

# Considerations on the Impact of Information Technology Evolution in Romania in the Last Six Years

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## Abstract

*The paper aims to monitor the use of Information Technologies and the Internet in particular, both at the population level and at company level, including developing regions in the period 2006-2012, using statistical data taken from Eurostat databases and the National Institute of Statistics. Before 2000 we cannot speak of an impact of IT or of any information infrastructure in Romania, and the interest of the population and of the companies was very low. Although Romania has made important steps in providing technological, economic and legislative parameters for the development of the information society, it is still in its infancy and has a long way to go in order to catch up with other EU countries among which Romania ranks last.*

**Key words:** *Internet, computer, information society, information infrastructure*

**JEL Clasification:** *C1, L86, R50*

## Introduction

In Romania, we cannot talk about the impact of information technologies until the 1990s when, with major policy changes, access to high technology became free. Even so, it took over 10 years to create an infrastructure which allows Internet access almost all over the country. Before 2000 we cannot speak of an impact of IT in Romania because the information infrastructure, as well as the population's and the companies' interest in modern technologies was very low.

Even now, there is a high reticence on the use of computers, Internet, e-business facilities, including online payments in the countryside but with notable differences between developing regions. However, in recent years, the average annual increase in the level of Internet access in Romania has exceeded the growth rate registered EU average. On the other hand, the economic crisis did not significantly affect growth levels of Internet access in Romania.

The paper proposes to monitor the use of information technologies and the Internet in particular, both in the population and gross investments and turnover of the companies in the IT, including developing regions in the period 2006-2012, using statistical data taken from Eurostat databases and the National Institute of Statistics.

## Evolution of the Level of Access and Use of the Internet in Romania since 2004

In this chapter we will analyze the dynamic increasing evolution of the level of access to the Internet for population and businesses but also of the population using the Internet.

If before 2004 the Romanian public access was very low (below 6%), mainly due to lack of adequate infrastructure, after 2004 it significantly increased (54% in 2012). This led to a considerable reduction of the gap with the EU average which decreased from 35 percentage points in 2004 to 20 percentage points in 2012.

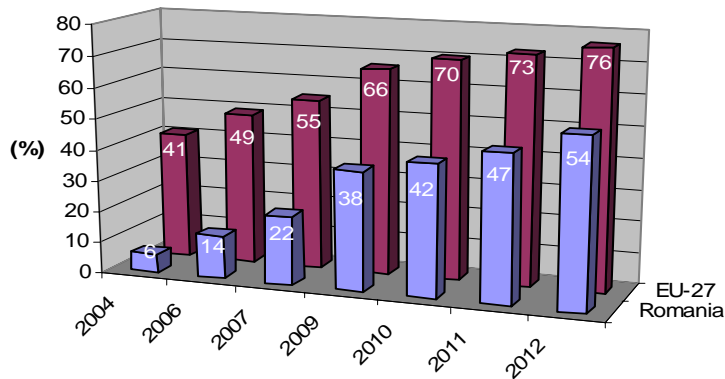
In the analyzed period, the increase of Internet access (Figure 1) of households aged 16 to 74 was linear, with about 8.21 percentage points annually. To check this statement it was tested the linearity of the model based on the assumptions:

*Hypothesis  $H_0$* : The model is not linear

*Hypothesis  $H_1$* : The model is linear

Applying the Fisher test for significance level  $\alpha = 0.05$ , the result value was  $SignificanceF = 4.73E - 05 < 0.05$ , which leads to rejection of the hypothesis  $H_0$  and acceptance of the hypothesis  $H_1$ . Note that for the linear model  $MultipleR = 0.98561$ , which strengthens the hypothesis of linearity.

