

THE RELATIONSHIP BETWEEN IT&C AND THE ECONOMIC DEVELOPMENT FOR THE EU-28 MEMBER STATES

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Abstract

Nowadays, many researches aim to describe the relationship between information and communication and the degree of economic development, in an attempt to define the key factors that spur national development. The Information Technology and Communications industry is vital to national competitiveness and has become a key factor for increasing economic performance and quality of life.

In this paper the relationship between IT&C and the economic performance will be described, using four data analyses. The economic development of a country was measured through the GDP-per capita indicator, while the IT&C level was represented by an IT&C usage indicator: ISOC – Enterprises. The results highlight the importance of developing the technology, especially the IT&C, as a critical step towards meeting the demands of society and the EU economy. The analyses are oriented towards the moderate developed countries, an particular segment being dedicated to Romania.

Keywords: IT&C, GDP, ISOC, data analysis

JEL Classification: C22, J24, M15

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1. INTRODUCTION

Computer skills are essential for efficiency in all aspects of our fast changing world. The usage of IT&C by the population is in a direct relationship with its welfare and with the economic development of the country.

Many attempts have been made in order to describe this relationship. In [7], the author proposes a multi-factorial regression analysis, explaining the dependence between IT&C expenditure and the level of Internet access, GDP per capita, Gross domestic expenditure on R&D, IT&C expenditure - Telecommunication.

In [2], the author emphasizes the importance of information and communication for the diverse economies. It is stated that IT&C is “a factor responsible for the widening of the huge difference between the rich and the poor societies measured along the multiple linear scales of progress in the global market economy”; also this doesn’t suggest that IT&C is inappropriate for developing countries.

In a debate of a virtual community [12] it is observed that “countries that encourage the development of a competitive IT industry often see a close connection between information technology and economic development”. The good practice of India is recalled here.

In this paper we’ll continue the work published in [4]: describing the connection between IT&C and the economic performance of the 28 European Union countries. In the mentioned paper we used ISOC-Individuals computer use (percentage of individuals), as a measure of the IT&C usage. In this approach, another parameter was tested: ISOC-Enterprises, i.e. Enterprises using computers (Percentage of enterprises), also obtained from Eurostat. As an economic development indicator we’ve maintained the GDP-per capita indicator. For both indicators we have used historical data from 2010 until nowadays, for the 28 Member States, obtained from Eurostat [6].

We’ve carried out the next four analyses:

(1) The economic performances of the 28 European Union countries in 2014 – we proposed a 4-groups division of the 28 Member States, according to their economic development;

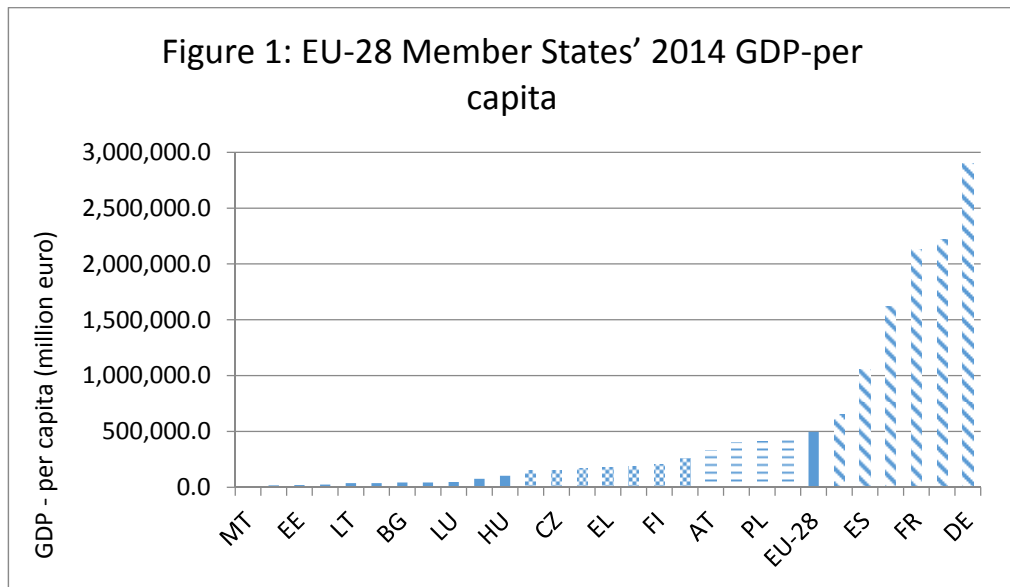
(2) The IT&C usage of the Moderate developed Member States - an analysis of the time series of the ISOC-Enterprises in the Moderate developed EU countries;

(3) The relationship between the economic performance and the IT&C usage in some European Union countries - a description of the relationship between the GDP per capita and the ISOC-Enterprises in some EU Member States in the last years;

(4) The relationship between the economic performance and the IT&C usage in Romania – an analysis of the correlation between GDP per capita and the ISOC-Enterprises in Romania’s case.

