

THE EFFECT OF ICT ON ECONOMIC GROWTH: AN ECONOMETRIC APPROACH

Khaled ROUASKI¹, Rachid TOUMACHE², Badreddine TALBI³, Benanaya Djelloul⁴

¹ ENSSEA, 11 Doudou Mokhtar Ben Aknoun, Algiers, Algeria,
khaled.rouaski@gmail.com

² ENSSEA, 11 Doudou Mokhtar Ben Aknoun, Algiers, Algeria,
rtoumache@gmail.com

³ ENSSEA, 11 Doudou Mokhtar Ben Aknoun, Algiers, Algeria,
talbi.bad@gmail.com

⁴ Univ Khemis Miliana, street thneyat elhad, Khemis Miliana, Algeria,
Benanayad@yahoo.fr

Abstract

Since the second half of the XXth century the world moved into a new era, based on the technological and information revolution and its application, in this context society has undergone an important structural change in the pattern of his social life moving from traditional industrial style to a new style based on the information, this information is relatively free and a range of temporal and spatial determinants which limited his life in the past. In addition to its informational evolution rely on the application of information technology and communication in several areas of social life. This paper discusses how the use of ICT contributes to economic growth and the ability to a relationship exists between information technology and communication (ICT) and the level of economic growth (GDP), by conducting an empirical investigation applies the statistical analysis methods on a sample of 137 countries of the world sorted index on the information society (ICT-RNI). It also provides an insight of results from past studies carried out to confirm the productive relationship between the two (ICT and economic growth)

Keywords: *Economic growth, statistical analysis methods, information and communication technology (ICT), Index information society (ICT-RNI), correlation analysis, regression analysis.*

Introduction

The field of modern technology and its sophisticated applications knows amazing development due to the great acceleration of the development of different fields of science and big jumps that have occurred in this area. While it took many centuries for the human transition from the agricultural era to the industrial era, mankind has moved into the age of atom in decades, and then to the space erainyears, and now we see a tremendous progress of technology almost every hour. On the other hand there is a real challenge facing the developing countries, which isthegreat technological development and the information revolution that changed many of the concepts, patterns of work and relationships. Moreover it increases the size of the technological gap between developing countries and developed countries, for this we wanted to test the quantitative relationship between information and communication technologies on the one hand and the economic growth on the other hand to determine the limits of this interdependence.

Methodology

Definition of the indicators of the econometric study

Statistical analysis is performed between two variables, each one of them refers to one of the two parties of the relationship. These two variables are:

Networked Readiness Index (ICT-NRI)

It is the dependent variable, which represents the values of the index of information technology in society (ICT-NRI) for the year 2010, where the first edition was issued in 2001 as a result of jointly academic study collected the World Economic Forum, the University of Business Administration (INSEAD business school) the World Bank, and since that date the index is released every year in the academic study looking at the development of information technology globally known as The Global Information Technology Report (GITR), the indicator consists of three main axes, in each axis there are homogeneous groups and each group includes a set of variables¹.

Per Capita gross Domestic income (GDP_{pc})

It is the independent variable which is adopted as a proxy of the level of economic growth due to his good performance at the level of statistical tests in many previous studies; we used the values of per capita gross domestic income (GDP_{pc}) for the year 2010².

Statistical analysis of the results of the correlation between the two variables.

Correlation analysis used to study the correlation between two variables, correlation means here case of agreement or similarity in the behavior of the two variables, which means that whenever there is a change in one, it is combined with a change in the other. The result of this analysis takes values ranging between (+1) and (-1), and the farther the value of the analyst is from zero the stronger the relationship is, and the relationship is Positive or direct correlation in the case of positive values, while the relationship is counterproductive in the case of negative values, and we have been conducting this analysis using the coefficient of Spearman's Rank correlation, which is more accurate in dealing with cases of non-linear relationships.

Research Results

Correlation Regression and analysis

Table (1) shows the existence of a correlation between the two variables for the group of countries of the sample. This relationship is largely Strong; the value of the correlation coefficient between the two variables is $R^2 = 0.915$. Moreover, the relationship between the two variables is positive correlation, which means both variables move in the same direction³.

Table 1: Results of statistical analysis of the variables of the sample

Variable	Observations	Obs. with	Obs.	Min	Max	Average	Stan-Error
(ICT-	106	0	106	242,000	49360,000	8924,019	11152,252
(GDPpc)	106	0	106	2,670	5,600	3,736	0,651
DDL							103,000
R ²							0,915
SCE							1110757262,801
MCE							10784051,095
RMCE							3283,908

To check the relationship between the two variables we performed another statistical analysis; the "Regression Analysis", which is a statistical tool, designed to analyze the relationship of the effect of a variable to another variable, and expressed graphically by the use of a mathematical equation, that is formulated from the results of the analysis. The affecting variable is called independent variable and the affected variable is called the dependent variable. Therefore, this analysis is performed to study the effect of the independent variable (per capita gross domestic income (GDP_{pc})) on the dependent variable (Networked Readiness Index (ICT-NRI)).

The path of the growth curve in the presence of information and communication technologies

Figure (1) represents correlation relationship between variables, where the x-axis represents the independent variable (income per capita gross domestic (GDP_{pc})) and the y-axis we have the dependent variable (Networked Readiness Index (ICT-NRI)) and all points in this figure reflects the countries of the study sample.

