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IMPACT OF ICT ON LABOR PRODUCTIVITY AND ECONOMIC GROWTH IN D-8 GROUPS COUNTRIES

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ABSTRACT

Information and Communication Technology (ICT) can be used as the most basic factors of production and employment in the adopted the other hand, with substitution instead of the manpower decreases their employment and the other by expanding the scale of production and creating new capabilities and opportunities, employment of skilled labor increases and on labor productivity and thus economic growth is impressive. The main objective of this research is investigate the effect ICT on labor productivity and economic growth in D-8 groups countries by using panel data for the period 2002 to 2011. The results show that, the effect of the number of researchers per million people variable, on labor productivity is positive and significant. Costs of research and development variable has a significant positive effect on labor productivity of member states. Training cost in the secondary level and the number of patents registered have a significant and positive effect on labor productivity in the member states. These results suggest that labor productivity in all member states, is due to the knowledge, technology, ICT and knowledge-based agents. However, labor no significant effect and capital have a significant effect. The results also show that human capital index has a positive and significant effect on economic growth and GDP growth in the member states and also shows that human capital is the most important factor of production. The results also show that logarithm of ICT has positive and significant effect on production in the member countries and ICT is one of the most important factors is the increase in GDP in these countries.

Keywords: Information and Communication Technology (ICT), Labor Productivity, Economic Growth, The D-8 Group Countries

INTRODUCTION

Undoubtedly all countries have discovered the importance of dissemination of information and communications technology in all areas and in some cases offer it as a development tools and shortcuts in developing countries. An important question that arises in this context is that how we can expansion information and communications technology in the country, according to the structure and features of the economic, social, cultural and technological to maximize its benefits and potential harms kept to a minimum.

According to the information and communications technology revolution and economic recovery in most countries and the Middle East in the past two decades, as well as high-growth of investment the second half of the twentieth century, the world entered a new period. In recent decades, after the introduction of information and communication technology, the effects of ICT on economic growth is one of the interest topic to economists in many countries. Most of the endogenous growth models, emphasize the role of ICT investment on economic growth in countries. According to studies, the countries where made investments to mobilize human and physical resources can enjoy the economic benefits of ICT. The flow of information and communications technology in supply-side economics and in addition to the complementary infrastructure, leading to a deepening of capital reorganization of economic processes and enhance economic growth in developed countries and follow it a slight delay, in some developing countries, this effect is observed. First with the introduction of computers to market and more by developments in information and communications area, computers joined to the telephone and television communications technologies and "information and communications technology" revolution occurred. The technology flow is effective in various economic processes. But studies in the 1990s with an increase in investments in information and communications technology leading to the introduction and emergence of a strong positive relationship between economic growth and technological mentioned. Although more than two decades has come around but ICT capital as considered by economists a source of economic growth.

Economic growth in developing countries is a major factor. Determine the factors influencing the growth and importance of the correct orientation of economic policy is effective and can accelerate the development process.

World motor vehicle in culture, economics and politics, advanced information and communication technologies such as the internet, satellite radio, video, fax and e-mail that the emergence of the knowledge society is effective, and consequently, political ties, social and cultural globally increased. The evidence shows that during the past two decades, technological development, especially in new technologies is a key factor in the integration of markets and the globalization process. In fact, technology is a major driving force behind the creation of global markets that is an important basis for competitive advantage. Most investigators recognizing this issue that technology and infrastructure development related to their parameters such as the number of Internet users, number of owners of mobile phones and personal computers etc. is regarded as one of the main indicators of globalization **(Naji, 2003: 121)**.

In this study, given the importance of the impact of ICT on labor productivity and economic growth in the world in the past decade and also, given the fact that economic development leads to industrial development, following the evaluation of the impact of ICT on labor productivity and economic growth in the D-8 group countries.

RESEARCH LITERATURE

An overview of the theoretical foundations of information and communications technology, labor productivity and economic growth

To better understand of the problem discussed into some features of modern economic issues related to economic growth and productivity. Information and communications technology with other technologies for the reasons that mentioned is vary. Firstly, Information and Communication Technology is a general purpose technology (GPT), which simultaneously profound influence on all sectors of the economy brings, is considered **(Helpman, 1998)**. Technological advances in Information and Communication Technology, can launch a very strong surge in the economy that influence everything; such as mergers and acquisitions in corporate finance to factories handling of warehouse management systems **(Quah, 2002)**.