2. THE ECONOMIC PERFORMANCES OF THE 28 EUROPEAN UNION COUNTRIES IN 2014

In order to perform a more accurate comparison, the 28 EU countries were divided into four groups with similar performances. We considered as indicator for grouping the economic level measured through the 2014 GDP-per capita values. The performances are shown in the figure below:



Source: own processing using Ms Excel, based on EUROSTAT data

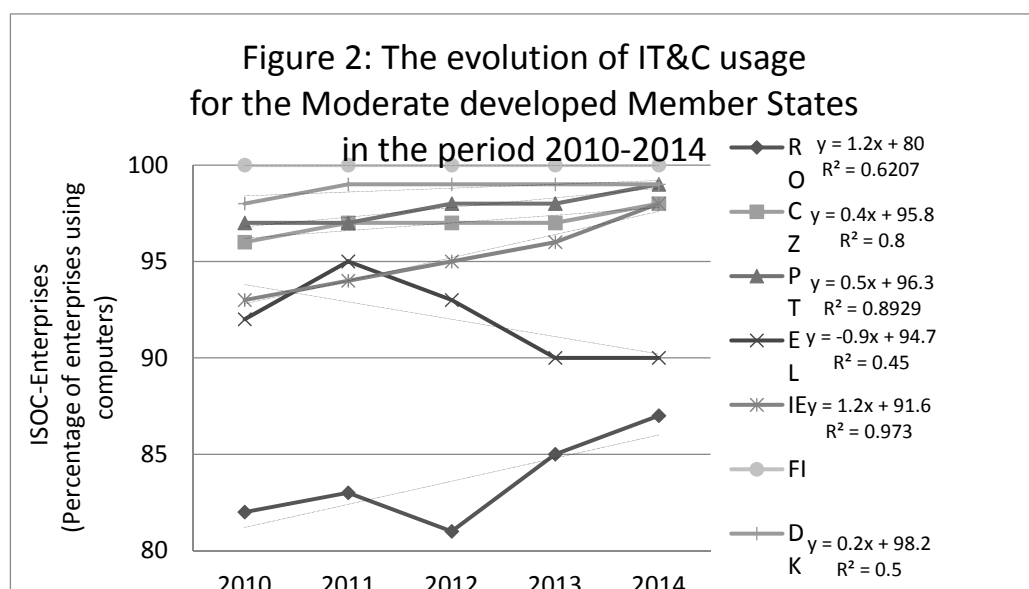
The member states fall into the following four economic performance groups:

- The first group of the most performant countries includes Member States in which the GDP-per capita 2014 values are above the EU-28 average. These countries are Germany, UK, France, Italy, Spain, and Netherlands.
- The second group contains countries with GDP values close to that of the EU average i.e. less than EU-28 mean but greater than 60% of it. These countries are: Slovenia, Poland, Belgium and Austria.
- The third group includes Member States where the economic performance rates between 30% and 60% of that of the EU average: Denmark, Finland, Ireland, Greece, Portugal, Czech Republic, and Romania.
- The fourth group includes Member States that show an economic performance level well below that of the EU average, i.e. less than 30% of the EU average. This group includes Hungary, Slovakia, Luxembourg, Croatia, Bulgaria, Slovenia, Lithuania, Latvia, Estonia, Cyprus, Malta.

Case of Romania. Romania is among the countries of the third group, having a GDP-per capita of 150.018,5 in 2014, the lowest value in its group. The leading country is Sweden, with a GDP-per capita value of 430.258,2. In the next sections we'll analyse the evolution of Romania in comparison with the other five countries of its group, referred as the Moderate developed countries group, in terms of economic performances.

