A., &Zoido-Lobotan, P. (1999a). Governance matters (Policy Research Working Paper 2196). Washington, DC: The World Bank Development Research Group.
- *Kazancigil, A. (1998). Governance and science: Market-like modes of managing society and producing knowledge. *International Social Science Journal*, 155(3), 69–79.
- *Manville, B., &Ober, J. (2003) Beyond empowerment: Building a company of citizens. *Harvard Business Review*, 81(1) 48–53.
- *Mbarika, V.W.A., Byrd, T.A. et al. (2002). Growth of teledensity in least developed countries: Need for a mitigated euphoria. *Journal of Global Information Management*, 10(2), 14–27.

*McLuhan, M., & Fiore, Q. (2003). *The medium is the message*. Corte Madera, CA: Gingko Press. (Original work published 1967).

*Morgan, A., & Cong, C. (2003). Integrity, internal control and security in information systems: Connecting governance and technology. *Journal of the American Society for Information Science & Technology*, 54(10), 976–977.

*Nasir, I. (2001). Democracy and governance in Pakistan's fragmented society. *International Journal of Public Administration*, 24(12), 1335–1355.

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