

GAP INDICATOR FOR MEASURING DIGITAL DIVIDE

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Abstract

The paper intends to present a new type of metrics for pointing out the differences in reaching a certain level of development – in this case – the penetration of internet users in the country population by building an indicator inspired from gap analysis. The application of the gap analysis is made on an aspect correlated to one of the most disturbing processes of the current days – the digital discrepancy in having and using access to the Internet services. Generally described, the gap analysis is an assessment tool to help identify differences between various information systems or applications. A discrepancy or a gap is sometimes called "the space between the actual state in one organization and that one desired/aimed; by seeing the observed reality in terms of differences or gaps or divergent paths from the common trends, the one interested in administration the observed system may conduct analysis exercises that helps bridging that space and time to reaching the targeted state, by highlighting which requirements are being met and which are not. The tool provides a foundation for measuring the investment of time, money and human resources that's required to achieve a particular outcome.

The "*digital divide*" is the division between those who have access to ICT (information and communication technology) and are using it effectively, and those who do not. The emphasis on the subject is given by the fact that ICT is increasingly the foundation of domestic competitiveness, and the base for developing our societies and economies. The digital divide regards a phenomenon was initially used for register the technical, physical barriers brought by the various rhythms of promoting ICT tools in business and private life of citizens. Lately, the concept is used by the policy makers more to emphasis shifted towards social barriers.

Keywords: digital divide, ICT, metrics.

1. SOME CONCEPTUAL DELIMITATIONS

The "*digital divide*" is the division between those who have access to ICT (information and communications technology) and are using it effectively, and those who do not. The emphasis on the subject is given by the fact that ICT is increasingly the foundation of domestic competitiveness, and the base for developing our societies and economies.

On the global view, really significant disparities exist in access to and use of information and communications technology (ICT) between countries (the "international digital divide") and between groups within countries (the "*domestic digital divide*"). Also, there are real disparities between countries and socio-economic groups that are benefiting from information technologies and those that are not. While information technology use is growing around the world as rhythm of volume, the applications in practice, in business and real life usage, the disparities are also growing.

The concept of digital divide has received in the last years a great importance in dealing with growth strategy at the national or regional level. Many points of interest derive from the political prospective as the both politicians and domestic administrators are interested in reducing the digital gap by finding the most effective tools in terms of social welfare. The term *digital divide* refers to the unequal access by some members of society to information and communications technology, and the unequal acquisition of related skills. For the domestic level, the digital divide may be described in terms of gender, income, and race groups, and by locations. Due to the range of criteria which can be used to assess the imbalance, and the lack of detailed data on some aspects of technology usage, the exact nature of the digital divide is both contextual and debatable. Criteria often used to distinguish between the '*haves*' and the '*have nots*' of the digital divide tend to focus on access to hardware, access to the Internet, and details relating to both categories.

Digital divide refers to the social and economical differences between communities that have access or not to computers and Internet. In the same time, it take into account abilities of communities to use their technologies communication and information technologies, due to different levels of education and technical studies, although the differences between groups that have access or not to useful and quality digital information. Globally, the difference is especially determined by variety of information and communication technologies available for certain segments of society, not necessary by the size or distance to the final user. Referred to Internet, the access is one of aspects, another aspects beeing the quality of connexion and of auxiliar services and the performances of computers.

The disparities between the "*haves*" and the "*have-nots*" is growing, and the potential impact on society – whether good or bad – are exacerbated by new *technology developments*. Fast acquisition of information, contacting administrators, downloading and filling in forms, tax returns, banking transactions, e-learning, work and entertainment, communication with friends and family - and the list could go on - are made possible through computers, mobile telephones, the Internet and online applications based on these. The positive impact of these tools on society, economy, administration, democracy and small communities is becoming ever more obvious, which is why it is increasingly the case that those who are unable, cannot or are not willing to use ICT tools, those people who lack the digital literacy enabling the routine use of the Internet and mobile communications find themselves at a significant disadvantage.

ICTs have a wide range of different economic effects which, directly or indirectly, can increase welfare and facilitate social and economic development. Direct effects include productivity gains resulting from the development and deployment of ICTs, and the development of new, related technologies. Indirect effects include trade creation and trade facilitation in service sectors, employment opportunities created by ICT-enabled reforms, enhanced flexibility for firms and workers; and the creation of new business models and opportunities.

