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# A STATISTICAL OUTLOOK ON THE DEVELOPMENT OF E-GOVERNMENT AND DIGITAL DIVIDE IN ROMANIA

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## Abstract

The paper deals with the disparity in e-government as concerning individuals and enterprises – the advance of e-Government deals with the digital divide, the need to address the lag against leaders in European Union members states, or at least the EU average. The new significance uses of the term of e-government refer the involving various tools and systems brought the advance of Information and Communication Technologies (ICTs) in order to provide better access to public services to citizens and businesses.

**Keywords:** government, Minkovski distance, digital divide

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## 1. INTRODUCTION

In the EU, the development and use of ICTs for doing business with public administrations is one aspect of e-government which is designed to improve public services and democratic processes by means of the Internet. Inclusion and better public services are part of the third priority of the EC's i2010 initiative. Reliable statistical data and indicators regarding readiness, use and impact of Information and Communication Technologies (ICT) help policy makers formulate strategies for ICT driven economic growth, social development and the prevention of a new form of socioeconomic exclusion, termed the "digital divide". According to (Ursăcescu, 2009), in a country or geographical area digital divide phenomenon induces significant differences in terms of labor productivity, but also in terms of skill levels of employees. As a result, public policies formulation in ICT sector is aimed to expanding the digitisation level of administrative procedures and public services, the deployment of E-government and in parallel, the implementing measures to reduce the digital divide.

E-government is expected to improve the function of public administration and its relationship to the public. Information and communication technology (ICT) offers an array of tools to meet the promise of e-government; although along with ICT tools also the user demand should also foster the E-government

applications dissemination. In such conditions, there is still a lot of space for increasing efficiency as ICT rapid advancements had led to a proliferation of websites, portals and electronic services that are incompatible, confusing and overlapping... not to mention expensive.

Mainly, the E-government describes the use of advanced mobile phones and computer technologies to facilitate the government' functions and the disbursement of government information and services. In 2007, Jeong have summed up some e-Government delivery models: G2C (Government to Citizens), G2B (Government to Businesses), G2E (Government to Employees), G2G (Government to Governments), C2G (Citizens to Governments).

## 2. INTERNATIONAL RANKINGS OF E-GOVERNMENT' PROGRESS

There are several international rankings of e-government maturity: The Eurostat rankings, Economist, Brown University, and the UN e-Government Readiness Index. As almost any formal definition employs of the Internet development and the world-wide-web applications for delivering government information and services to the citizens, in the following a parallel is made between the rhythms of the two correlated phenomena.

The e-Government Benchmark Survey 2010 report captures the findings of the 2010 eGovernment benchmark survey, conducted over the period May to December 2010. It shows that more people across the EU now have access to public services online. The average availability of online public services in the EU went up from 69 % to 82 % from 2009 to 2010. The report reveals the best and worst performers in the EU, focusing on two essential public services: 'finding a job' and 'starting a company'.

The Digital Agenda for Europe (European Commission, Digital Agenda Scoreboard, 2011) is one of the seven flagship initiatives of the Europe 2020 Strategy, set out to define the key enabling role that the use of Information and Communication Technologies (ICT) will have to play if Europe wants to succeed in its ambitions for 2020. The objective of this Agenda is to chart a course to maximise the social and economic potential of ICT, most notably the internet, a vital medium of economic and societal activity: for doing business, working, playing, communicating and expressing ourselves freely.

According to the Digital agenda ([http://ec.europa.eu/information\\_society/digital-agenda/scoreboard/index\\_en.htm](http://ec.europa.eu/information_society/digital-agenda/scoreboard/index_en.htm)), e-Government services offer a cost-effective route to better service for every citizen and business and participatory open and transparent government. E-Government services can reduce costs and save time for public administrations, citizens and businesses. They can also help mitigate the risks of climate change, natural and man-made hazards by including the sharing of environmental data and environment-related information. Today, despite a high level of availability of e-Government services in Europe, differences still exist amongst Member States and the take-up of e-Government services by citizens

is low. In 2009, only 38% of EU citizens used the internet for accessing e-Government services, compared to 72% of businesses. General internet take up will be lifted if the usage and quality and accessibility of public online services rises.

In the EU, there is a steady increase in the proportion of both individuals and businesses that interact with public authorities via the Internet. From 2004 to 2009, the proportion of enterprises (businesses and companies) which were interacting with public bodies over the Internet was higher, and growing at a faster rate, than the proportion of individuals.