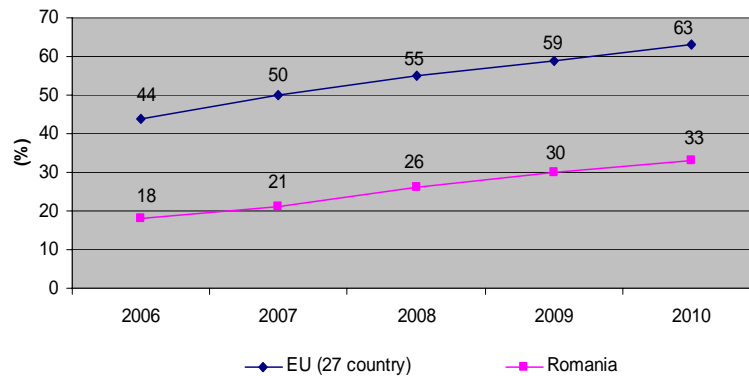
One conclusion that emerges here is that the economic crisis triggered in 2008 did not significantly affect growth levels of Internet access in Romania. However, the same conclusion can be drawn for the development of the level of Internet access in the EU, checking the linearity assumptions in this case ( $SignificanceF = 0.00014 < 0.05$ ,  $MultipleR = 0.97$ ). It should also be noted that the population growth in terms of the possibilities to access the Internet is very high (9 times), which was determined on the one hand, by the development of information infrastructure and growing of quality (fiber optics), and on the other hand, by the population appetite to be connected to the Internet.



**Fig. 1.** Level of Internet access - households %.

Data source: <http://appsso.eurostat.ec.europa.eu>

A second conclusion is that the average annual increase in the level of Internet access in Romania was 8.21 percentage points higher than the one registered in the EU of 6 percentage points which lead to a gradual reduction of the gap.

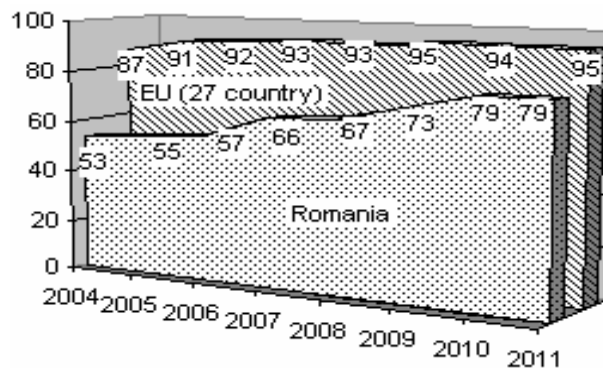


**Fig. 2.** Internet activities – individuals (%)

Data source: <http://appsso.eurostat.ec.europa.eu>

Regarding the use of the Internet by population (Figure 2) the situation is somewhat different. Although in this case, the assumptions of linearity are confirmed for Romania ( $MultipleR = 0.9963$ ) and the EU ( $MultipleR = 0.9957$ ), the average increase for internet activities in Romania was 3.9 percentage points to 4.7 percentage points in the EU.

In conclusion, despite the annual growth of the Internet access in Romania ahead of the EU, the annual increase of the effective use of the Internet in Romania is lower than in the EU, the gap is increasing. To remedy these situations, it is required that education and awareness measures on Internet use should be provided to individuals in education facilities, e-commerce and many other areas.



**Fig. 3.** Enterprises – level of Internet access (%)

Data source: <http://appsso.eurostat.ec.europa.eu>

At corporate levels (Figure 3) there is an increasing growth of Internet connections, but as expected, they are ahead of the people with regard to internet access availability. Thus, if in 2004 over 54% of companies were connected to the Internet, in 2011 the percentage is over 79%. The average annual increase in the level of Internet access businesses in Romania is 4.17 percentage points, while in the period under review, the EU average annual increase was only 0.95 percentage points. If this trend continues, in about 2.5 years, from this point of view, we reach the EU level. As expected, firms have folded faster than the need to use IT in the development and efficient operation, so that in 2004 more than half of the companies (53%) had access to the Internet as compared to the shy 6% in the population.

## Skills Development in Using the Computer and Internet in Romania

The slow growth of Internet usage by individuals, much lower than Internet access, is due largely to the relatively low computer usage skills. Thus (Table 1), in 2006, at the EU level, 51% of all individuals between 16 and 64 years had intermediate skills of computer usage, whereas in Romania the share was only 17%.

During 2006 - 2012 the share of individuals with at least average abilities of computer usage in total population increased. At EU level, their share was 60% (an increase of 9 percentage points). In Romania, the same year, their share was only 26% (up everything by 9 percentage points). Note that in Romania, growth figures were higher in the period 2006 - 2009 (an increase of 13 percentage points), while in the EU the increase was only 5 percentage points.

