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Estimating of information and communication technology shares on service section growth in Iranian economic

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ABSTRACT: As regard information communication technology (ICT) is one of the most significant and effective agent on industrial and developing country's growth. In others hand service section is most substantial part of economic in developing country and especially in Iran. So this study investigates the relationship between ICT and value added of service section and that is innovative aspect of this research compared with other studies in this filed. Owing to calculation of agent elasticity ratio, Cob Douglas function is utilized in this research and the estimating method is ordinary least squares (OLS)during the (1978–2008) in Iran.The result shows ICT index has negative effect on economic burgeoning, also the ICT investment impact is less than Non-ICT one.This conclusion justified by regarding to economic conditions and lack of ICT investment in Iran, also inability and lack of user's knowledge to using the ICT tools are causes of paradox efficiency.

Key word:information communication, economic growth, ICT investment, Non-ICT investment, service section

Nowdays we observe the great revolution in information and communication field, this change has principal influence on growth and output of world economy. Considering that developing countries improvement relay heavily on service section, so in such those country, especially Iran. Some effective elements on service section should be regarded by economist. In other hand information communication technology is impressive factor of economic extension and growth so relation between these two variables is significant. According to universal union, information communication technology (ICT) is described: compound of software and hard ware industries, official machine,data process equipment,service and contact equipment.

In this study influence of utilizing of ICT in growth of service section (by using communication section investment index) is examined during the 1978-2008 in Iranian economy measuring method is utilized in this study is minimumleast squares.

Although impressive of ICT investment on economic growth was researched,inspection of information communication technology's effect on service section growth in Iranian economy and calculation of its elasticity is created present research distinct fromother studies in this field.

Theoretical base of ICT and economic growth

Evaluation of information and communication technologies effect on macroeconomic variables such as economic improvement was seriously considered from 1990s. In theoreticalaspect, ICT impress onsides, demand and supply. In former side, utility function of economic impact on the behavior consumer but in later one producer behavior as input. Figure 1 showstotalperformance of ICT in new economy. If A is showed as digital goods (ICT), left side of diagram showssupply side and right side of it; consumption or demand side. So A make function in both in consumption and production. In production function F (N, K, H, A) describes physical capital, human capital and work force respectively.

In utility function U(C) indicates primal consumer goods. In this new economic structure digital goods aid to economic cultivate like in traditional structure and these commodities assist directly to consumer utility and demand sides too.
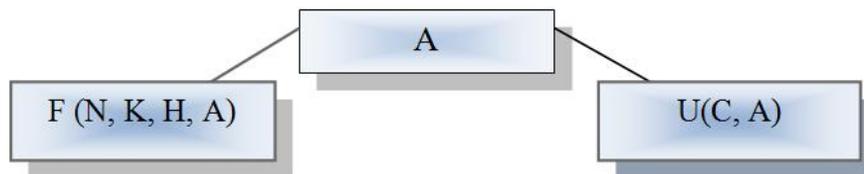
Figure1. Relation of Variables