Secondly, Information and Communication Technology products are treated like knowledge **(Quah, 2002)**, products of ICT; had all the hallmarks of the knowledge economy: infinitely deployable and triviality of geographical distance is also a character of it **(Mahmoodzadeh, 2007)**. This attitude is obviously suggests new threads in the new economy.

Overall, Information and Communication technology in the economy effects on the supply side and the demand side. On the demand side through the utility function effects on economic behavior of the consumer and the on the supply-side impact on the behavior of producers. In this study with the aim to focus only on the supply side and into demand side is purely mention for the performance of this technology.

Figure 1 shows the overall performance of Information and Communication Technology in the New Economy. If A represents the digital goods (Information and Communication Technology), left side shows the production, or in other words the supply side and the right side shows the consumption and the demand side. So A also plays a role in the consumption and production. In the production function (F); K, H, N, respectively, represents physical capital, human capital and labor. In the utility function, U; C, represents basic consumer goods. In the traditional structure, in the supply side of the economy and contribute into economic growth and as well as these products directly into consumer and utility demand side assist **(Quah, 2003)**.

Figure 2 illustrates the structure of the process of economic growth. This Figure shows how skilled workers in the industrial sectors that are supplying goods and services to the ultimate consumer.

Royalties and machines, is intermediary between the manufacturer and the consumer's knowledge.

In the **Figure 3**, the same work as scientist's researchers and engineers and other same worker work as a skilled labor force. Ideas generated are added to the fundamental principles of economics and technology, however, is the engine of economic growth.

Opinions and ideas, intellectual assets that are attracted to the social and economic support. Ideas are easy to buy and sell in the market. Because after the expression of an idea there is no chance to reclaim it of the consumers and others in the community, and cannot control the spread of ideas income: copy of ideas to reproduce is cheap. In a free market, the marginal cost of reproduction immediately goes to zero, **(Talati, 2006: 121)**.

In the new economy what is the value is topic chain information economy. But these chains of information are not long to connect to other information processes. Final consumer directly deal with digital tools and information consulting, and financial health for economic exchange. In this economy ideas were always are not meant from laboratories and academic research. Thus, according to discussion modern economy is weightless and based on knowledge on his deep is different with classical forms of knowledge-based economy. In the traditional knowledge-based economy, inductive effect of knowledge in the improved productivity be find in some industrial processes **(Quah, 2000 and 2001)**.

In the knowledge-based economy, royalties and machinery, are intermediaries between producers and users of knowledge that in the new knowledge-based economy, the gap between science and the consumer or the consumer has declined **(Quah, 2000)**.

Information and Communication Technology have a binary role in the economy, is input for industry used and output for users of the technology. Technological revolution with rapid improvement in the quality of equipment and software parameters are known with considerable reduction in prices **(Yojola, 2003)**. Profit maximizing firms by observing the relative price through replacement equipment, software and services relative respond to other goods and services to with the rapid advancement of technology to increase the share of Information and Communication Technology In the gross domestic product and investment despite the sharp decline In the price of Information and Communication Technology to provide maximum benefits **(Mahmoodzadeh, 2007: 140)**.

Increase the power and speed of information processing, becomes cheaper the relative price of hardware and software, and widespread use of automated systems; caused to create optimal information systems and quick and easy access to information, enabling the calculation of the exchange of data with high speed and at the broader geographic has been shared access and synchronized to information resources. By using Information and Communication Technology arise the manufacturing facilities of similar production lower cost, speed up in the procurement and supply of factors of production without increasing costs **(Mahmoodzadeh, 2007: 143)**.

But Information and Communication Technology In the supply-side of economic as input, along with other factors of production, including: organization and management experience, organization of the legislative, economic structure, government policies and investment in human capital are improve the production process of capital deepening, technological progress and the quality of the workforce and their consequences increase the value added of a firm, sector, country and ultimately economic growth, productivity and consumer welfare **(Dedrik and *et al*, 2002)**.