**Table 1.** Individuals' level of computer skills (%)

	2006	2007	2009	2011	2012
<b>EU(27 country)</b>	51	54	56	61	60
<b>Romania</b>	17	23	30	31	26

Data source: <http://appsso.eurostat.ec.europa.eu> *Individuals' level of computer skills (Level of basic computer skills)-% of the total number of individuals aged 16 to 74*

After the economic crisis the situation is reversed. In Romania, between 2009 and 2011 the increase is only 1 percentage point, while the EU is 5 percentage points. This is due to the very low level of computer use registered in countries that joined the EU since 2005. As outlined in our study (Zaharia M., Enăchescu D., 2013), “after the EU enlargement, this indicator (the percentage of computer use at place of education by unemployed) decreased significantly from 8% in 2005 (EU-15 countries) to 3% in 2009 (EU-27 countries). Compared to 2009, in 2010 there is a slight reversion to 4%. Regarding Romania, the percentage of computer use at place of education by the unemployed in 2010 was only 1%”[7].

Year 2012 brings both the EU and Romania a decline in the percentage with at least average skills in using the computer. If the EU faces 1 percentage point decline (-1.7% since 2011), in Romania it is 5 percentage points lower (-6.2% since 2011). The situation can be considered the more alarming as it is mainly due to people who turned 16 in 2012 (which came into young population age range considered) and to a smaller extent to the population that was aged 74 years old in 2012. The same aspect of Romania's population loss of appetite for getting IT skills is presented in Table 2. In 2011, only 5% of the population between 16-74 years obtained IT skills, compared to 14% in EU.

**Table 2.** Way of obtaining e-skills (Individuals who have obtained IT skills % of the total number of individuals aged 16 to 74

	2005	2006	2007	2011
<b>EU (27 country)</b>	10	11	11	14
<b>Romania</b>		2	2	5

Data source: <http://appsso.eurostat.ec.europa.eu>

Given the results presented here, the school, first, has to review curriculum and mode of transmission of knowledge, and the family and other institutions with responsibilities in educating the younger generation must take action to develop their skills and to increase computer use.

Regarding the level of competence in using the Internet, the data published by the National Statistics Institute (Table 3) for 2007 and 2010 indicate an improvement.

**Table 3.** Share of persons by level of competence in using the Internet, at national level (%)

	Level of competence in the use of Internet <sup>1)</sup>					
	2007			2010		
	low	med.	high	low	med.	high
<b>Total</b>	16	10	2	25	16	1
<b>gender</b>						
<b>male</b>	17	11	3	27	18	1
<b>female</b>	16	9	2	25	16	1
<b>age groups</b>						
<b>16-24</b>	27	25	7	36	33	2
<b>25-34</b>	23	13	3	33	26	1
<b>35-44</b>	19	9	2	31	14	–
<b>45-54</b>	15	4	1	24	10	–
<b>55-64</b>	6	2	–	13	4	1
<b>65-74</b>	1	–	* <sup>2)</sup>	4	1	*

1) difference to 100% is the share of people 16-74 years old who engage in activities other than the activities analyzed

Source: [http://www.insse.ro/cms/files/Web\\_IDD\\_BD\\_ro/index.htm](http://www.insse.ro/cms/files/Web_IDD_BD_ro/index.htm)

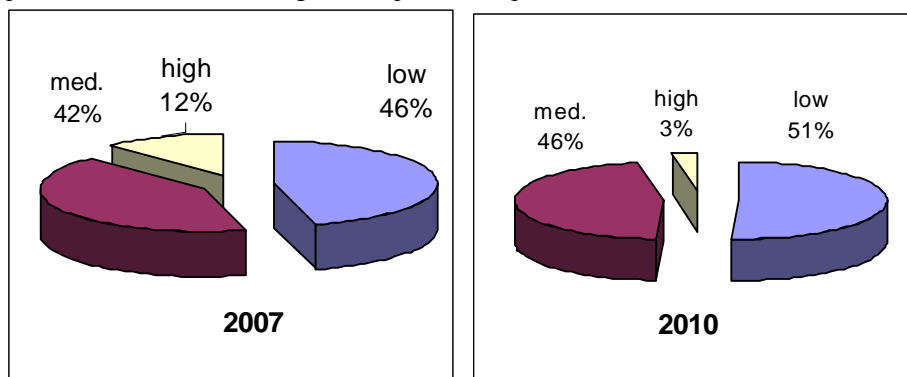
Thus, overall, the share of Internet use skills has increased from 28% in 2007 to 42% in 2010. On the other hand the percentage of those with medium and high skills in total decreased from 42.86% in 2007 to 40.48% in 2010. This is due to increase at a higher percentage rate of those with low skills in using the Internet (16% in 2007 to 25% in 2010) than the percentage of those with medium level skills that rose from 10% in 2007 to only 16% in 2010. At the same time, the share of those with high skills decreased from 2% in 2007 to 1% in 2010.