TABLE 1 - ONLINE INTERACTION OF ENTERPRISES WITH PUBLIC AUTHORITIES, 2009 (%)

	Obtaining information	Downloading forms	Sending filled forms	Treating administrative procedure completely electronically	Submitting a proposal in an electronic tender system
All enterprises	65	64	55	44	11

In 2009, almost two thirds (65 %) of EU enterprises either obtained information or downloaded official forms from public authorities' websites. More than half (55%) of these enterprises then returned the completed forms to public administrations. 44 % of the enterprises treated administrative procedures completely electronically, i.e. without the need for exchanging information in paper form. Around one tenth (11%) of the enterprises submitted a proposal using an electronic tendering system.

### 3. DEVELOPMENT OF E-GOVERNMENT SERVICES USAGE IN ROMANIA

The sources for the data in this article are the Community survey on ICT usage in households and by individuals and the Community survey on ICT usage in enterprises.

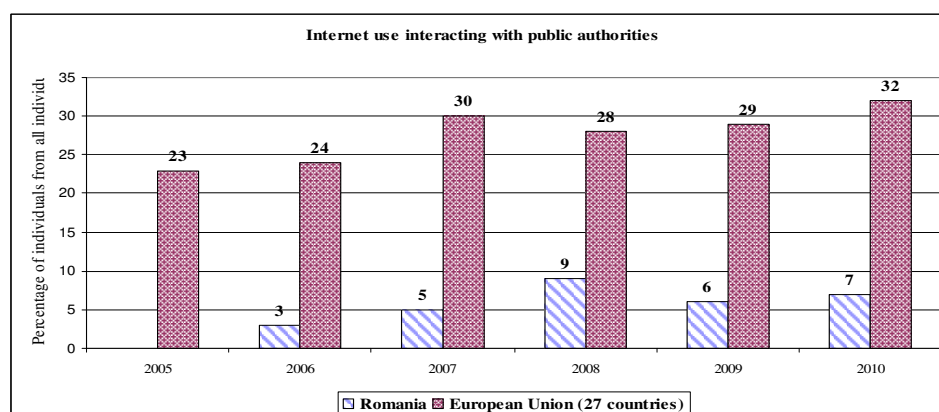


FIGURE 1 - THE INTERNET USE WITH PUBLIC AUTHORITIES (2005-2010)

The analysis will be completed targeting two beneficiaries: individuals and enterprises. For individuals, the indicators used are described in Table 2.

TABLE 2 - INDICATORS OF INDIVIDUALS PARTICIPATION IN EGOVERNMENT

Indicators	Short description	Source and period of reference
Individuals using the Internet for interaction with public authorities	Percentage of individuals aged 16 to 74 - Within the last 12 months before the survey for private purposes. Individuals used at least one of the following services: for obtaining services from public authorities websites, for downloading official forms, for sending filled in forms.	Eurostat, Information society statistics, table: [tin00012] 2008-2011
Individuals using the Internet for interaction with public authorities, by type of interaction	Percentage of individuals aged 16 to 74 - Internet use obtaining information from public authorities web sites (last 12 months)	Eurostat, Information society statistics, table: [tin00013]
	Percentage of individuals aged 16 to 74 - Internet use downloading official forms (last 12 months)	
	Percentage of individuals aged 16 to 74 - Internet use sending filled forms (last 12 months)	

The most frequent type of interaction of individuals with public administrations over the Internet is to obtain information, followed by downloading official forms, returning completed forms electronically, managing administrative procedures completely electronically.

