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Presentation and Analysis of Structural Conceptual Model for Economic and Social Impact Promotion of ICT: Case Study (Countries below the Level of Global Performance Network Readiness

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Abstract: Capabilities and competitive operation of countries in changeable and dynamic environmental conditions are affected strongly by stable application of ICT. Countries which employed ICT in their main capabilities, have significant differences comparing to other countries regarding economic and social change and development. So, analysis of effective factors on obtained effect from ICT in country territories which are in lower level of global operation regarding taking ICT revolution, is highly significant. This study suggested a model to analyze environmental impacts (political and regulatory environment and innovation) and promote economic and social impacts of ICT by government and business use of ICT. Furthermore, indirect impact of environmental effects on economic and social impacts of ICT was assessed. In this study, these relationships were evaluated by using data related to 51 countries which are in the lower level of global range of network readiness. Results indicated that political and regulatory environment and business environment and innovation affected positively and significantly on government and business use of ICT. Government and business use of ICT affected positively and significantly on economic and social impacts of ICT. The presented model helps mentioned countries to comprehend better the relationship among global criteria for promoting and developing economic and social impacts of ICT and makes them more influential than management.

Keywords: Information and Communication Technology, Business use of ICT, Government use of ICT, the political and regulatory environment, Business environment and innovation, The economic impact of ICT, social impact of ICT.

Introduction

Emergence and employing ICT in being global framework, could play significant role in economic and social change of government and businesses. However, conversely, ICT has made new digital gaps in global level and countries which have employed ICT in their main capabilities, have significant differences comparing other countries regarding economic and social change and development from use of ICT. Generally countries (with each kind, size, area, position and culture) can be placed concerning orientation and achieving economic and social impacts of ICT on a continuum. In one side of continuum, there are countries that employed ICT in their main capabilities and placed in acceptable level concerning global performance. On the other side, there are countries that for promoting this effect, these has not developed significantly and in fact, these countries placed in lower rate of global performance level and they should play active role to facilitate this importance by identifying and employing effective factors on ICT impact. Economic and social impacts refer to obtained and promoted economic and social development of a country by ICT use (WEF, 2015). Economic and social development by ICT are affected by various factors.

One of effective factors is business use of ICT. It refers to rate of business use of internet in a country for business operation and incorporating ICT in their operations and making capacity for facing new technologies (WEF, 2015). ICT development, emergence of new markets, commerce increase, stable development challenges, developing uncertainty in global economy resulted in basic changes in approaches in business management. Awareness of electronic business technologies and availability of sources as empowerment in helping market forces were as stimulation and lack of infrastructure and sources were as acceptance obstacles and use of electronic business (Heeks, Erumi-Esin, 2015).

One of other significant factor is government use of ICT. There are many evidences that ICT is stimulation of economic growth and governments are tended to propagate it highly, especially when there is need to develop economy (Galloway, Mochrie, 2005). Government use of ICT refers to strategy and success of government in developing and implementing these strategies to develop ICT and use of ICT based on availability and service quality on government line (WEF, 2015). Government efficiency increases when citizens are able to influence quantity and quality of service delivering by using new technologies (Lowery, 2002). Electronic government tends to help being strengthen and move toward effective monitoring and increase transparency for better economic and social management of country regarding development by assisting from other countries (James, 2005).

Furthermore, high quality of political and regulatory and business environment to be affected completely by ICT and produce effect is highly important. According to international telecommunication union, stable and predictable regulatory environment which protect existed environment by creating location for new cases, can be one of highly significant subjects (WEF, 2015). Improvement of business environment among countries resulted in condition improvement for effective and useful activities of all economic actors so that all parts can use their potential position (Shah Abadi, Sarigol, 2013). In this study, by presenting conceptual model, role and impact of political, regulatory and business environment and innovation for promoting economic and social impacts of ICT were explored by government and business use of ICT in area of countries lower than global average. Furthermore, this study evaluated indirect impacts of political environment and regulatory adjusting and business environment and innovation effects on economic and social impacts of ICT in area of these countries.