Mentioning the “*digital divide*” between developed and developing countries, it is seen by evidence that, for example, a person in a high-income country is over 22 times more likely to be an Internet user than someone in a low-income country. Similarly, secure Internet servers, a rough indicator of electronic commerce, are over 100 times more common in high-income than in low-income countries. In high-income countries, mobile phones are 29 times more prevalent and mainline penetration is 21 times that of low-income countries. Relative to income, the cost of Internet access in a low-income country is 150 times the cost of a comparable service in a high-income country. Unfortunately, there is little information upon the ICT, merely existent in poor and rural areas of developing countries. As a consequence, the digital divide means that the information “*have-nots*” are denied the option to participate in new ICT-based jobs, e-government, ICT-improved healthcare, and ICT-enhanced education. Consequently, accelerating people’s inclusion in the information society has become evident in developed and developing countries alike.

In European culture, for example, the idea of social integration and inclusion has always played a very important role in traditions and people’s ways of thinking. Accordingly, programmes launched here envision an increasingly fair and decreasingly fragmented society. The e-inclusion Ministerial Declaration of 2006 (Riga) approved by the leaders of 32 EU countries set definitive objectives: the digital divide between groups facing exclusion (the elderly, the unemployed, those living with disabilities) and the majority society must be reduced by fifty percent by 2010 in the EU, an objective that was unfortunately not met in most of the Member States.

In order to create a strong and highly inclusive information society the developed countries of the EU, North America and Asia employ ICT tools that improve the quality of life, considerably relying on broadband networks, the development of new skills and literacy, and the development of e-administration and e-health. These countries clearly see that the digital divide is caused by a cumulative social disadvantage and is also the cause of further inequalities; therefore specific measures are adopted to go beyond the traditional approaches in healthcare, social policy or employment (e.g. atypical employment, active old age, personalised e-administration, etc.).

2. IMPORTANT TRENDS IN THE INFORMATION SOCIETY

The *World Information Society Report 2007*¹ report points out that the digital divide is shrinking in most technologies, especially mobile telephony, but that limitations in the availability and affordability of broadband remain a cause for concern. Although broadband is now available in 170 economies by the start of 2007, it remains at least ten times more expensive in low-income countries than in high-income countries and is often unavailable outside urban areas. In fact, the digital divide is a complex problem that manifests itself in different ways in different countries. It presents both practical and policy challenges. Moreover, it is apparent that solutions which work in developed countries cannot simply be transplanted to developing country environments: solutions must be based on an understanding of local needs and conditions.

An important experience of developed countries is that the problem of the digital divide persists even in periods when ICT penetration in society is high, since new technologies and tools (e.g. broadband, mobile devices, Web 2.0, etc.) enter the markets, generating new lines of division. In addition to the usage versus non-usage dichotomy, the different skills of the users form an equally significant factor, which is mostly manifested in the dimensions of digital literacy, online self-expression skills, network-thinking and problem-solving skills. The World Bank has found that in low- and middle-income countries every 10 percentage point increase in broadband penetration accelerates economic growth by 1.38 percentage points - more than in high-income countries and more than for other telecommunications services (Information Society Policies Report, 2009). However, despite the recent economic downturn, the use of ICT services, such as mobile phones and the Internet, seems to have suffered little from the crisis.

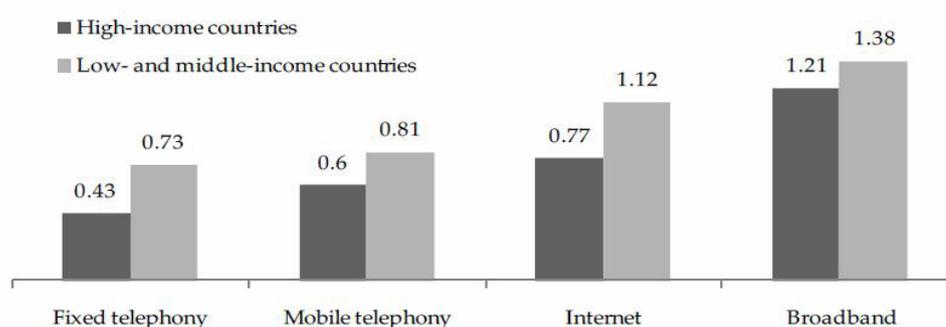


FIGURE 1 - GROWTH IMPACT OF TELECOMMUNICATIONS (GDP PERCENTAGE POINT INCREASE DUE TO 10 PERCENTAGE-POINT INCREASE IN PENETRATION)

Source: Yongsoo Kim, Tim Kelly, and Siddhartha Raja (2010) Building Broadband – Strategies and policies for developing world, Global Information and Communication Technologies (GICT) Department, World Bank, January 2010

¹ <http://www.digitaldivide.net/articles/view.php?ArticleID=838>. The Report uses the evaluation methodologies endorsed by the WSIS to measure “opportunity” in access to ICTs, using the Digital Opportunity Index (DOI), Digital Opportunity Platform, and the ITU’s ICT Opportunity Index (ICT-OI).