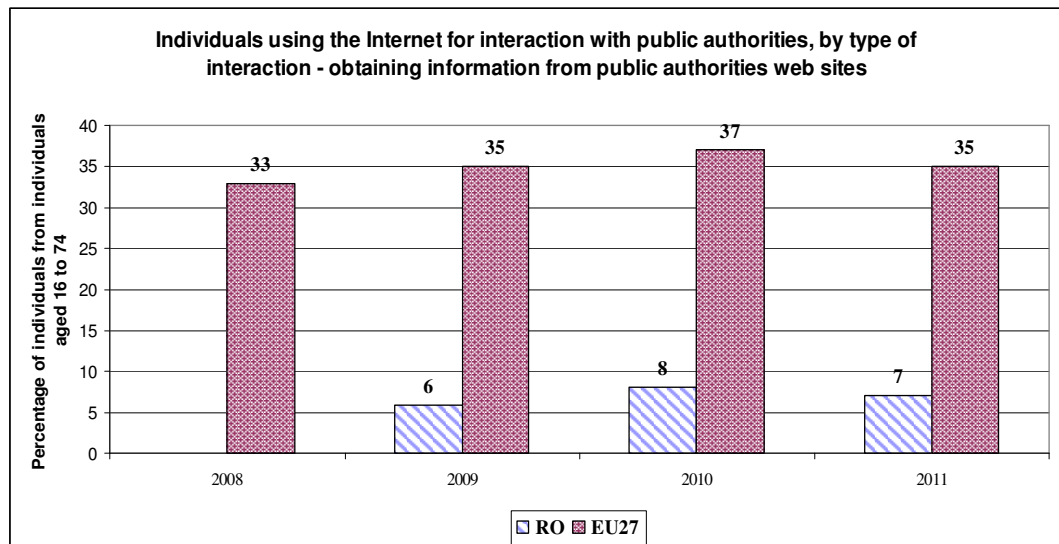


FIGURE 2 - INDIVIDUALS USING THE INTERNET FOR INTERACTION WITH PUBLIC AUTHORITIES - INTERNET USE: OBTAINING INFORMATION FROM PUBLIC AUTHORITIES WEB SITES - LAST 12 MONTHS (2008-2011)  
Source: Eurostat, [tin00013]

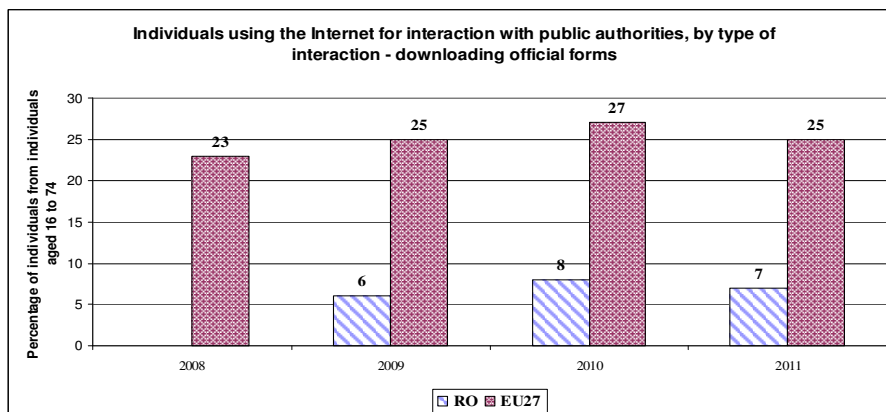


FIGURE 3 - INDIVIDUALS USING THE INTERNET FOR INTERACTION WITH PUBLIC AUTHORITIES - INTERNET USE: DOWNLOADING OFFICIAL FORMS - LAST 12 MONTHS  
 Source: Eurostat, [tin00013]

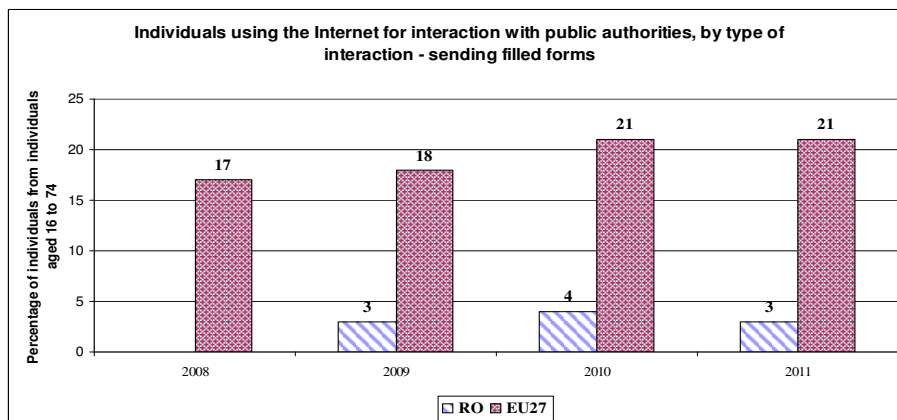


FIGURE 4 - INDIVIDUALS USING THE INTERNET FOR INTERACTION WITH PUBLIC AUTHORITIES - INTERNET USE: SENDING FILLED FORMS - LAST 12 MONTHS  
 Source: Eurostat, [tin00013]

For enterprises, the indicators used are described in Table 3.