Theoretical Framework and Hypotheses

Political and Regulatory Environment by Government and Business Use of ICT

The rate of facilitation of ICT penetration and development of business activities relied heavily on political and regulatory environment of a country (WEF, 2015). In case of lack of regulatory environment, political environment opens in virtual environment and citizens are called to electronic participation with delay (Bretschneider, 2003). Regulatory environment adjusting has been applied currently as a means and improve to comprehend the effects of economic and social welfare of Regulation in most developed countries and as an important mechanism can help to improve business environment widely (Ladegaard, 2005). In case of lack of comprehensive legal and criminal support, most citizen participation cannot be taken into account as support of electronic government (Wang & Nan, 2011). Accurate and comprehensive legislation and appropriate operating assurance to achieve it, make develop and enhance economic activities (Klonowski, 2006).

Accordingly, two hypotheses are formulated:

H1: there are positive and significant relationship between political environment and regulatory adjusting and business use of ICT.

H2: there are positive and significant relationship between political environment and regulatory adjusting and government use of ICT.

Business and Innovation Environment by Government and Business Use of ICT

Generally, high quality of business environment to be affected completely by ICT and produce effect is highly important. One of methods of electronic government is government interaction with commercial sector. This subject causes to transparency of economic environment and by creating free competition, the cost of commodities and services has been reduced for consumers and consumer rights have been considered highly (Gilbert, 2001). Creating appropriate environment and better use of ICT as well as raising direct internal and external investment due to probable increase of according new technologies, can be effective in economic growth (Moshiri and Jahangard, 2004). Environment has played effective role in developing country readiness it should be considered by making proper reactions and plying active role instead of passive role (Taghi Zadeh et al, 2011).

Accordingly, two hypotheses are made:

H3: there are positive and significant relationship between business and innovation environment and government use of ICT.

H4: there are positive and significant relationship between business and innovation environment and business use of ICT.

Government and Business Use of ICT with Economic and Social Impact of ICT

Impact of complete penetration of ICT needs extensive community efforts. All Beneficiaries including government, business and total community sector have significant role. Extensive use of ICT by

businesses, government and community in large scale is a prerequisite of achieving all advantages and chances (Novec, 2003). ICT setting provides more opportunities for civil partnership (Moreno e al, 2012). Electronic government can increase process based confidence by improving interaction with citizens and responsiveness reaction (Tolbert & Mossberger, 2006). On the other side, concerning high productivity of ICT, this variable was employed as investment apart from physical investment in models of economic growth during last two centuries and studies like Pohjola,2002, Jorgenson&Vu,2007, Pohjola& Jalava,2007 are emphasized and results of these experiments showed the positive relationship between economic and investment and ICT. ICT use helps to reduce commercial costs (Yushkova, 2013). The rate of information and telecommunication technology and in economy relied heavily on ICT use and its structures (Irawan, 2013) and by increasing investment in ICT sector and increasing use and its application, economic growth also increases (Nour & Satii,2002). There are positive relationship between GDP growth rate and index of ICT (Saidi et al, 2014).

Accordingly, four hypotheses are drawn:

H5: there are positive and significant relationship between government use of ICT and economic impact of ICT.

H6: there are positive and significant relationship between business use of ICT and economic impact of ICT.

H7: there are positive and significant relationship between business use of ICT and social impact of ICT.

H8: there are positive and significant relationship between government use of ICT and social impact of ICT.

Conceptual Model

In figure 1, the conceptual model of study is shown. In this model, political environment and regulatory adjusting and business innovation environment are as independent variables, business and government use if ICT are as mediator variables and economic and social impact of ICT are as dependent variables.