Preliminary studies of economic growth emphasized on the role of physical capital but economists with new issues such as R & D, knowledge and new technologies, opened new literature in the field which are briefly described:

Physical Capital

The idea that capital accumulation is introduced as a determinant of economic growth and several experimental and theoretical studies have endorsed on the establishment and sustainability, has existed in the economic from Adam Smith. This approach assumes that the mechanism for achieving high rates of capital accumulation are inherently in capitalist market economies and with strengthen these mechanisms, high economic growth is realized. Although Smith extraordinary attached importance to the role of the division of labor in the economic growth but considered capital accumulation as a basis of growing up. The first generation of endogenous growth models in the group and also more basic models of development strategy focuses on capital accumulation as a source of economic growth.

Historically the impact of investment on growth is seen in the studies of Harod Dumar. Although this model was adjusted to suit the growing conditions in an industrial economy but was used to estimate the amount of capital needed for growth in the developing countries. In his analysis expansion of production capacity and increase total demand are key for investment and changes in growth depends on the changes in physical capital. **Solow (1957)** also use a production function to analyze the contribution of growth on growth factor (capital and labor) and a residual factor.

In explaining of residual factor as growth of total factor productivity, exogenously spoke from technological progress and factors in technology. Over the years, the complex tools and techniques were made for accurate measurement of inputs and the concept of investment were raised beyond the physical assets on growth issues.

Human Capital

The second concept of investment is related to human capital which is considered change in the quality of the workforce. Most economists believe that investment in people and money spent on education, health, employment and labor, increased the quality workforce and has a positive impact on productivity.

Griliches (1960), Denison (1967) and Griliches and Jrgenson (1967) were the first people that by using wage data, weighted heterogeneous to the workers and were introduced quality index for labor inputs. As a matter of capital, this approach raises the substitution between different types of labor. Thus, labor quality variable obtained by subtracting the growth in the labor force and working hours. Neglect of this quality change in the labor leads to over-estimate the productivity growth. So, **Mankiw, Romer and Weil (1992)** had arrived investment in human capital as a variable in the production function of Cobb-Douglas. Their educational achievements were regarded as a substitute for human capital accumulation. **Lucas (1998)** entered human capital into the growth model and explicitly entered the external effects on growth theory.

Research and Development

Knowledge creation through research and development work, is the third expansion of the capital accumulation process. Research and development were defined as investment in the new knowledge that can improve the production process. But the issue is whether according to neoclassical R & D should be consider as a factor of production or according to endogenous growth theory consider as a source of the spill?

Research and development can be considered as an investment in the tangible assets. **Griliches (1995)** believes that firms investment in the research and development in order to improve manufacturing processes and increase profits. The spillover effects are secondary effects. Although he focuses on the role of the neoclassical research and development, but believes at the assessment of the role of research and development in growing, due to the lack of access to information is difficult. **Hall (1996)** notes that research and development often leads to improve in production. So, Measurement the impact of research and development completely linked to the price deflator and the adjusted inflation of products. Also for research and development as input must depreciation rate is calculated that added to the above problems. However, some research began to the measurement the direct effect of research and development. **Griliches (1995)** added research and development to the classic model. Some believe research and development is different with other assets and knowledge is a non-competitive capital; because in a time, many producers can use it therefore, because of the potential spillover effects in returns between manufacturers are not distributed proportionally and that's why considered for it a great role in endogenous growth models.

Three factors will usually increase productivity:

1. Increasing the level of capital employed for unit labor the so-called capital deepening.
2. Improve the quality of inputs or factors of production, in particular labor that occurs as a result of education.
3. Multifactor productivity (MFP) that remaining growth that is not accounted for by two factors, capital and labor. Increase in the MFP means that the modes of production and improve product quality and the ability to achieve higher levels of output provides the same level of inputs. Improvements in the manufacturing processes can occur for many different reasons. Research and development (R & D) on the production and manufacturing process may rounded due to the increase of MFP.

Now with regard to the some mechanism of the influence of information and Communication Technology on labor productivity and economic growth, separately will be discussed to calculate the theoretical aspects of labor productivity and economic growth.