A similar situation is also recorded in the distribution of skills by gender. Note that the share of male competence in this area is higher than the female population.

Analyzing the share levels of skills in using the Internet in the age group 16-24 years, the first finding that underlines the above conclusion is that although the overall weight increased, in terms of skill level it was recorded a significant decline.

Thus, in 2007 the total population analyzed in the age range 16 to 24 years, the share of those with high skills was 12%, while in 2010 it drops three times reaching only 3%.

A very important conclusion that emerges here is that the school does not keep up with the development of IT, as the training and acquired competences decrease.



**Fig. 4.** The evolution of the levels of skills in using the Internet in the age group 16 to 24 years

Data Source: [http://www.insse.ro/cms/files/Web\\_IDD\\_BD\\_ro/index.htm](http://www.insse.ro/cms/files/Web_IDD_BD_ro/index.htm)

On the other hand, if we analyze the rhythm of development of medium levels, the percentages of skills in Internet usage by age group in 2010 compared to 2007 show that the highest values are recorded in the age group 45-54 years (2.5%), followed by age group 25-43 years, 55-64 years (2%) and 35-44 years (1.56%). These developments are due to the fact that staff of over 25 and especially between 45-54 years old in leadership positions, have to cope with IT developments in order to have good performance in jobs.

### Aspects of Computer Use by Region

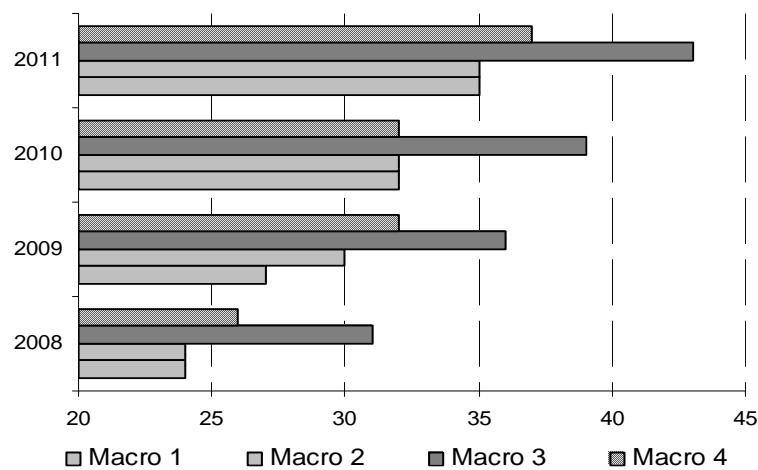
During 2008 - 2011, by region and macro region development, the level of computer use and developments of this indicator register specific issues. At the macro regions (Figure 5), the share of population in the age range 16-74 years old who used the computer at least once per week varies between a minimum of 24%, in 2008, in Macro1 and Macro2 and maximum 43% recorded in 2011 in Macro 3.

Macro with the highest level of computer use along the period was Macro 3 in which this indicator increased linearly from 31% in 2008, with an average of 3.9 percentage points in 2011 to a value of 43%.

Ranked second was Macro 4; the percentage of individuals who used a computer at least once a week evolved fairly linear ( $MultipleR = 0.947$ ), increasing by an average of 3.3 percentage points. All with a linear evolution, evolved percentage of individuals who used a computer at least once a week, but starting last, in Macro 1. Average annual growth rate in this case is 3.8 percentage points higher than in Macro 4, but lower than in Macro 3.

In the developing regions (Table 4), in all the 8 regions, in the analyzed period, the percentage of individuals who used a computer at least once a week increased continuously. The highest values were recorded in Bucharest-Ilfov, where this indicator increased from 44% in 2008 to 55% in 2011. In fact, this is the development region that has maintained Macro 1 on the first place, in the period under review, although the South-Muntenia forming Macro 1 showed much lower values (23% in 2008 and 34% in 2011).