TABLE 1 - GLOBAL ICT DEVELOPMENTS, 2000-2010*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Mobile cellular telephone subscriptions	12.0	15.5	18.4	22.2	27.3	33.9	41.7	50.1	59.3	67.9	76.2
Internet users	6.4	8.0	10.7	12.3	14.1	15.9	17.5	20.8	23.8	27.1	30.1
Fixed telephone lines	15.9	16.6	17.2	17.8	18.7	19.3	19.4	19.0	18.3	17.7	17.3
Mobile broadband subscriptions	0.0	0.0	0.0	0.1	0.5	1.1	2.4	4.6	6.8	10.3	13.6
Fixed broadband subscriptions	0.3	0.6	1.0	1.6	2.4	3.3	4.3	5.2	6.1	6.9	8.0

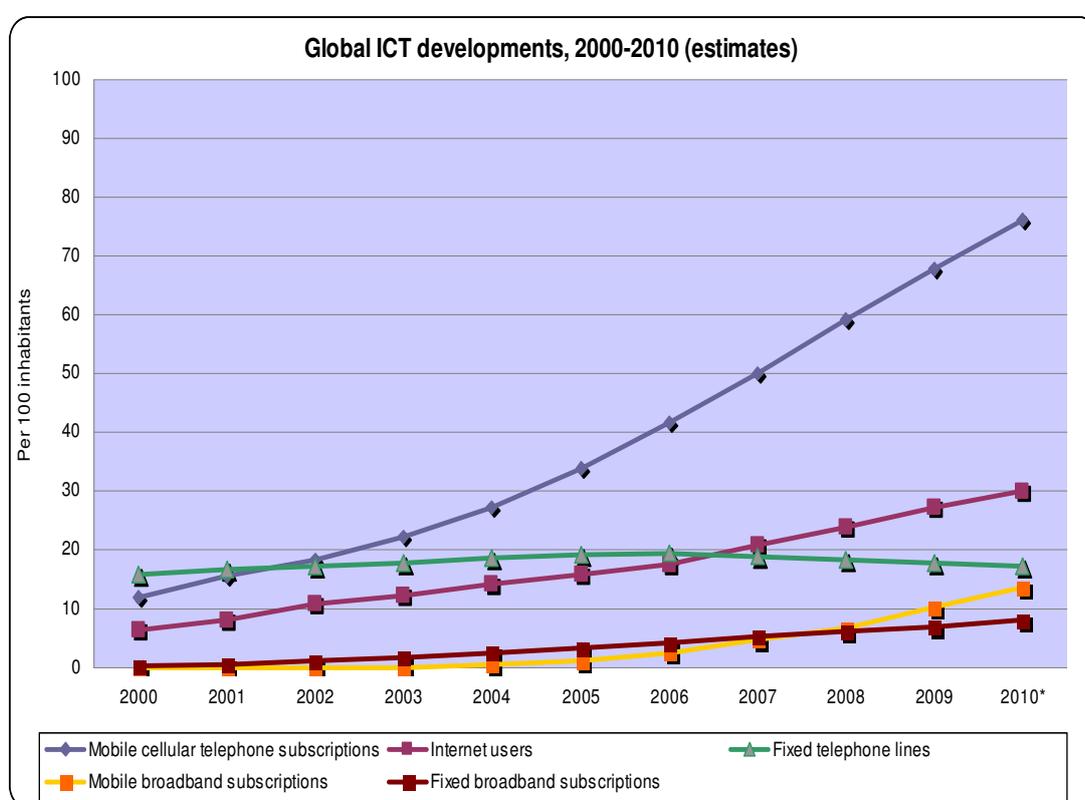
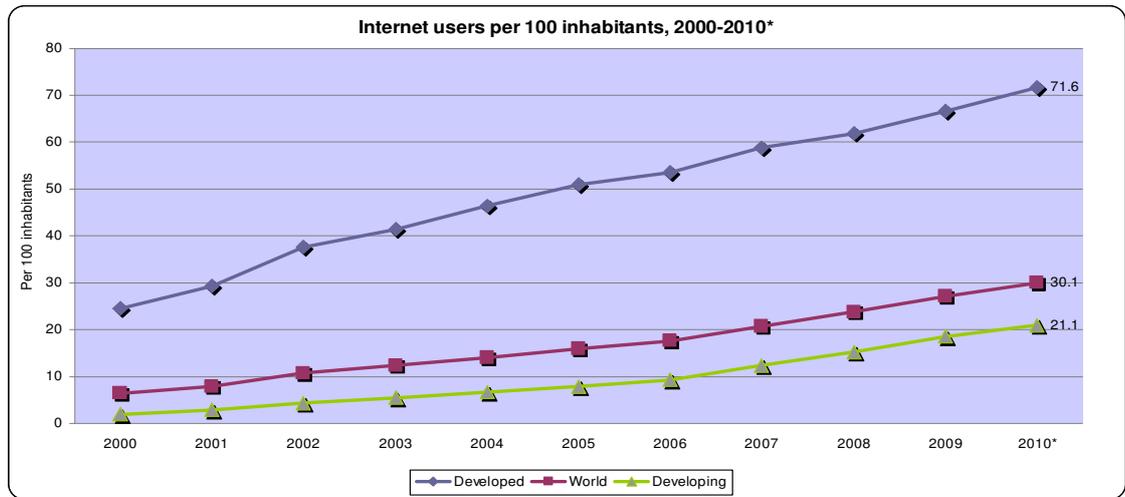