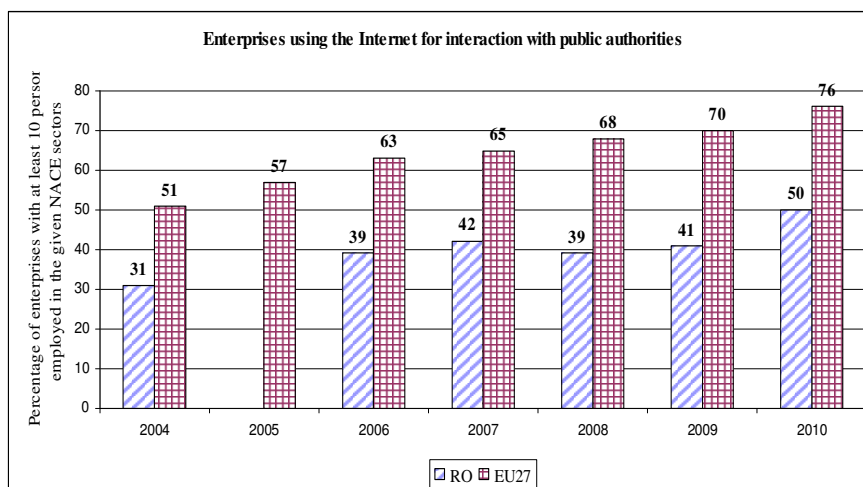


FIGURE 5 - ENTERPRISES USING THE INTERNET FOR INTERACTION WITH PUBLIC AUTHORITIES (2004-2010)  
 Source: Eurostat, [tin00107]

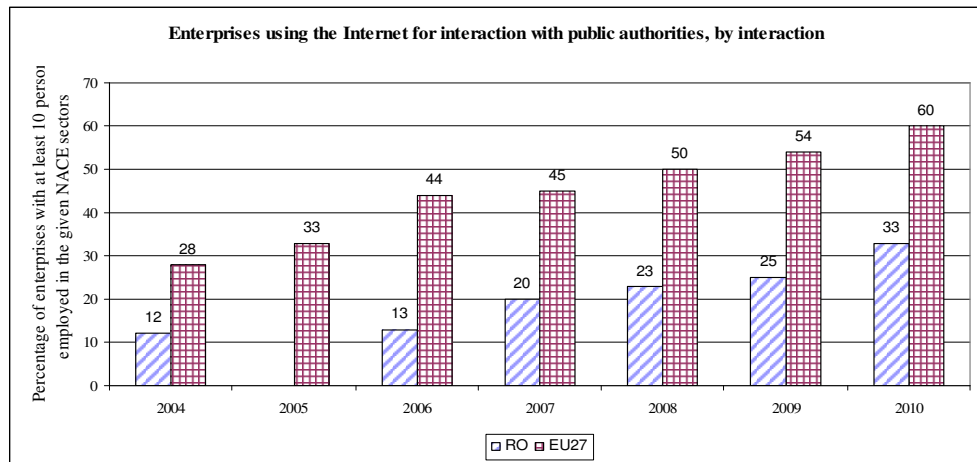


FIGURE 6 - ENTERPRISES USING THE INTERNET FOR INTERACTION WITH PUBLIC AUTHORITIES, BY INTERACTION (2004-2010)  
 Source: Eurostat, [tin00108]