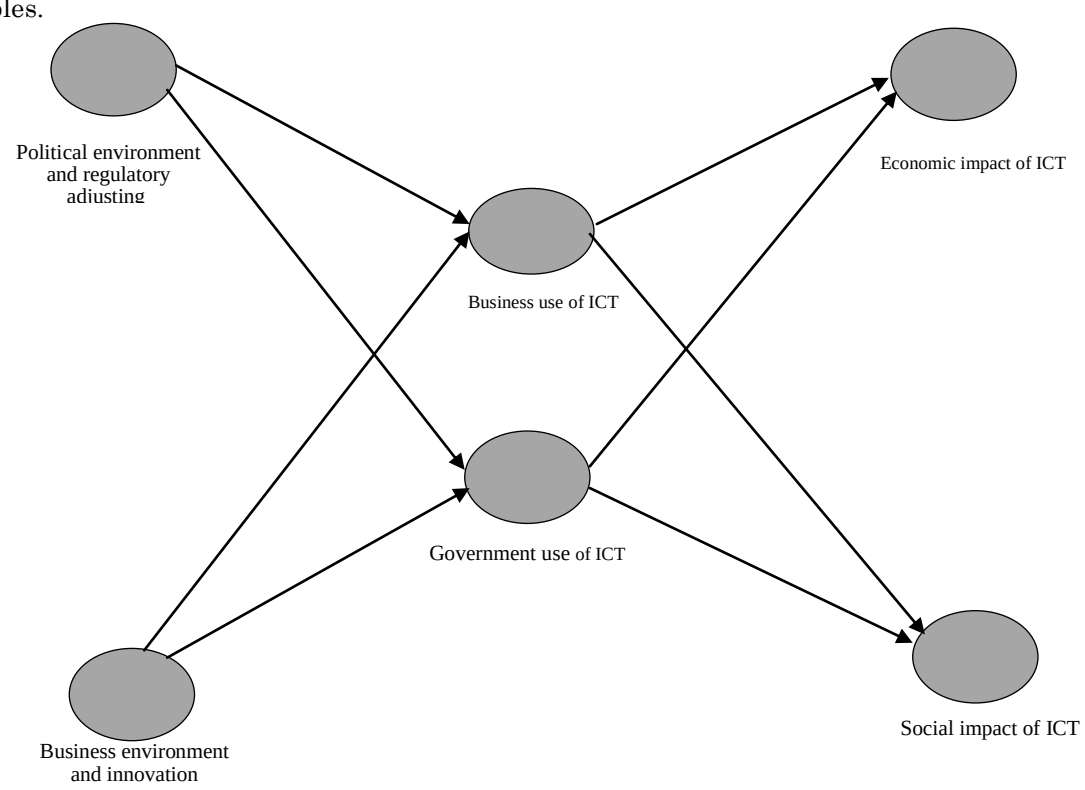

Figure 1. conceptual model of study (based on results of study)

Method

Sample and Methodology

This study is quantitative and explorative one. The population of this study includes countries which are in lower level in the field of electronic readiness. This study focus on countries which according

to report of global criteria evaluation report in the field of electronic readiness by global economy convention in 2015, are placed in lower level of global average regarding dimensions including environmental conditions and applications and economic and social impacts. The sample includes 51 countries. Accordingly, to select studied countries, 143 countries are analyzed according to convention report and mean of total performance of countries are obtained which their performance means are in accordance with variables including economic impact (3.45), social impact (4.12), political environment and regulatory adjusting (3.48), business environment and innovation (4.29), government use of IT and TC (3.8) and business use of IT and TC (3.98). 51 countries are considered which their performance are lower than global average in the field of network readiness and their data are employed in this study which include Ethiopia, Algeria, Uganda, Albania, Angola, Burundi, Bangladesh, Botswana, Burkina Faso, Bolivia, Paraguay, Pakistan, Peru, Tajikistan, Tanzania, Timor-Leste, Iran, Chad, Dominican Republic, Zimbabwe, Ivory Coast, Senegal, Swaziland, Suriname, Philippines, Cambodia, Cameroon, cap Verde, Gabon, Gambia, Guatemala, Guyana, Guinea, Laos, Lebanon, Lesotho, Libya, Madagascar, Malawi, Mali, Egypt, Mauritania, Mozambique, Myanmar, Nepal, Nigeria, Nicaragua, Vietnam, Haiti , Honduras, India. To collect data and measure variables, the published documents and 2015 report of global economy convention are used which are the most famous global reports in accessing electronic readiness of world countries. To predict economic and social impacts of ICT, the suggested conceptual model is analyzed by modelling of structural equations and concerning hypotheses of study, Partial least squares method is used to estimate pattern. The variables of this study includes: 1. Political environment and regulatory adjusting, 2. Business environment and innovation, 3. Business use of ICT, 4. Government use of ICT, 5. Economic impact of ICT, 6. Social impact of ICT.

Measures

Determination Coefficient

Basic assessment criteria of endogenous latent variable of model is determination coefficient. This index indicates that how many percentage of endogenous latent variables are resulted from exogenous variables. Values of 0.67, 0.33 and 0.19 for dependent variables in structural model (endogenous) are described considerable, medium and weak respectively, but, if endogenous latent variables are affected by few numbers (one or two) of exogenous variables, avrage values of dtermination coefficient will be acceptable (Henseler et al 2009; Chin, 1998). Hair et al (2011) estimated values of 0.25, 0.5 and 0.75 for endogenous variables in structural model as weak, medium and considerable respectively.