FIGURE 2 - GLOBAL DEVELOPMENTS OF ICT

Source: ITU World Telecommunication /ICT Indicators database - ITU Statistics (<http://www.itu.int/ict/statistics>)

TABLE 2 - INTERNET USERS PER 100 INHABITANTS, 2000-2010*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Developed	24.6	29.4	37.7	41.5	46.3	51.0	53.6	58.8	62.0	66.6	71.6
World	6.4	8.0	10.7	12.3	14.1	15.9	17.5	20.8	23.8	27.1	30.1
Developing	2.0	2.8	4.3	5.5	6.6	7.8	9.4	12.3	15.3	18.5	21.1



*Estimates; The developed/developing country classifications are based on the UN M49, see: <http://www.itu.int/ITU-D/ict/definitions/regions/index.html>

FIGURE 3 - EVOLUTION OF INTERNET USERS
Source: ITU World Telecommunication /ICT Indicators database

3. METRICS FOR DIGITAL DIVIDE

Composite indicators

A useful tool to monitor such progress is the ICT Development Index (IDI) proposed by the International Telecommunication Union in the report “*Measuring the Information Society 2010*” (ITU-D, 2010), a composite index covering of 11 indicators for ICT access, use and skills. It has been constructed to measure the level and evolution over time of ICT developments taking into consideration the situations of both developed and developing countries. The report “*Measuring the Information Society 2010*”, International Telecommunication Union© 2010 ITU shows that despite the recent economic downturn, the use of ICT services, such as mobile phones and the Internet, has continued to grow worldwide. The ITU (International Telecommunication Union) published the latest *ICT Development Index (IDI)* and *ICT Price Basket*, as benchmarking tools to monitor information society developments worldwide resulting in two key tools for presenting the current state of information society developments: the ICT Development Index (IDI - calculated for 159 countries) and the ICT Price Basket.

The IDI aims to capture the evolution of the information society as it goes through its different stages of development, taking into consideration technology convergence and the emergence of new technologies. The IDI combines 11 indicators related to ICT access, use and skills into a single composite index. A single indicator cannot track progress in these three components of the ICT development process, thus requiring the construction of a composite index such as the IDI. Based on this conceptual framework, the IDI is divided into the following three sub-indices:

- *Access sub-index*: captures ICT readiness and includes five infrastructure and access indicators (fixed telephony, mobile telephony, international Internet bandwidth, households with computers, and households with Internet).
- *Use sub-index*: captures ICT intensity and includes three ICT intensity and usage indicators (Internet users, fixed broadband, and mobile broadband).
- *Skills sub-index*: captures ICT capability or skills as indispensable input indicators and includes three proxy indicators (adult literacy, gross secondary and tertiary enrolment). The skills sub-index therefore has less weight in the computation of the IDI compared to the other two sub-indices.

All 159 countries included in the IDI have improved their scores during the past year confirming the ongoing diffusion of ICTs and the overall transition to a global information society. The top-ranking economies continue to be primarily high-income countries from the developed world but a number of developing countries have shown strong improvements in their IDI scores and rankings between 2007 and 2008. There are large inter- and intra-regional disparities in IDI performance, especially in the Americas and Asia and the Pacific regions, reflecting the income differences in those regions. The IDI results show that although the digital divide is still significant, it is slightly shrinking, especially between those countries with very high ICT levels and those with lower levels. Moreover, high IDI growth in some developing countries illustrates that countries with low ICT levels can catch up relatively quickly provided their ICT sectors receive adequate policy attention.