How ICT contribute to economic burgeon?
ICT impact process display in figure 2. Diagram shows ICT as input juxtapose with others agent production prompt to improvement of production and investment,technological development and flourishing quality of work force. Exceed of firmvalue added, economic growth and broaden of consumer's welfare are consequence of those one.
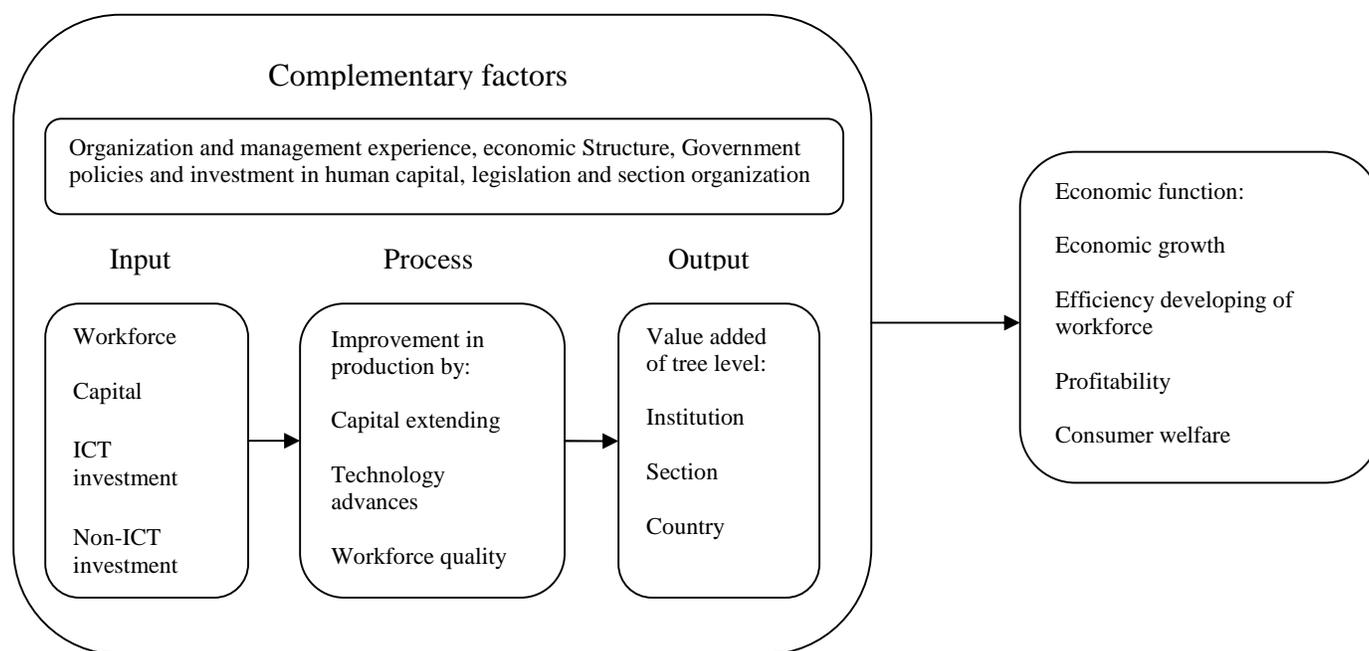Production System

Figure2. Complementary factors

According to Ghobadi studies (2004) compared influence of ICT on productivity in Asian and European country by using of Panel data during 1998-2004. Cobb-Douglas generalized production function was utilized that was composition of four variables that involved: demotic investment, direct investment foreign and ICT variables. The conclusion of estimating model with emphasize on ICT in Asian and European country display that ICT has meaningful and positive transfer on productivity of these country. Although external direct investment coefficient is meaningful and positive, gross domestic investment coefficient of Asian country is meaningful and positive and ICT variable have more influence on European country.

Rahmani and Hayati(2005) in their research with name of investigation of ICT impression on expansion of productivity of total production agent; following model is used for 69 countries and these models produce separately tree models for developing, developed and all countries.

As we expect that ICT has positive and meaningful impact on TFP and product growth. In developed country ICT investment effect on TFP flourishing is more intensify than communication investment wax. This calculation is vice versa about developing country, but impact of internal ingredients of ICT and its international overflows on TFP cultivation is meaningful and positive. Also result shows the workforce with higher ranking university education supports countries in absorbing profit earned by ICT.

Najarzade et al (2005) in their study with name of " The ICT impression on economic burgeon of countries that are as member of Organization of Islamic Conference (OIC) examined relationship between ICT and (OLC) countries flourishing according to Pohjola and Quah studies. In the estimating of experimental model of (OIC) mentioned countries growth was utilized ICT investment data and panel data during 1990-2004. Conclusion of this study confirmed the existence of positive and meaningful relationship between ICT and economic extension in these countries by 2004.

Komeyjani and Mahmoudzade (2006) calculated the role of ICT and its share on Iranian's economic by using of growth accounting approach and vector error correction model and time series data (1959-2003) in various subcategories rang such as second and third developing program. Result shoed in all studied period (except in time of war) none-ICT capital had fundamental role in economic improvement and described around %50 of economic growth.

Mahmodzade(2007) in his study;"investigation of ICT infrastructure and usage effect on economic cultivation (pointed studying Iran and elected developing countries) estimated model for 28 countries during 1995-2003. Result of studies indicated physical investment has most impact on growth. The striking point is that telephone penetrative coefficient as ICT infrastructure has significant role on economic evolve of such these countries.

ICT investment both in infrastructure and in usage view has remarkable impression .the density and utilizing of information has considerable impact on growth. Positive effect of human capital on growth goes through with doubt and we can't judge about it strictly. In fact, it confirms with general result of experiment research.

Belorgy etal (2004) studied "efficient agent of economic improvement with emphasize on ICT in 25 countries by GMM (Generalized Method of Moment) and fusion model. Research shows ICT variables has positive and meaningful influence on growth. Workforce exceed has negative impact that confirm descending efficiency of workforce. Although physical investment is percentage of ICT spending that caused estimated coefficient is similar.