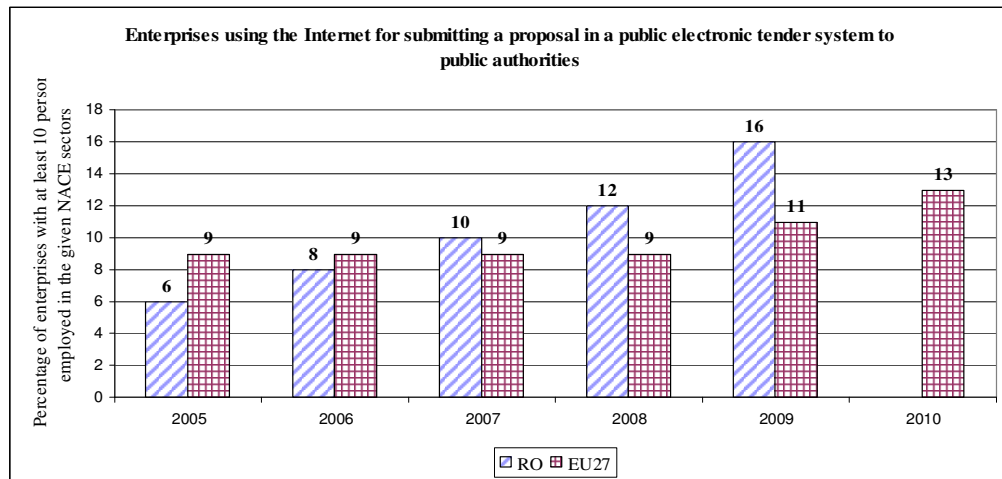


FIGURE 7 - ENTERPRISES USING THE INTERNET FOR SUBMITTING A PROPOSAL IN A PUBLIC ELECTRONIC TENDER SYSTEM TO PUBLIC AUTHORITIES (2004-2010)  
 Source: [tin00109]

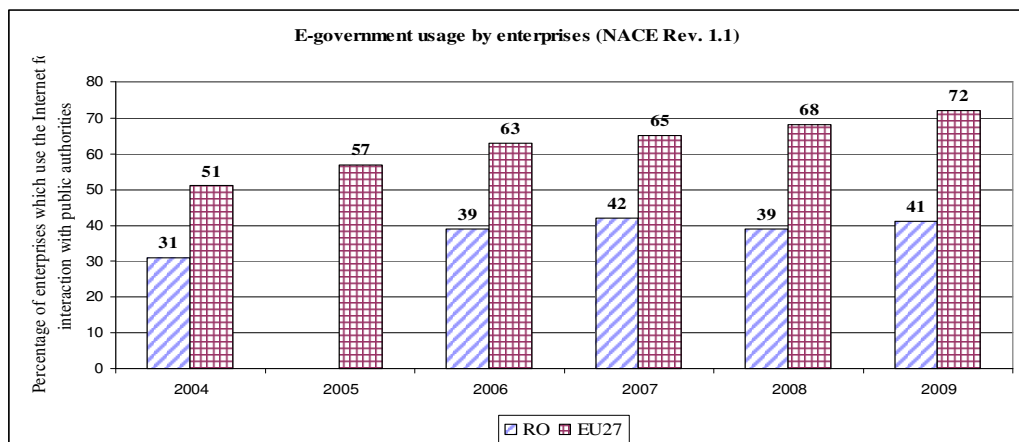


FIGURE 8 - E-GOVERNMENT USAGE BY ENTERPRISES (NACE REV. 1.1) (2004-2009)  
 Source: Eurostat, [tsir140]

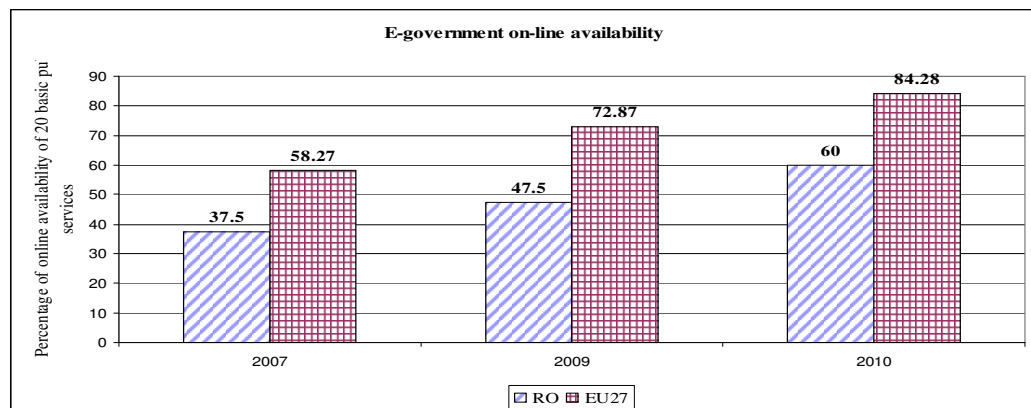


FIGURE 9 - E-GOVERNMENT ON-LINE AVAILABILITY (2007-2009)  
 Source: Eurostat, [tsiir120]