Background of Research

Pezeshki Yahya (2011), in his book entitled "The role of Information and Communication Technology in the economic growth," states that Information and Communication Technology as a new technology enters the market in the late 90's and quickly expanded. This Technology due to its generality has a basic difference with other technologies, this means that not only impressive in its scope, but also in the total economic and non-economic activities have a significant role in facilitating tasks and enhance productivity and efficiency. During the decade of the 90, was introduced many stories and narratives about the revolution in Information and Communication Technology. But the important question is whether, after the lapse of about 15 years of prosperity and development of information and communication technology, this technology has been able to prove these claims? Really how technology has contributed to the economic growth of nations and the world during this period? Scholars and experts from around the world to express different opinions, the best comments will must heard from the actual figures. Given the available evidence in the world and according to figures in recent years have tried to show the impact of information and communication technology in economic growth. For this purpose, have been helped from two valuable studies, one by Kiang et al at the World Bank and others by Khuong at Harvard University. In this book presents various aspects of the impact of Information and Communication Technology on economic growth and trying to list how this influences and the future trend.

Hosseini nasab and Aghayi (2009), evaluate and test the relationship between Information and Communication Technology and economic growth in OPEC countries. To estimate the empirical model of economic growth in the context of a model were used GMM panel data for the period 1990-2007. Their estimates indicate the significant impact of ICT investment on economic growth in the OPEC countries.

Mahmoud Zadeh and Asadi (2007) have investigated the impact of Information and Communication Technology on labor productivity growth in Iran economy. In this study, using experimental and theoretical models, function of labor productivity with respect to information and communication technology and the use of time-series data 1971-2003 and the method of ordinary least squares is estimate. The results show that productivity, information and communication technology and non-information and communication technology capital and human capital, have positive effects on labor productivity in the Iran economy.

Faghih Nasiri and Godarzi (2005) by estimate a model pay to assess the effects of information and communication technology on economic growth of 37 developing countries and developed countries at period 1995-2003. The results show that the logarithm of ICT expenditure per capita in constant 2000 prices in developing countries and in developed countries is respectively 0/13 and 0/18 percent. The larger of these variables in developing countries interact to the provision of necessary infrastructure and dynamic economies.

Hall et al (2012), in his study entitled "The Effects of research and development and information and communication technology on the creativity and productivity of enterprises in Italy" suggests that investment in both the research and development (R & D) and technological information and communication (ICT) as well as a source of creativity and performance in Europe and America. In this paper, have been investigated the effects of investment in research and development and information and communication technologies in Italian firms. The study uses an unbalanced panel data sample of Italian firms to evaluate the effects of R & D and ICT on creativity and productivity. The results show that both the independent variable have strong and significant effects on creativity and productivity of firms.

Khuong (2011) in an article entitled "information and communication technology as a source of economic growth in the information age: an experimental study for the period 2005-1996" test that information technology has a significant positive effect on economic growth. Accordingly, the following three channels are estimated using the assumption of payment:

(1) Promote innovation and technology

(2) Enhance the quality of decision-making firms and households

(3) Reduce demand and cut production costs, thereby raise the level of production.

Al-Khatib et al (2007) studied the effects of human capital and information technology on economic growth of the UAE as well as collective and error correction models. The results show that human capital and ICT investment on economic growth in the UAE is effective in the long term but were ineffective in the short term. The results show that proper training is essential to take advantage of new technologies.

Piatoski and Ark (2005) evaluated the role of information and communication technology on productivity and economic growth in Eastern Europe and Central America, compared to 15 European countries and America. They have used the growth accounting model, where per capita production is a function of information and communication technology and non-information and communication technology capital and whole productivity. They with the separation of producing industries and use of information and communications technology, evaluated the share of the efficiency of each of these sections. The results show that ICT is robust has increased labor productivity in countries of Central and Eastern Europe and had the greatest impact on the convergence of countries in the 1990s.

Model of Research

Econometric model to examine the impact of ICT on labor productivity of countries is as follows:

$$\text{Ln}(y\ it) = \beta 0 + \beta 1\ \text{Ln}(res\ it) + \beta 2\ \text{Ln}(r\&d\ it) + \beta 3\ \text{Ln}(ict\ it) + \beta 4\ \text{Ln}(edu\ it) + u\ i1)$$

Variables in above model include:

Ln (res_{it}): The number of researchers per million people of country i in year t

Ln ($r\&d_{it}$): Research and development of country i in year t

Ln (ict $_{it}$): Information and communications technology country i in year t

Ln (edu $_{it}$): Secondary education in country i in year t

Ln (y $_{it}$): Labor productivity in country i in year t

u_{it} : error term.