Path Coefficient and Significance

Bootstrap procedure is used to calculate T value and determine significance of path coefficient. The path coefficient are applied to determine share of each predictable variables in explaining variance criteria. Significance of path coefficient is high complement and assign sign of beta coefficient of model. If obtained value is considered higher than static minimum in reliable level, this hypothesis of relationship will be confirmed. In significance level of 90%, 95% and 99%, this value is compared with static minimum of 1.64, 1.98 and 2.58 (Hair et al, 2011 Henseler et al, 2009).

Pridictive Relationship

(Stone and Gaysler index): pridictive relationship is another index for evaluating structural model and its qulaity which aims to examine ability of structural model in predicting by Blindfolding method. The most popular and known measurement criteria of this ability is Stone and Gaysler index. Vaules higher than zero indicated that well observed values are reconstructed and ave predictive ability model and it can be concluded that the structural model have appropriate qulaity. Henseler et al (2009) in troduced three values of 0.02, 0.15 and 0.35 respectively as weak, medium and strong for endogenous variables.

Correctness and Reliability

Regarding correctness of reliability and validity due to the fact that each variable of model is formed from observant variable and so, its indices and criteria are not calculated, it means, it shows value of 1. The main purpose in this study is to analyze and test structural quality of suggested model.

Goodness or Quality of Structural Model

In addition to mentioned indices of total fit of model in PLS, this is index of goodness of fit and it is used generally in addition to goodness or quality of PLS. the value of this index is between 0-1 and values close to 1 indicate appropriate quality of model. This index is able to predict total model and whether the

tested model are successful in predicting endogenous latent variables or not. This index is square multiplication of two values of communality and R square average.

Models and Analysis

To analyze data and hypotheses of model, the modelling of structural equation was used with minimum least squares. The reasons of this approach include its high quality in model prediction, new model development, support of reflexive and combined measurement models, lack of sensitivity to data normality and sample volume and especially being mono-item of model. In this approach, the most applicable software namely smart-PLS was used.

Results

In this section, the main results of study are presented. In figure 1, the tested model of relationship between variables of study are shown. The values inside circle indicated describe variance of study variables and values on lines showed direction coefficient between them and demonstrated that 68% of dependent variable changes are economic impact of ICT and 88% of dependent variable changes are social impact of ICT by independent variables.