- *ICTDI* (information and communication technology diffusion index)² is measuring the outcome of a complex socio-technical system, the ranks are relatively stable over time; however, more volatility is observed in low-ranking countries than in high-ranking countries. There is a strong correlation between a country's ICTDI and its income and level of human development as measured by the UNDP's *Human Development Index* (HDI). The Index of ICT Diffusion is designed to evaluate ICT development using indicators of ICT diffusion across countries. It measures the average achievements in a country in two dimensions: .
- The *Digital Opportunity Index* (DOI) is a composite index provided by *World Information Society Report* (a joint publication between ITU and the United Nations Conference on Trade and Development (UNCTAD), that measures "digital opportunity" or the possibility for the citizens of a particular country to benefit from access to information that is "universal, ubiquitous, equitable and affordable". It uses a range of indicators, including data on service prices and the take-up of latest ICTs, to assess countries' performance and prospects to measure progress in building the

² Source: UN Conference on Trade and Development (UNCTAD)

Information Society. The DOI has been designed to as a tool for tracking progress in bridging the digital divide and the implementation of the outcomes of the World Summit on the Information Society (WSIS); IT can be used to enrich policy and inform policymakers of the latest trends and impact analysis of ICT policies to identify successful policies and replicate them elsewhere. The WISI 2009 report tracks progress in digital opportunity for 181 economies since the start of the WSIS process; it shows that there has been a steady expansion in digital opportunity, both in terms of more widespread access to basic ICTs and the growth in high-speed access to ICTs, on both fixed line and mobile networks.

The DOI allows the tracking and comparison of countries in different aspects of the Information Society. It measures countries' ICT capabilities in infrastructure, access path and device, affordability and coverage, and quality. The DOI has been compiled for 181 economies for a period of three years from 2004-2006; an even longer time series for 62 leading economies for the period 2000-2006 is also available.

Time distance measure. Another way of measuring differences in ICT development is provided by the time-distance methodology, which measures the number of years a country or region lags behind a benchmark country or region in terms of development indicators. The results illustrate that the gap between developed and developing countries in terms of ICT indicators is relatively small – especially compared to that for other development indicators, such as life expectancy or infant mortality rates. According to ITU's latest report of measuring information society (2010) in 2008, mobile cellular penetration and fixed broadband penetration in developing countries had reached the level that Sweden (ranked first in the IDI) had almost a decade earlier, and the number of Internet users per 100 inhabitants was the same as Sweden's just over 11 years earlier. In contrast, life expectancy in developing countries is lagging Sweden by 66 years, and the infant mortality in developing countries in 2007 was at the same level where Sweden stood 72 years earlier.

The new indicator of delta gap in the 50th and 90th percentile. This digital divide analysis follows the idea that, in a sample of countries, the distribution of certain scale values reflects the uneven uniformity of performance status. The difference between values of the observed indicators corresponding to two different percentile could be an expressive indication for evaluation the gap in time. The analyzed indicator is *number of Internet users* reflecting the people with Internet access to the worldwide network (calculated as a ration of 100 persons); the values are reported by World Bank (2010c) and included in International Human Development Indicators (source: <http://hdr.undp.org>). The reasons for that the internet user indicator was used, comes from the recent report's conclusions (Measuring the Information Society 2010) that the largest differences between developed and developing countries can be seen on the *ICT use sub-index*, where developing countries are still far behind developed countries, in particular for the uptake of mobile and fixed broadband. The novel approach in assessing the state of digital divide is to compute the difference between the indicator values

according to some benchmarking thresholds. These are chosen as the 50th percentile and the 90th percentile: the first one indicating the average situation of the entire sample of countries and the second one as the desired value corresponding the upper-ranked units of the sample. Based on the data series provided by the World Bank database, including 194 different countries, the performance profile were constructed for the 2000 and 2005-2008 years (figures 5-9). For each year, corresponding to the interval in which the 50th and the 90th percentiles were placed, by the regular normalization procedures (linear type), an appropriate value for the number of Internet user per 100 persons. In table 3, those gap values are given, revealing an obvious decrease of the dispersion among the unit states.

TABLE 3 - THE CALCULATIONS OF DELTA INDICATOR FOR INTERVAL 2000-2008

Year	2000	2005	2006	2007	2008
Delta Indicator	25,95	51,95	49,73	52,18	49,42
Coefficient of variation	1.570	1.146	1.056	1.004	0.936