Econometric model to examine the impact of ICT on economic growth of countries is as follows:

Ln (DDP $_{it}$) = Ln A + α_1 Ln (LF $_{it}$) + α_2 Ln (CAP $_{it}$) + α_3 Ln (EDU $_{it}$) + α_4 Ln (ICT $_{it}$) + u $_{it}$

(2)

Variables in above model include:

Ln GDP $_{it}$: Logarithm of GDP in country i in year t

Ln LF $_{it}$: The log of labor force in country i in year t

Ln CAP $_{it}$: The log of capital reserve in country i in year t

Ln EDU_{it}: The log of human capital in country i in year t

Ln ICT $_{it}$:The log of ICT in country i in year t

U $_{it}$: error term.

The data for this research were obtained from the World Bank and for the period 2002 to 2011, and a panel data approach is used.

Estimation Model

Productivity of production factor from Cape Douglas production function is obtained as follows:

$$Y_{it} = AL_{it}^{\beta}K_{it}^{\gamma}$$

(3)

By logarithm of the parties mentioned and then measured differential with respect to time has been:

$$\log Y_{it} = A + \beta \log L_{it} + \gamma \log K_{it}$$

$$A = \log Y_{it} - \beta \log L_{it} - \gamma \log K_{it}$$

Where K is physical capital and L is labor and A is the productivity of factors of production. Then, by using the estimated coefficients of the variables will be calculate the productivity and in the later stages from the resulting data is used to estimate the model.

Before estimating the model it is necessary to teste the stationary of all the variables used in the estimation. Because the lack of stationary of the variables in the time series data and the panel data is causing the pseudo regression problem. But contrary to what is customary in the case of time series data, panel data cannot be used dickey-fuller test and the Augmented dickey fuller (ADF) to test the stationary of data. It might be with another way test the stationary of the collective variables. It can be used for the following tests:

The result of Levin, Lin and chu test, IM, pesaran and shin test, Breitung test and

Fisher-type tests using ADF implies the stationary of all variables in the model at the surface. In this test the hypothesis H0, is based on the lack of stationary and hypotheses H1 is based on the stationary of variables.

The results indicate that the null hypothesis is rejected, so that the variables in the level are stationary.

Limer statistics F showed the number 95/382, with zero probability indicating that the using panel data is verified, therefore, according to this statistics and analysis panel data is acceptable. Haussmann test is 321/6 with the probability of more than 5%, which represents the random effects method is verified.

The results of this model are as follows:

Number of researchers has a significant and positive effect on the productivity of the D- 8 countries so that one percentage change in the number of researchers led to 0/32 increase in productivity.

Research and development has a positive and significant effect on productivity of D- 8 countries such that one percentage change in R & D leads to 0/14 an increase in productivity.

Information and Communication Technology has a significant and positive effect on the productivity of D- 8 countries such that one percentage change in information and communications technology makes 0/03 increase in productivity.

Human capital has a positive and significant effect on productivity of D- 8 countries such that one percentage change in Human capital leads to 0/04 an increase in productivity.

The second model estimated

Model estimated in this study are as follows:

The results are as follows:

Labor force is positive and significant effect on economic growth of D- 8 countries.

Physical capital has a significant positive effect on economic growth of D- 8 countries.

Information and Communication Technology has a significant positive effect on economic growth of D- 8 countries.

Human capital has a significant positive effect on economic growth of D- 8 countries.

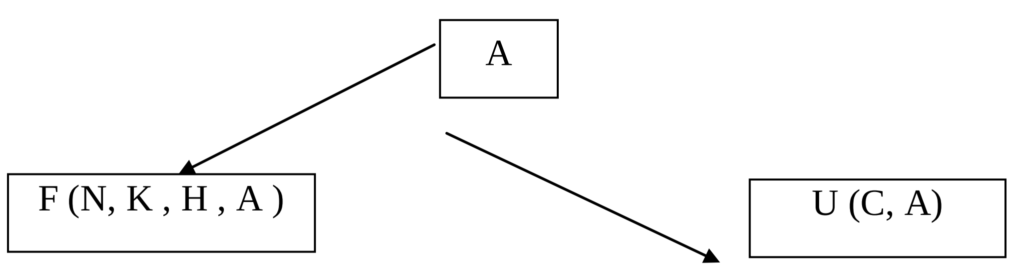

Figure 1: Economy and performance of digital goods ; Source: Quah (2003)