Breitenbach and Muzundu (2007) in their article investigated "the effect of ICT on South African countries' economic flourishing "by utilizing the time series data that involved main telephone lines as index to measure the ICT and GDP (Gross Domestic Product) with fixed price of 2000. During 1975-2002 Conclusion illustrated all model coefficient standpoint statistic are meaningful and it's token positive relationship between ICT and GDP that positive impact of ICT on GDP extension prompt enormous in economic wax and it also caused intensify of flourishing in industry section as %1 enhancement of telephone line; GDP as exceeded about %4.

Kuppusamy and shanmugan (2007) in their study "economic burgeoning of Islamic countries and ICT extension" investigated ICT effect on Malaysian economic cultivation. Estimating of model stated ICT has positive and meaningful influence on Malaysian economic wax. Although during (1964-1982) a Malaysia economic relay heavily on agriculture aspects, from 1993 innovative policies alter to developing of new technology coefficient, especially ICT.

Mouelhi (2009) in his research examined impress of ICT on Tunisian company's efficiency. Estimating of parametric and panel data model shows ICT has powerful and positive affect on efficiency of companies.

The evidence confirms gaining of ICT profit investment needs the changing of human capital, it means utilizing both of ICT and human capital are more intensify than each of them one by one.

Joo et al (2009) in their study with title of "does ICT investment extend growth gap? "With cumulative growth model investigated dynamic relationship between ICT investment and economic developing of 29 countries in 1990s. Conclusion of this examination done by 3SLS (Three Stage Squares) demonstrated:

1: there is correlation between ICT investment and economic development. 2: Non-ICT investment influence on growth gap as same as that of the ICT investment. 3: countries with economic stability and free trade had mobilized investment on ICT. 4: countries with lower efficiency can mitigate growth gap by using developed country's knowledge. 5: franchise by ICT investment incitation had positive impact in economic burgeoning. To sum up ICT investment haven't powerful relationship with economic improvement.

Research method and presentation of relationship between economic flourishing in service section and ICT in Iran

In this part, model of ICT investment impact on Iranian economic growth is presented in below:

$$(1) \upsilon_s = A(\kappa_{ICT}, \kappa_0, \iota)$$

That in this quation υ_s is service section value added, κ_{ICT}- ICT investment becouse of limited data, κ_0- Non-ICT investment and ι–the number of service secgtion workforces. So final model is utilized by taking logarithm and agnt's share extracting:

$$(2) \quad \ln \upsilon_s = \ln A + \upsilon_{ICT} \ln \kappa_{ICT} + \upsilon_0 \ln \kappa_0 + \upsilon_\iota \ln \iota$$

Table number 1 shows variables and their resources'. Data are provided from Iranian center bank, World Bank and world development index software.

$$v_s = A(K_{ict}, K_0, l)$$

Table1. Variables and its sources

number	variables	index	sources
1	$\ln v_s$	Logarithm of service section value added	world bank, world development index software
2	$\ln \kappa_{ICT}$	Logarithm of ICT investment	world development index software, Iranian center bank
3	$\ln \kappa_0$	Logarithm of Non-ICT investment	world development index software, Iranian center bank
4	$\ln \iota$	Logarithm of service secgtion workforces	WDI2007

Computing of model

Economic models are divided 3group according to applying of the statistical data. some of the model estimated by using of time series data during long period, some others estimated by Cross-Sectional data, its mean variables in elected period of time. Third method is estimating by integration data. That is compound of time series and integration models. Time series data is utilized in present research.

Unit root test for variables

In first step variable's Stationary is examined by unit root (Dickey-Fuller) test. As there are four variables v_s, κ_{ICT}, κ_0, ι in logarithmic scale, unit root test is performed for these variables by following model.

Table 2. Conclusion of Dickey Fuller test

variables	retards	ADF	Critical values		
			%1	%5	%10
$\ln v_s$	first difference	-5.67	4.33	3.58	-3.22
$\ln \kappa_{ICT}$	first difference	-1.65	2.64	1.95	-1.61
$\ln \kappa_0$	first difference	-3.54	4.30	3.57	-3.22
$\ln \iota$	first difference	-5.21	3.67	2.96	-2.62

As a table indicates variables are stationary in first difference.

Model computing

After examination of variables stationary, model is computed as below:

Tables3. Conclusion of economic growth model estimating

variables	Coefficient	T-statistic	Prob
C	-34.63	-8.03	0
$\ln \kappa_{ICT}$	-0.23	-1.114	0.26
$\ln \kappa_0$	1.9	6.45	0
$\ln \iota$	1.35	3.74	0.001
AR(1)	0.95	58.42	0
MA(1)	0.99	10.56	0
$F - $ statistic	507.19		
R^2	0.99		
$Durbin - Watson$ stat	1.89		

Then autocorrelation and heteroskedasticity of model is checked. Also after adding $AR(1)$, $MA(1)$ to eliminate serial autocorrelation, Brush-god Frey test is used for this case.