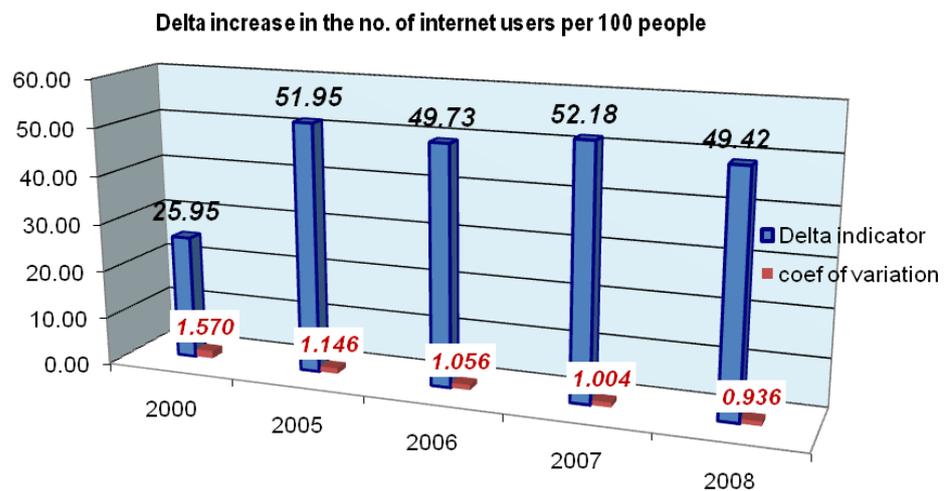


FIGURE 4 - EVOLUTION OF DELTA INDICATOR FOR INTERVAL 2000-2008

For further analysis, the cumulative distribution function of the indicator values was used to compute percentiles (in this case, a *percentile / quantile* refers to the value corresponding to the given estimated cumulative probability).

The estimate of the cumulative probability is intuitively the percentage of the data points to the left of the point of interest. If a country has scored at the 60th percentile (roughly 60% of those units evaluated had been worse scored and roughly 40% had better scores in terms of the number of internet users. The 80th percentile could be a score of 28 points, or stated in terms of a "quantile", $Q(0.60) = 28$. More easily, the Excel functions were used: PERCENTRANK() and PERCENTILE()(see Box 1).

Box 1 - EXAMPLE OF USING EXCEL FUNCTION TO PERFORM CALCULATIONS

If one is interested in finding the percentage of the countries registering less than 50 users, the percent rank function will be used: =PERCENTRANK(array,x), where the array is the data range and x=50. If x matches one of the values in the array, this function is equivalent to the Excel formula =(RANK(x)-1)/(N-1) where N is the number of data points. If x does not match one of the values, then the PERCENTRANK function interpolates.

TABLE 4 - DESCRIPTIVE STATISTICS FOR 2000-2008 PERIOD FOR THE SERIES "INTERNET USERS (PER 100 PEOPLE) - INTERNATIONAL HUMAN DEVELOPMENT INDICATORS

Year	2000	2005	2006	2007	2008
Mean	7,8080925	19,464171	21,9178378	24.59680851	27,63617
Standard Error	0,9321614	1,6311966	1,70233208	1.803685167	1,8863912
Median	2,2	9,5	12,5	15.5	21,1
Mode	0,1	1	7,5	1.8	6,2
Standard Deviation	12,260669	22,306278	23,1542196	24.73088503	25,864893
Sample Variance	150,324	497,57005	536,117887	611.6166743	668,9927
Kurtosis	2,8633159	0,6334027	0,1697949	-0.352322357	-0,663734
Skewness	1,974138	1,307728	1,1215593	0.949781678	0,7793274
Range	47,9	85,6	87,6	88.9	90
Minimum	0	0	0	0	0
Maximum	47,9	85,6	87,6	88.9	90
Sum	1350,8	3639,8	4054,8	4624.2	5195,6
Count	173	187	185	188	188
Confidence Level(95.0%)	1,8399488	3,2180248	3,35859991	3.558185626	3,7213424

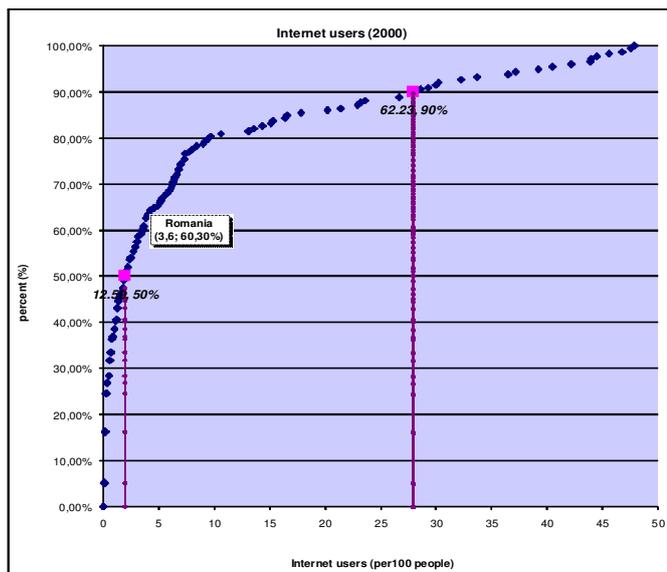


FIGURE 5 - THE PERFORMANCE PROFILE FOR THE WHOLE SAMPLE – YEAR 2000

Characterization for Romania in 2000:
 - current value 3,6 Internet users/100 people; reaching the 60,30% of performance profile;
 The top ranked: Switzerland (value of 47.9)
 The lowest ranked: 0
 The gap between the 50th and the 90th percentile values a difference in number of internet users equal to 49,42 users/100 people.