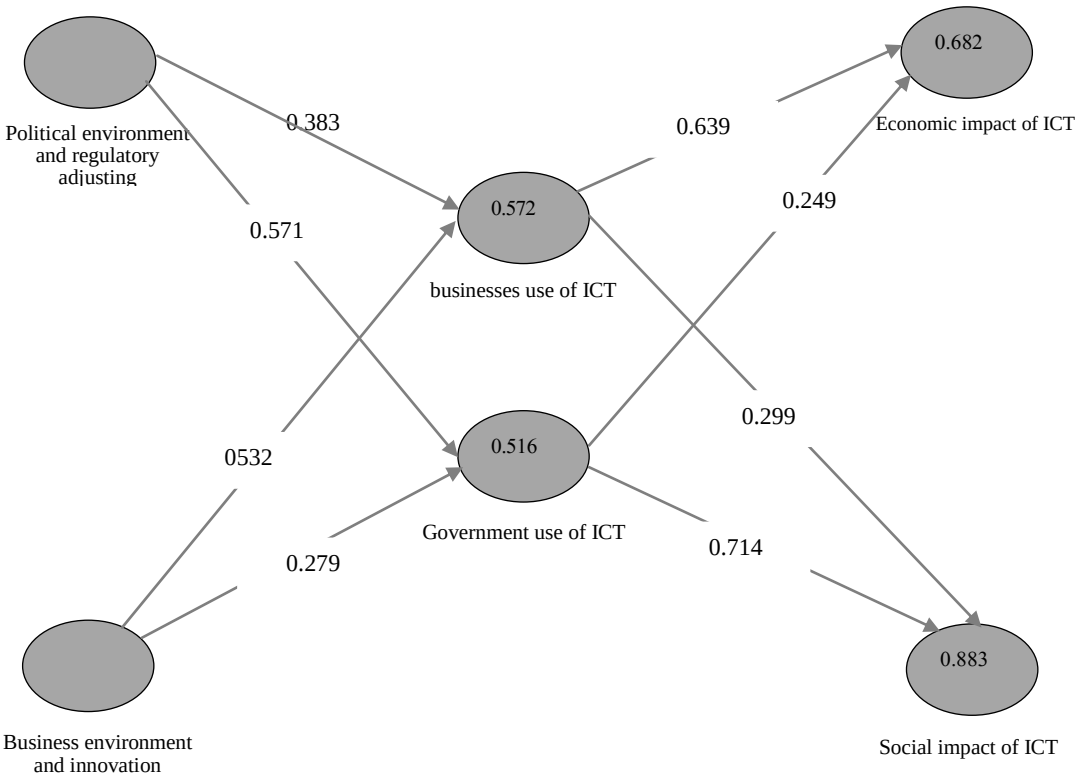

Figure 2.tested model of study (source: results of study)

Moreover, in table 2, the direct and indirect coefficients and all variables of study were reported. Concerning table, political environment and regulatory adjusting and business environment and innovation affected positively and significantly on business and government use of ICT. Business and government use of ICT affected positively and significantly on economic and social impacts of ICT. Furthermore, political environment and regulatory adjusting and business environment and innovation affected positively and significantly in an indirect way on economic and social impacts of ICT and so, all hypotheses of this study were confirmed. Also, based on table, 88% variance of social impact of ICT and 68% variance of economic impact, 57% variance of business use of ICT and 52% variance of government use of ICT were described by model of the study. On social impact of ICT, the most direct effect referred to government use of ICT and most indirect effect related to political environment and regulatory adjusting. On economic impact of ICT, the most direct effect related to business use of ICT and the most indirect referred to business environment and innovation.
As it was observed in figure 3, T coefficients of all directions (values on lines) are positive and significant.

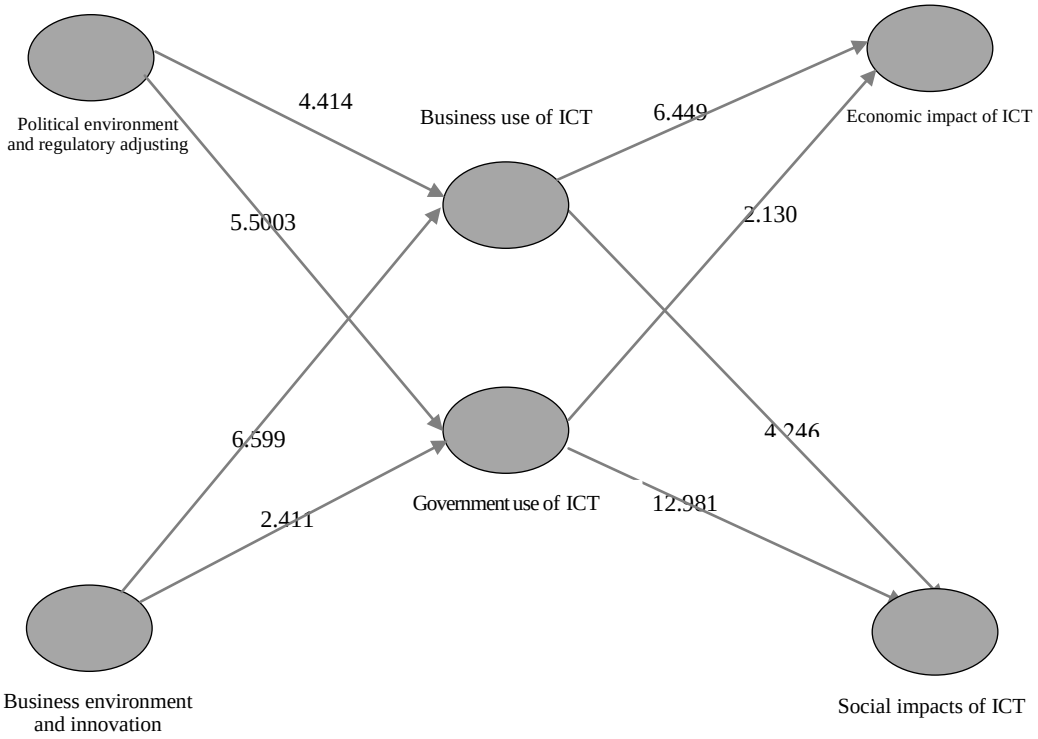

Figure 3. T coefficient of model(source: results of study)