3. THE IT&C USAGE OF THE MODERATE DEVELOPED MEMBER STATES

In this section the evolution of IT&C usage of the Moderate developed Member States will be analysed. The ISOC-Enterprises (individual computer usage in enterprises) indicator for the seven countries in the cluster 3 has been plotted, for the period 2010-2014. For each time series the trendline was traced and the regression parameters were computed.



Source: own processing using Ms Excel, based on EUROSTAT data

Table. 1. The trendlines' coefficients corresponding to the Moderate developed Member States

Country (GDP-per capita order)	Slope	R ²
RO	1.2	0.62
CZ	0.4	0.80
PT	0.5	0.89
EL	-0.9	0.45
IE	1.2	0.97
FI	-	-
DK	0.2	0.50

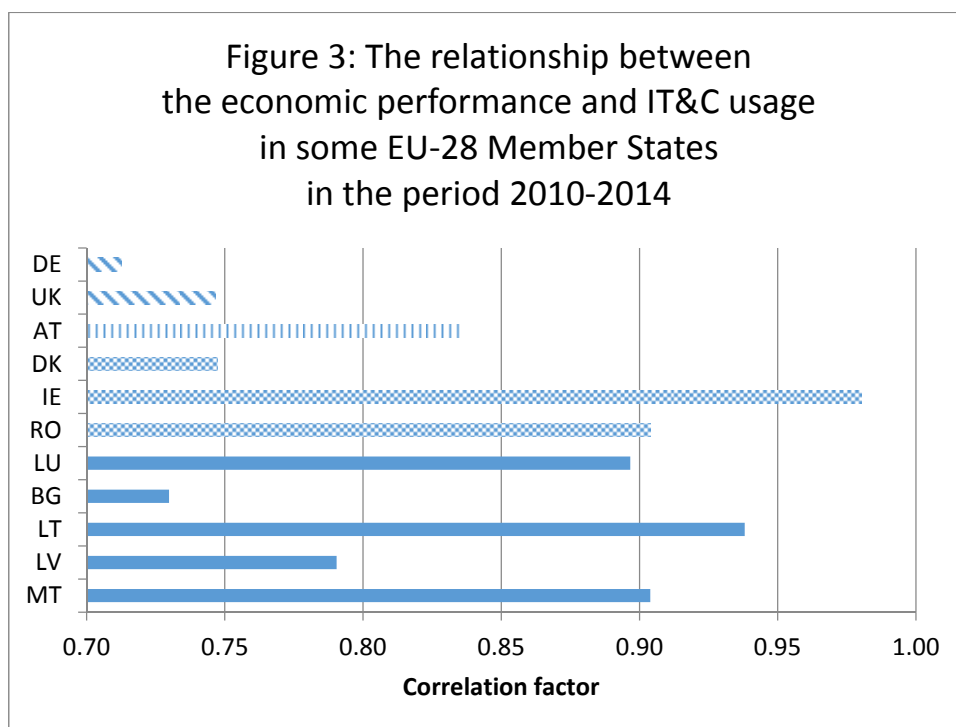
Source: own processing based on EUROSTAT data

Finland is the leader of the group, in the last five years it registered a 100% usage of computers in enterprises. It is followed by Denmark, Czech Republic, Portugal, and Ireland, the three of them registering high values of ISOC indicator and a constant progress in time. Greece, although in 2011 registered a good level of IT&C usage (95%), in the next three years, its situation has worsened.

Romania has the lowest ISOC-Companies values in its group. But, excepting 2012, Romania registered a constant progress. With a regression slope of 1.2, the progress of Romania has been more accelerated than in the other countries' case. Denmark, the most economic developed country in the Moderate group, also a leader in IT&C terms, has no progress in the last three years.

4. THE RELATIONSHIP BETWEEN THE ECONOMIC PERFORMANCE AND THE IT&C USAGE IN SOME EUROPEAN UNION COUNTRIES

In this section we analysed the correspondence between the economic performance and the IT&C usage in some EU countries. We considered as indicators the GDP-per capita and the ISOC-Enterprises time series of five years long: 2010-2014. For every country we performed a correlation analysis. In the figure below are listed the eleven countries proving a significant relationship between the two indicators:

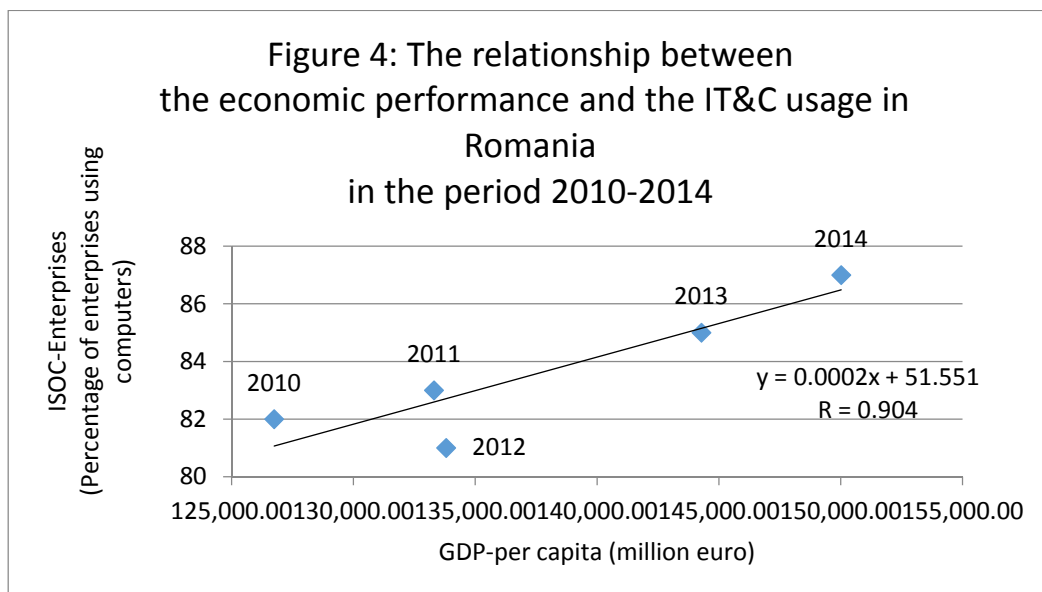


Source: own processing using Ms Excel, based on EUROSTAT data

The most significant relationships are included in the figure above. Every group is represented by some countries: Denmark and UK as economic leaders, Austria as representative of the second group, Denmark, Ireland and Romania as moderate developed countries, and, Luxemburg, Bulgaria, Lithuania, Latvia, and Malta for the forth group.

5. THE RELATIONSHIP BETWEEN THE ECONOMIC PERFORMANCE AND THE IT&C USAGE IN ROMANIA

In this section, we measured the strength of the relationship between the GDP-per capita and the individual usage of computers in enterprises in Romania in the last five years (period 2010-2014).



Romania registered a constant improvement of the economic performance. The GDP-per capita has been growing from 126.746,40 million euro in 2010 to 150.018,50 million euro in 2014. Also, except 2012, the percentage of enterprises using computers has been growing. In 2010, 82% of the Romanian enterprises were using computers, while in 2014 the percentage has grown to 87%.

The two indicators follow an ascendant trend in a strong relationship, the high value of the correlation factor ($R=0.904$) proving this dependence. The detailed Anova analysis is presented in the Annex.

6. CONCLUSION

As a conclusion, the observations that we've made in the previous research have been mentainted: we can state that in some EU-28 Member states, there is a significant link between computer usage and the economic performance. In the case of Romania, this relationship proves to be very strong.

The Moderate developed Member States have different evolutions regarding the usage of computers in enterprises; there is a significant gap between Finland, the leader of the group, with a performance of 100% companies using computers in the last five years, and Romania, whose percentage has just reached 87% in 2014.

But, nevertheless, Romania is registering the most dramatically progress in ISOC-Enterprises terms of all Moderate Member States.

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ANNEX

The Anova analysis for the linear relationship between the individual usage of computers in enterprises and the GDP-per capita indicators in Romania in the period 2010-2014

The Anova analysis was obtained using MS Excel product.

Regression line equation:

$$ISOC-Enterprises = 0,0002 * GDP-per\ capita + 51,551$$

$$R^2 = 0,8169$$

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0,904
R Square	0,817
Adjusted R Square	
Square	0,756
Standard Error	1,190
Observations	5

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	18,951	18,951	13,381	3,53E-02
Residual	3	4,249	1,416		
Total	4	23,2			

	Coeff.	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	51,551	8,778	5,873	9,85E-03	2,36E+01	79,485
GDP-per capita	2,33E-04	6,37E-05	3,658	0,035	3,03E-05	4,35E-04