TABLE 3 - INDICATORS FOR ENTERPRISES

Indicators	Short description	Source and period of reference
Enterprises using the Internet for interaction with public authorities (Within the last calendar year before the survey)	Percentage of enterprises with at least 10 persons employed in the given NACE sectors.	Eurostat, Information society statistics, table: [tin00107] (2004-2010)
Enterprises using the Internet for submitting a proposal in a public electronic tender system to public authorities	Percentage of enterprises with at least 10 persons employed in the given NACE sectors.	Eurostat, Information society statistics, table: [tin00108]
Enterprises using the Internet for submitting a proposal in a public electronic tender system to public authorities	Percentage of enterprises with at least 10 persons employed in the given NACE sectors.	Eurostat, Information society statistics, table: [tin00109]
E-government on-line availability - Percentage of enterprises which use the Internet for interaction with public authorities	Percentage of online availability of 20 basic public services - The indicator shows the percentage of the 20 basic services which are fully available online i.e. for which it is possible to carry out full electronic case handling. For example if in a country 13 of the 20 services were measured as being 100% available on-line and one service was not relevant (e.g. does not exist), the indicator is 13/19 which is 68.4%. Measurement is based on a sample of URLs of public web sites agreed with Member States as relevant for each service.	Eurostat, Information society: Structural Indicators [tsiir120]
E-government usage by enterprises (NACE Rev. 1.1)	Percentage of enterprises which use the Internet for interaction with public authorities - Percentage of enterprises using the internet to interact with public authorities (i.e. having used the Internet for one or more of the following activities: obtaining information, downloading forms, filling-in web-forms, full electronic case handling)	Eurostat, Information society: Structural Indicators [tsiir140]

#### 4. THE DISPARITY MODEL

The empirical study is based on a frequently used method for testing the integration or the belonging to a group with common features: the Minkovski distance computation model. Theoretical and empirical developments of the Minkovski distance were provided by A. Ricci (1973), Barr (1981), Hanson (1988) and Akelman (1996), who created several operators and functions based on the Minkovski inequality, applied mainly to economy and finance.

It is quite a simple model, which entails the measurement of several distances (Euclidean, Cebishev type, etc.) in relation to the mean of a group of countries or to a country considered as representative. This distance is very common for the measurement of the convergence (based on dissimilarities) of various countries, it is computed:

$$d_p = \left( \sum_{k=1}^d |x_c - x_b|^p \right)^{1/p}$$

where:

$d$  is the number of dimensions given by the number of indicators/parameters considered (see tables 4 and 5);  $p = 2$  for Euclidean distances and  $p = 1$  for the Manhattan metric distance system. For interpretation of this indicator simple evidence indicates: the longer the distance, the lower the degree of convergence with the EU average and vice versa.

In order to identify the similarity among the EU countries and to assess the convergence based on the Minkovski distance, the following procedure will be followed: for each group of indicators – individuals and enterprises, the multiple facets of registering the advance in e-government will be involved.

Minkovski distances in the case of individuals are given in the table 4.

TABLE 4 - THE SYNTHESIS FOR MINKOVSKI DISTANCES FOR INDIVIDUALS FOR  $p=1$

	base EU27				base EU-euro area			
	2008	2009	2010	2011	2008	2009	2010	2011
Romania $p=1$	109.00	96.00	101.00	100.00	115.00	102.00	110.00	109.00
Romania $p=2$	56.60	49.68	51.99	51.61	59.52	52.63	56.44	56.58
Romania $p=3$	46.37	40.58	42.34	42.19	48.63	42.88	45.84	46.40

The Manhattan distance between Romania and the EU varied quite steady between 2008 and 2011 from the lowest value of 49.68 (2009) to the highest 56,60 (in 2008), meaning that divergence of the Romanian performance towards the individuals' performance in e-government was reduced as against the EU-27



average. Obviously, for the corresponding years, the distance against the EU euro area is larger: form 59.52 (in 2008) to 56,58 (in 2011).