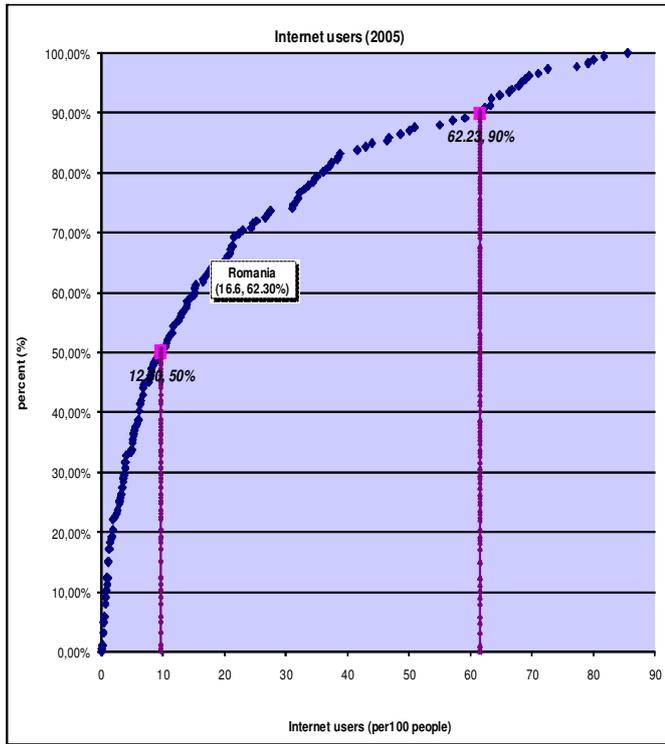


FIGURE 6 - THE PERFORMANCE PROFILE FOR THE WHOLE SAMPLE – YEAR 2005

Characterization for Romania in 2005:
 - current value 16.6 Internet users/100 people; reaching the 62,30% of performance profile;
 The top ranked: Iceland (value of 85.6)
 The lowest ranked: 0
 The gap between the 50th and the 90th percentile values a difference in number of internet users equal to 51,95 users/100 people.

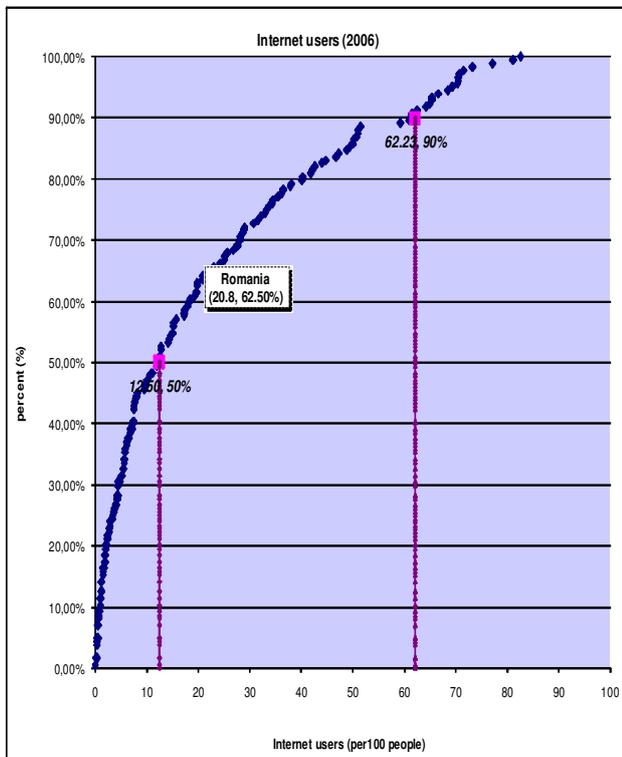


FIGURE 7 - THE PERFORMANCE PROFILE FOR THE WHOLE SAMPLE – YEAR 2006

Characterization for Romania in 2006:
 - current value 20,8 Internet users/100 people; reaching the 62.50% of performance profile;
 The top ranked: Iceland (value of 87.6)
 The lowest ranked: 0
 The gap between the 50th and the 90th percentile values a difference in number of internet users equal to 49,73 users/100 people.