Table 2. direct and indirect coefficients and ll variables of study

Variables		Direct effects	Indirect effects	Total effect	Defined Variance
On economic impact of ICT	political environment and regulatory adjusting	-	0/39	0/39	0/68
	business environment and innovation		0/41	0/41	
	business use of ICT	0/64		0/64	
	government use of ICT	0/25		0/25	
On social impact of ICT	political environment and regulatory adjusting		0/52	0/52	0/88
	business environment and innovation		0/36	0/36	
	business use of ICT	0/30		0/30	
	government use of ICT	0/71		0/71	
On business use of ICT	political environment and regulatory adjusting	0/38		0/38	0/57
	business environment and innovation	0/53		0/53	
On govrnemnt use of ICT	political environment and regulatory adjusting	0/57		0/57	0/52
	business environment and innovation	0/28		0/28	

Source: findings of the study

In figure 4, values inside o circle are analysis results of credit redundancy and being positive of values showed appropriate quality of model and in other words, have predictive ability model.

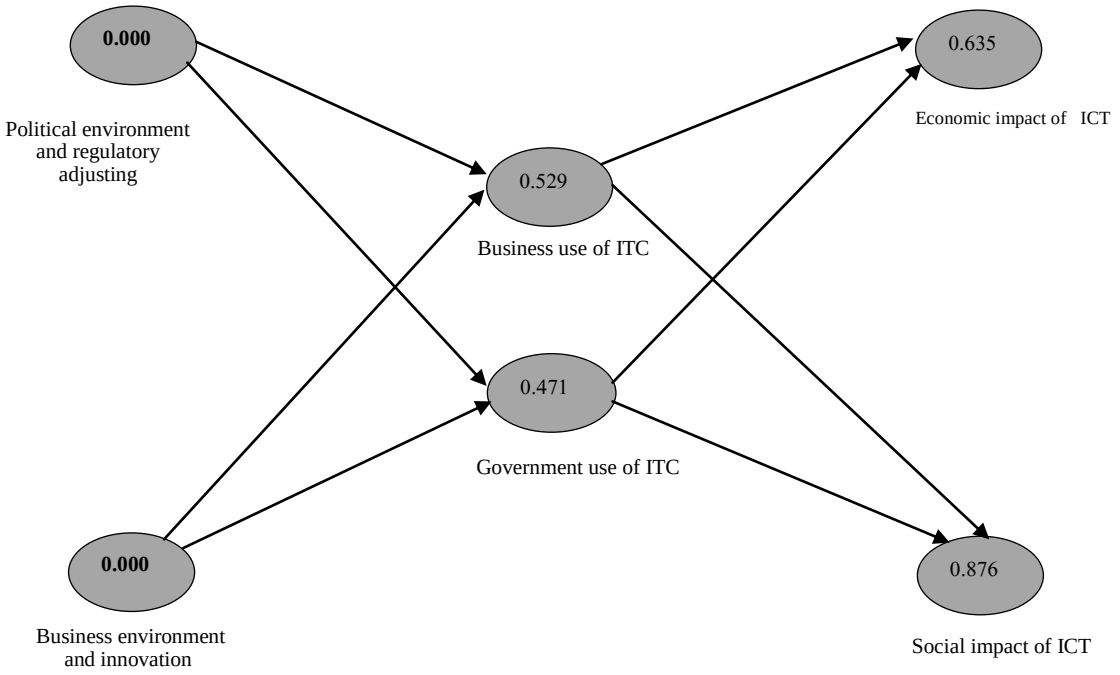

Figure 4. test of structural model (source: results of study)

In the present study, for tested model of absolute fit index, concerning being mono-item variables, the the common avarage was 1 and only avarage square of determination coefficeint was calculated. GOF index of this model was obtained 0.56 which referre to efficiency of model. Accordngly, results of present study emphasized the suggested conceptual model in developing economic and social impacts of ICT in area of countries lower that global operation level in network readiness. Furthermore, variables of business and government use of ICT in this model, generally are appropriate mediators for higher effectiveness of political environment and regulatory adjusting and business environment nd innovation on economic and social impacts of ICT.