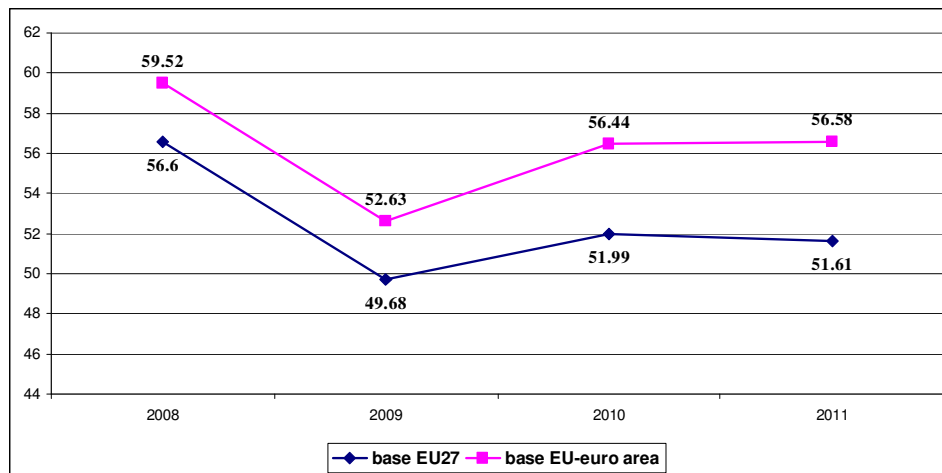


FIGURE 10 - THE MINKOVSKI DISTANCES FOR INDIVIDUALS FOR P=2

Minkovski distances for enterprises are computed as previously stated and presented in table 5:

TABLE 5 - THE MINKOVSKI DISTANCES FOR ENTERPRISES

	base EU27						base EU-euro area					
	2005	2006	2007	2008	2009	2010	2005	2006	2007	2008	2009	2010
Romania p=1	99.00	58.00	49.00	57.00	59.00	56.00	101.00	61.00	53.00	61.00	63.00	58.00
Romania p=2	66.48	39.32	33.99	39.64	41.02	37.60	67.48	42.06	37.48	42.46	43.87	38.39
Romania p=3	60.54	35.21	30.29	35.32	36.54	33.41	61.45	37.69	33.40	37.84	39.10	34.04

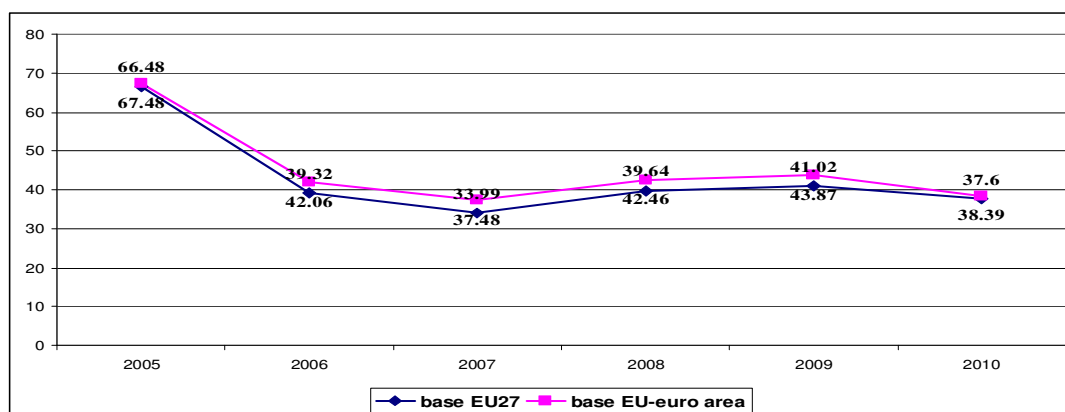


FIGURE 11 - THE MINKOVSKI DISTANCES FOR ENTERPRISES FOR P=2

The Minkovski distances show that the Romanian enterprises became closer, in 2010, to that of EU27 average – the disparity is rapidly decreasing, from 66,48 (in 2005) to 37,60 if the base is the average of EU 27, respectively from 67,48 (in 2005) to 38,39.

## 5. CONCLUSIONS

The paper relates to several concepts in the practical and theoretical applications of the ICT technologies, with an important role in increase the quality of life of the citizens. The Electronic government (E-Gov) is the use of technology, particularly Web-based Internet applications, to enhance the access to and delivery of government information and services to citizens, business partners, employees, agencies, and other entities. E-Gov promises its government sponsors a powerful tool for improving processes and communicating with the rest of the economic and social actors.

Empirical studies confirmed the existence of both similarities and differences between Romania and the EU in the e-government matters. The distance between Romania and the EU average is slightly decreasing, which means an improvement in accessing modern tools for digital government between 2005 and 2010 in the case of enterprises. The model used in this study help the interested professionals to estimate not only the evolution of the convergence degree as against the European average, but also the number of years necessary for Romania to reach the EU average or the growth rate necessary for the Romanian e-government sector to reach the EU average in a certain number of years, on the basis of the comparative dynamics of the sectors in Romania and the EU.

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