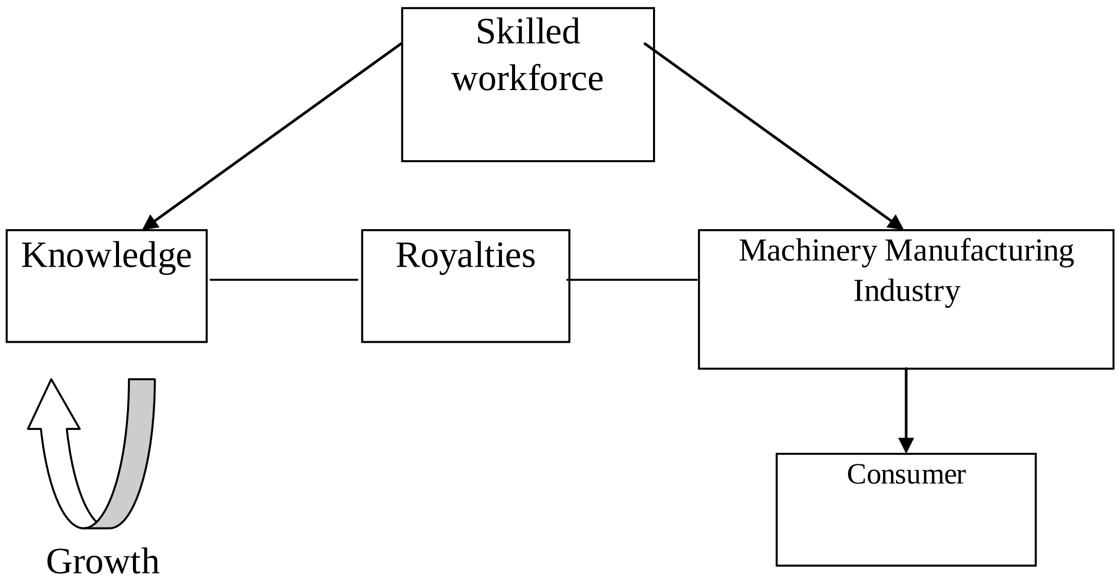

Figure 2: The traditional pattern of growth and knowledge; Source: Quah (2002)

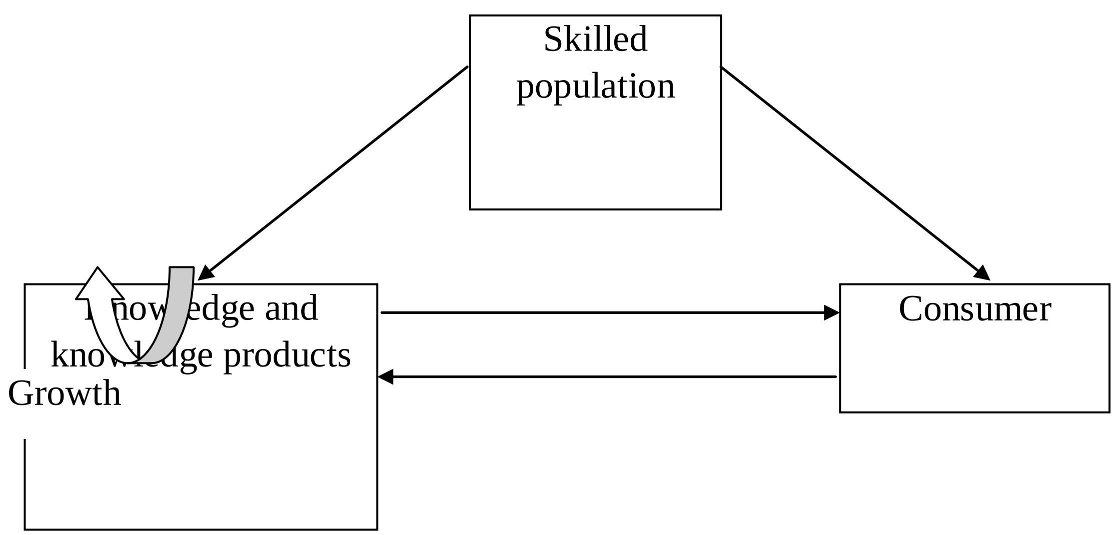

Figure 3: The new economy based on knowledge and weightless economy; Source: Quah (2002)