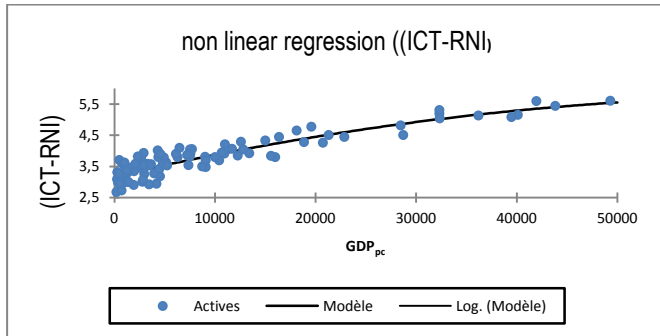


Figure1: the correlation of the variables for the study sample

Figure (1) shows the existence of a positive and non linear relationship between the two variables and the high concentration of the cloud of points of the sample proves the strength of the relationship. Through statistical results we conclude that the equation of the curve is the mathematical equation of the second degree writes as follows:

$$(ICT-NRI) = -0.00000000053 GDP_{pc}^2 + 0.000074 GDP_{pc} + 3.19$$

As we can deduce from the statistical tests that the strength of correlation of the variables estimated at 85.4 % ($R^2 = 0.854$), and Figure (1) indicates that the curve shows varying slope that bind variables to each other, and this means that the proportion of the change of the value of the (ICT-NRI) with the change of the value of (GDP_{pc}) is not constant. Therefore, there is a disparity of the nature and the size of the impact of ICT on the level of economic growth. By studying the path of the growth curve in the presence of information and communication technologies we can deduce that it can be divided into three principal parts according to the average value of marginal slope of curve as shown in Figure 2, where the value of marginal propensity to curve gradually decreased when the values of the horizontal axis increased, and this refers to the decline in the power of correlation, i.e., that the higher the value of the index (ICT-NRI) induces less important change in the value of the index of per capita gross domestic income (GDP_{pc}).

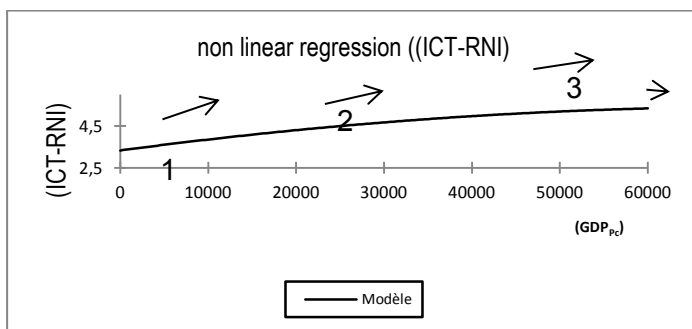


Figure2: the different degrees of inclination of the marginal curve

Analysis & Discussion

Stages of the impact of information and communication technologies on economic growth

From the three cases that have been previously identified in the light of the impact of the degree of correlation between the two variables on the value of the marginal propensity to growth curve and depending on the results of the statistical analysis can identify three main phases experienced by the society in the information age to achieve development⁴.

Start-up phase

This phase represents the first meeting or first interaction between a developing countries and information and communication technology. This phase is characterized by the fact that the rate of change of the economic growth is higher than the rate of change of the development of the Information and communication technologies. According to this relationship, the small use of information and communication technology in these developing countries leads to more important improvement in the characteristics of economic growth. Moreover, the use of the ICT should be limited due to the fact that the attributes of the developing countries and the lack of human skills and capabilities of financing and intellectual and legal frameworks.

Transition Phase

it is the second phase, in which the community recognizes the importance of the new technologies, the reason behind this is primarily the touch of the positive role played by ITC to improve the level of development during the previous phase, so at this stage society starts a transition in its intellectual frameworks, and becomes more aware of the importance of information and communication technology in its life and future. Moreover, this phase is characterized by intensification in the use of applications of information and communication technology.

Maturity phase

Represent the highest levels of growth and the society has achieved a high level of development, as well as a high level of the use of the latest information and communication technologies. It can be described by Information Society, where all categories and sectors of the society adopt the pattern of informational life. Moreover, this phase is characterized also by decrease the rate of change in the level of development that is associated with the change in the level of ITC from its previous phase, and the community at this stage has achieved the highest levels of development.

Conclusion & Suggestions

By means of statistical analysis. We studied the relationship between economic growth and the level of information and communication technology using a sample consisted of 137 countries, the results obtained confirmed through the analysis of the correlation matrix the presence of a strong relationship linking the two variables, in addition, regression analysis results indicate the existence of a strong positive relationship. Furthermore, the development of society in the information age pass through three principal stages; start-up phase followed by transition phase, then maturity phase, and by returning to the most important theory of development in the twentieth century, which is the theory of Rostow for economic growth, we find that the most important difference between them is the rate of change in the level of development that is associated with the change in the social and economic conditions of the first and the change in the characteristics of informatics in the second, where we find that the rate of change in the second clearly higher than the first. Where ICT play catalytic role in achieving development and growth of the community.

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