Dicussion and Conclusion, Limitation and Future research

Discusion and Conclusion

Emergence and employing ICT in globalization farmework, change of developing factors nd considerable role of ICTin economic and social change and especially available digital gap in remarkable number of world counties are basis and motivation of this study. For these countries, by applying published data of global economy convention (2015) and relations between data in enviromental diemnsions, the use and impact of a structural conceptual model was evaluated. Results indicated general efficiency of model; so that creating relationships between variables influenced on economic and social achievement of ICT and their positive equality in the form of hypotheses indicated appropriate performance of aspects and internal components of model. The framework of this model focused on:

The promotion of economic and social impacts of ICT was not created in vacuum; but it needed required conditions and fields.

The capabilities and performance of ICT were affected highly by business and government use of ICT which by this way, these capabilities resulted in effective economic and social performance obtained from it.

Variables of business and government use of ICT were appropriate mediators for higher effectiveness of political environment and regulatory adjusting and business environment and innovation on economic and social impacts of ICT.

Business use of ICT had the most effect on economic impact. Government use of ICT had the most effect on social impact.

Effective business and government use of ICT occurred when relative countries understood appropriate business environment and innovation and political environment and regulatory adjusting by stable application of information and telecommunication technology and this identifcation affected on their growth and development.

Appropriate business environemnt and inovation and political environment and regulatory adjusting interact and cooperate and also enhance each other to achieve more economic and social impact by business and government use of ICT and conversly, the high probable weakpoints in each dimension resulted in avoiding higher effect raising.

The appropriate business environment and innovtion had the most effect on economic impact of ICT indirectly and political environment and regulatory adjusting hd the most effect on social impact of ICT indirectly.

This study are line with results of reports and studies namely world economy federation (2015), Bretschneider, (2003), Ladegaard, (2005), Wang & Nan, (2011), Klonowski (2006), MOshiri and Jahangard (1383), Moreno et al (2012), Novec (2003), Yushkova (2013), Saidi et al, (2014), Irawan (2013), Nour & Satii, (2002), Pohjola (2002) and Wang & Nan (2011). But, several authors have not confirmed significant effect of ICT on economy; but in several Arabic countries, the relationship and positive effect between use of ICT was confirmed but the significance level was not revealed (Nour, 2002). In Kenya and Tanzania, the studies showed positive effect of ICT on output level, but the significance of this impact was not confirmed as well (Wolf, 2001). Totally, a study in framework of present study hypotheses in countries lower than global level in electronic readiness and in a structural set has not been investigated, so, the result of this study can present new achievement in this field and develop our understanding from various dimension effect of ICT in disputable society. Although, the analysis of economic and social impacts of ICT should be considered as a developing task; it is hope that the studies and experiments in this area showed growing song.

Managerial implication

ICT as the most important source for disputable countries should be kept, reconstructed and managed and policymakers and planners should employ each technique and method that can increase its effect on economic and social growth and development. Disregarding of policymakers on competency of ICT application, will not provide proper future for them. They can facilitate this process by keeping dominant values, facilitating tasks and proper reaction to expectation. In this regard, focus was on editing effective ICT vision for transparency of policies and strategies with pragmatism, measurable and obtaining purposes and assurance of proper performance of program with useful and powerful legal system.

In a general view, the suggestive conceptual model assist policy makers of relative countries to comprehend better the relationship among world criteria for growth and promotion of economic and social impact of ICT by appropriate planning and tasks and responsibilities organizing and effective guide and leadership and control in the field of ICT and manage them effectively, so that whatever they tried in improvement of political and business and innovation environmental conditions namely facilitating ICT penetration and developing business activities with evaluating protection of intellectual property rights, the spread of pirated software, performance and independence of the judiciary, the legislative process efficiency and overall quality of regulations related to information and communication technology and entrepreneurship support, ease of starting a business and tax and conditions that allows growth in innovation with including indices total availability of technology, competition intensity, demand conditions for innovative products that were done by developing purchase of advanced technology products by government and provide investment availability for financial aids to projects relative to innovation; to te same extend, business and government use of ICT was increased and the availability and service quality on lines were promoted and by this way, they can obtain economic and social impacts of ICT.

Limitation and Future Research

This study was not longitudinal studies and the results may be different from results of such similar studies. The results of this study were not applicable to other countries. This study was conducted based on certain period, while ICT has dynamic nature and countries are improving readiness conditions; so, redundancy of this study in next years in this population may be obtained different results from present results. Analysis of economic and social impact of ICT should be considered as developing task; so, researchers in future studies can obtain more comprehensive data easily.

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