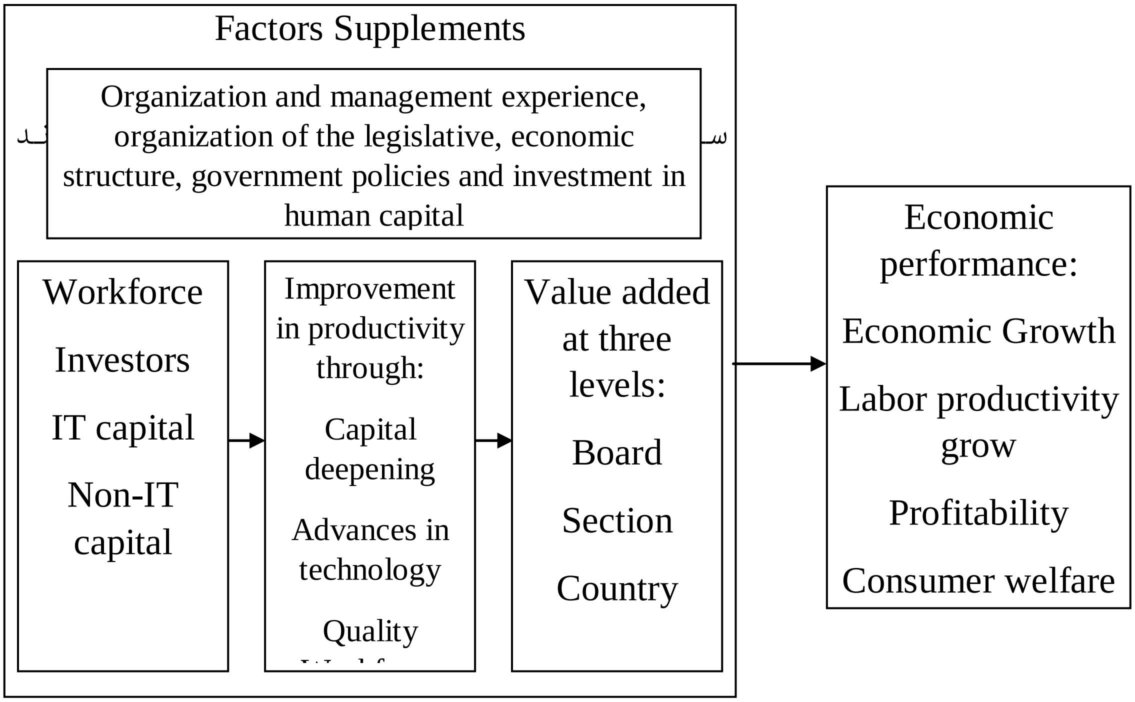

Figure 4: performance of Information and Communication Technology In the supply-side of the economy; Source: (Moshiri and Jahangard, 2004: 59)

Table 1: The evolution of productivity measurement since 1920 to now

The transformation in scientific methods of measurement productivity in economics	Period
The concept of production function of with capital and labor inputs development and spread by Cobb and Douglas (1928) and Douglas (1948).	The 1920s
Copland (1937) proposed measurement the performance by using the national income and product accounts and the relationship between real output and the actual cost.	In 1936with consultations on research income and welfare
Tinbergen (1943)	Other efforts to measure TFP
Stigler (1947)	First estimates or estimates of TFP for the Economic America
Solow (1957) and Kendrick (1956, 1961) and other accurately described The concept of TFP and more estimates were prepared, and help to TFP as a useable and effective conceptual. Solow (1956) and Abramotiz (1956) seriously considered residues resulting from the difference between real output growth and the growth of labor and capital inputs to measure TFP.	The 1950s
Continuing and expanding efforts by Kendrick (1961), Griliches (1960, 1963), Jorgenson (1973, 1976, 1977), Dension (1967) and others leads to simplifying the Solow residual. Efforts led to the improved communication between the scientific Measurement of productivity and economic theory.	1960s and beyond

Source: (Diewert and et al, 1998).