As regarded $prob$ is 0.45 and it's greater than 0.05, so H_0 hypothesis is accepted and model doesn't have correlation problem. White test is utilized for testing the heteroskedasticity problem of model. As $prob$ is 0.13 and greater than 0.05, model doesn't have heteroskedasticity problem. Coefficient in table number 3 illustrates percapita value added elasticity logarithm towards each of variables:

As it mentioned %1 extending in logarithm of service section ICT investment prompts %23 reduction of service section value added, that isn't confirm the theoretical topic.

Totally ICT users in developing countries cleaved two categories: first group is those who don't have enough knowledge to take advantage of ICT. Second one with given enough science and literacy are unaware to

correct exploitation of ICT technology and they just interest about entertainment aspect of it. Also lack of organization supervision on staffs operation prompt this agent doesn't have tangible impression on service section development, in addition to government role shouldn't be overlooked in this case because government has indispensable role for propagandizing of ICT usage impact on economic growth that unfortunately government has tingly role in this aspect. Finally people and government aren't successful to transform ICT as effective index in Iranian economic evolve in service section.

Estimated coefficient indicates direct relationship between Non-ICT investment logarithm and service section value added, with increasing of one percent of ICT investment logarithm, service section value added exceeds 1.9 percent.

Conclusion displays logarithm of service section workforce variable's impact and value added logarithm I meaningful and positive and flourishing of one percent of service section logarithm causes 1.3 intensify of service section value added.

As regard table number 3, utilized variables in long term model of Iranian service section evolve described %99 of service section extension transformation. T —Statistic shows that except of ICT investment, other used variables are meaningful in %95 significance level. Result demonstrated total validity of growth model. As all of variables are Non-stationary, the Engle test is presented to examine theexistence of co integrating relationship.

First at all residual is earned by exploiting of long term model then it administered by unit root test. The conclusion indicates ADF statistic is -5.02 and it's greater than critical value in%1. So residual of model is stationary and estimated coefficients of model are admitted.

THE ANALYSIS OF CONCLUSION

Due to Victorian condition of service section in Iranian economic, ICT doesn't have meaningful influence on service section value added improvement. Result illustrates ICT index has negative transfer on economic evolve and given economic condition and Non-expanding of ICT investment in Iran it's justified.

As considered, ICT usage extension requires adept workforce. It is as instruments that need capability and digital literacy to demonstrate its efficiency and employment consequence. Analysis makes disparity between ICT purchasing and intensifies of its usage. ICT accommodation production is obligatory to expand information density and ICT usage is more significant of its producing. Statistical evidence show some countries with minus trade level in ICT commodities, are profited by ICT in burgeoning and efficiency exceed. One of productivity paradox causes is disability in ICT application. ICT improvement requires supplementary agent such as Non-ICT investment, versatileworkforce, transparent legislation and appropriate electronic breadbasket like training and awareness. So lack ofconsciousness user to utilizing of this technology in service section, ICT output doesn't shed light more on our expectation. Provided ICT investment and users knowledge flourishing become utilizingof ICT, its meaningful and positive impact would be substantial.

So during (1978-2008) ICT technology has negative effect on service section growth in Iranian economic, also there isn't vigorous constant relationship between ICT and growth and Non-ICT investments impact on service section value added is greater than ICT one and its demonstrates there is resistant and powerful relationship between economic burgeoning and Non-ICT investment. So theory emerging of the greatest ICT investment impact on service section value added compare with Non-ICT one is rejected.

THE BELOW RECOMMENDATIONS PRESENTED ACCORDING TO OBTAINED RESULT

In addition to regard on equipment sector, in ICT usage on economic and commercial field should be invested.

Application training for elected group in ICT users' context to encourage and to instigate the economic activists to increase ICT demand.
Developing country like Ira, without cultural social infrastructure and efficient skills to take benefit of ICT capabilities aren't successful to utilize of its opportunities and privileges, so it's vital:

Governors develop the ICT demand with providing information and service and ICT users training.

Governments make step towards boosting active institutes in ICT field with enhancement of its span and adding more role in research development (R&D).

As considered low rate of computer and internet penetration in schools and educational cluster center, accessibility of computer and internet in there should be improved.

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