In the second place, as the level of computer use by individuals, are the West development region includes the counties of Arad, Caras-Severin, Hunedoara and Timis, and the value of this indicator increased from 29% in 2008 to 40% in 2011.



**Fig. 5.** Share of population in the age range 16-74 years old who used the computer at least once a week on macroregions

Data source: <http://appsso.eurostat.ec.europa.eu>

Although it ranks third, with South East region, Center region registered a good evolution of this indicator, the number of individuals who use the Internet regularly in four years increased by 14 percentage points. At the same time, in the South-East region, the increase was only 9 percentage points.

Ranked last was the South West region which is made up of the following counties: Dolj, Gorj, Mehedinti, Olt and Valcea. In this region, in 2011 the percentage of the level of computer use by individuals was 33%. With all the good evolution recorded in the West region, the situation from South West region had a negative impact on the percentage registered in Macro 4.

Of course, the question arises: what happens to the percentages of the population that are not included in the above situations? It is expected that some of them use the computer but less often than once a week, and some never use this important tool of the 21st century.

**Table 4.** Individuals regularly using the Internet by NUTS 2 regions % of individuals aged 16 to 74

	2008	2009	2010	2011
<b>Nord-West</b>	25	29	30	34
<b>Center</b>	22	25	34	36
<b>Nord-East</b>	22	30	33	35
<b>South-East</b>	27	30	31	36
<b>South-Muntenia</b>	23	26	29	34
<b>Bucuresti-Ilfov</b>	44	51	53	55
<b>South-West Oltenia</b>	24	27	28	33
<b>West</b>	29	36	37	40

Data Source: <http://epp.eurostat.ec.europa.eu>

A special situation which is not encouraging can be found in Romania, in the case of the people who have never used the computer. Their percentages (Table 5) for development regions far exceed those recorded for those who use a computer at least once a week, presented in Table 4.

As it can be noticed, and in accordance with those outlined above, a better situation was recorded in Bucharest-Ilfov region where the percentage of those who have never used a computer decreased from 44% in 2008 to 35% in 2010.

**Table 5.** Individuals, aged 16 to 74, who have never used a computer by NUTS 2 regions (%)

	2008	2009	2010
<b>Nord-West</b>	60	54	48
<b>Center</b>	60	61	48
<b>Nord-East</b>	62	57	53
<b>South-East</b>	59	60	57
<b>South-Muntenia</b>	62	61	58
<b>Bucuresti-Ilfov</b>	44	40	35
<b>South-West Oltenia</b>	63	60	55
<b>West</b>	53	48	44

Source: Eurostat.eu, *Individuals who have never used a computer*, by NUTS 2 regions

In contrast, with the highest percentage of those who have never used the computer in 2008 is the South West region. After a decrease by 3 percentage points in 2009 it leaves the last place, which is occupied by South Muntenia with a percentage of those who have never used computer of 61% in 2009 and 58% in 2010.

Although in 2008 the regions of the North-West and Center recorded 60% for this indicator, in 2010, after a fall of 12 percentage points (the largest decrease recorded in this period), they reach 48%, being ranked second after Bucharest-Ilfov.

The high share of the population that has never used the computer leads to the conclusion that the education level of the population, especially in rural areas, regarding the use of IT, is very low requiring popularizing measures among the whole population.

## Conclusion

In the last 23 years since it had free access to technology, Romania has made strides in developing infrastructure and IT equipment as well as skills for workers and still, Romania was the last in the EU in terms of information society indicators. This paper tries to analyze some aspects of the impact of Information Technology at the population level but also at the companies level in recent years.

The following conclusions can be drawn.

As long as there are regions in which over half of the population has never used a computer, even if technological conditions are fulfilled, we have a lot to do in the educational area, especially for the population older than 55 years.

There are great differences between developing regions, with highly developed regions such as Bucharest-Ilfov and underdeveloped regions such as South-West Oltenia and more than 40% of the population lives in rural areas. The economic crisis hit also the investments in IT sector but less than in other economic sectors and ICT is an important vector of economic recovery.

Romania has top IT specialists but also a majority who does not want to improve their IT skills.

We can say that there are notable differences geographically, at the development regions, but also at the population level, age and gender. Although Romania has made great strides in achieving technological parameters, and taking economic and legislative measures for the development of the information society, it is still in its infancy and has a long way to recover.

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