Table 2: Calculation of performance indicators

	Coefficient	Standard deviation	Statistics t	Probability
C	**-7.452**	**15.044**	**0.4954**	**-0.623**
LL	**0.2332**	**0.0713**	**3.273**	**0.0061**
K	**0.139**	**0.0621**	**2.2399**	**0.0115**
The coefficient of determination : 0.414177	**Statistics f** : 0.094373	**D.W:** **1.9087**	**Probability** : 0.910123	

Table 3: The stationary results of variables

Variable	Symbol	Levin, Lin chu Statistics	Probability	Results
Gross Domestic Product	**GDP**	-1.64971	0.0495	**I(0)**
Human Capital	**H**	**-2.2055**	**0.0137**	**I(0)**
Information Technology	**ICT**	**-1.6765**	**0.0468**	**I(0)**
Physical capital	**K**	**-3.3837**	**0.0004**	**I(0)**
Labor force	**LL**	**-628.03**	**0**	**I(0)**
Number of researcher	**R1**	**-6.8199**	**0**	**I(0)**
Research and Development	**RD**	**-3.628**	**0.0001**	**I(0)**
Productivity	**Y**	**-2.4632**	**0.0069**	**I(0)**

Table 4: Results of regression estimates for the years 2001 to 2011 (productivity is dependent variable)

Variable	Coefficient	Standard deviation	t Statistics	Significant Coefficient
C	**-3.32001**	**0.331036**	**-10.02912**	**0**
R1	**0.322359**	**0.078752**	**4.093333**	**0.0018**
RD	**0.142339**	**0.067104**	**2.121167**	**0.0575**
ICT	**0.03611**	**0.016543**	**2.182874**	**0.0516**
H	**0.047877**	**0.022249**	**2.151804**	**0.0038**
2/13	**D.W Statistics**		0/95	**R_2**
63/37	**F Statistics**		0/94	**Adjusted R^2**
0/00	**Significance of statistics**			

Table 5: Results of regression estimates for the years 2001 to 2011 (Economic Growth is dependent variable)

Variable	Coefficient	Standard deviation	t Statistics	Significant Coefficient
C	**14.69853**	**9.021690**	**1.629244**	**0.1131**
LL	**1.459566**	**0.329385**	**4.431185**	**0.0001**
K	**1.153819**	**0.481476**	**2.396420**	**0.0226**
ICT	**1.619702**	**0.094527**	**17.13483**	**0.0000**
H	**3.552344**	**0.921527**	**3.854845**	**0.0005**
2/40	**D.W Statistics**		900/	**R_2**
75/07	**F Statistics**		0/89	**Adjusted R^2**
0/00	**Significance of statistics**			

CONCLUSIONS AND SUGGESTIONS

The results show that the effect of the number of researchers per million people variable on labor productivity was positive and significant and suggests that part of the increase in labor productivity is due to the presence researchers at the D-8 countries and spillway from them. The results indicate that costs of research and development variable on labor productivity has a significant and positive effect that the results are based on the endogenous growth literature and knowledge-based economy. The results show that the costs of information and communication on labor productivity had a significant and positive effect. This means that one of the key factors for increasing productivity, is increasing the costs of ICT or Information and Communication Technology. The results further suggest that the costs of secondary education and the number of patents has a significant and positive effect on labor productivity. These results all point this fact that labor productivity, from knowledge, technology, ICT and knowledge-are agents. These results are based on Knowledge Based Economy. The second pattern is as follows:

Labor and capital has a positive effect. However, Labor force have a no significant effect and capital have a significant effect. This could be due to the fact that the developing countries because of the surplus of labor force in different sectors are face with less effective from Labor force and because of the Lack of capital, felt the need for more investment to boost economic growth. The results also show that human capital have a significant and positive effect on economic growth and GDP growth and shows that human capital is considered one of the most important factors of production. The results also show that logarithm of information and communication technology had a significant positive effect on production and ICT is considered one of the most important factors in increasing GDP. In fact, the with respect to the variable itself is located in the second area of production function. According to the results of the study suggest:

- Review the factors that affecting the uptake of research
- Increase the share of Research and development from manufacturing
- Provide grounds for an increase in Number of patents
- Move towards technology user or labor force export and imports of capital
- Investment on Information and Communication Technology to increase economic growth.

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