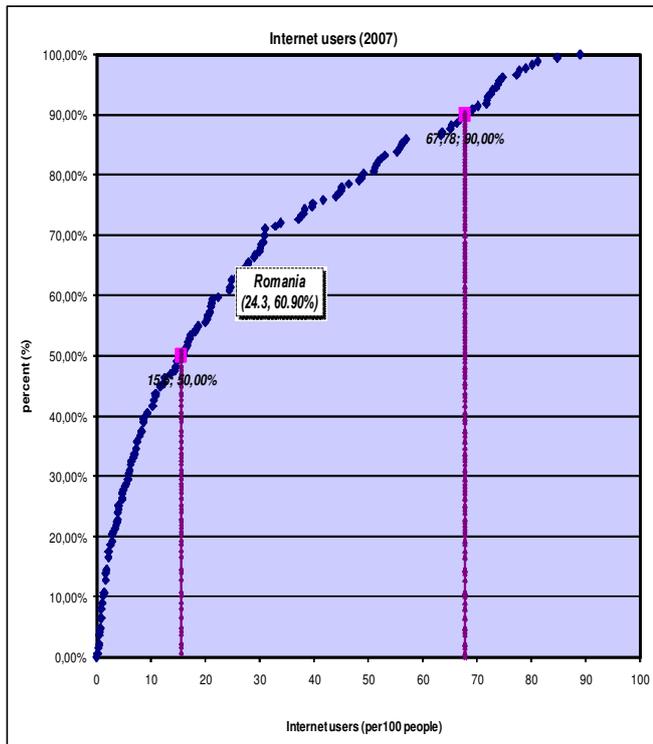


FIGURE 8 - THE PERFORMANCE PROFILE FOR THE WHOLE SAMPLE – YEAR 2007

Characterization for Romania in 2007:
 - current value 24.3 Internet users/100 people; reaching the 60,90% of performance profile;
 The top ranked: Iceland (value of 88.9)
 The lowest ranked: 0
 The gap between the 50th and the 90th percentile values a difference in number of internet users equal to 52,18 users/100 people.

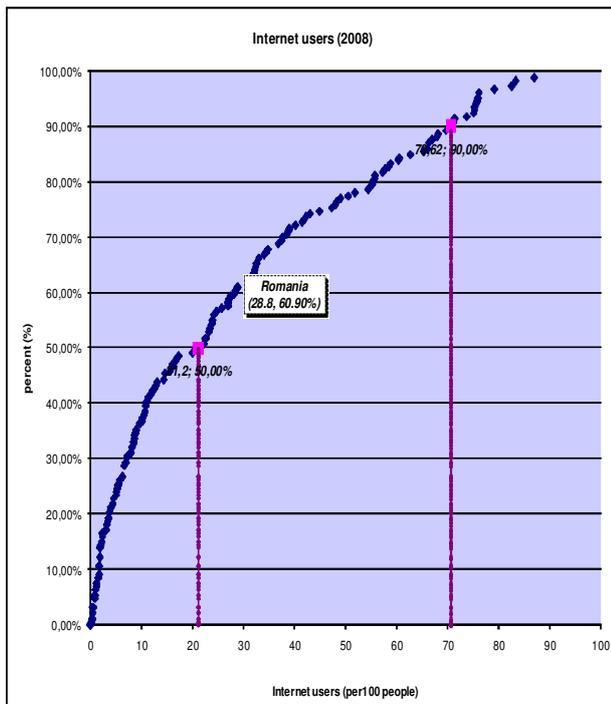


FIGURE 9 - THE PERFORMANCE PROFILE FOR THE WHOLE SAMPLE – YEAR 2008

Characterization for Romania in 2008:
 - current value 26.8. Internet users/100 people; reaching the 60,90% of performance profile;
 The top ranked: Iceland (value of 88.9)
 The lowest ranked: 0
 The gap between the 50th and the 90th percentile values a difference in number of internet users equal to 49,42 users/100 people.

The case of Romania

In the last years, for Romania, the trend of domestic economy to align to the world's trends was impetuous. In overall view, the sector of communication represents one of the most dynamic and gainful sector, having a high rate of income (approx. 60%); what is beneficial is that the percent of private sector is major, over 90%, both registered capital and turnover, product and gross value added. Earnings registered in the field of communication have an increase evolution; the sector developed from the point of view of human resources, by growing of number of employees and their revenues, as well.

TABLE 5 - THE CASE OF ROMANIA- INDICATOR OF ICT PROGRESS

Access indicators	Main (fixed) telephone lines per 100 inhab.		Mobile cellular subscriptions per 100 inhab.		International Internet bandwidth Bit/s per Internet user		Proportion of households with computer		Proportion of households with Internet	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Romania	19.8	23.6	95.2	14.5	21'950	31'640	34.0	37.8	22.2	30.4
Use indicators	Internet users per 100 inhabitants		Fixed broadband Internet subscribers per 100 inhabitants		Mobile broadband subscriptions per 100 inhabitants					
	2007	2008	2007	2008	2007	2008	2007	2008		
Romania	24.4	29.0	9.1	11.7	8.0	21.6				
Skills indicators	Gross enrolment ratio				Adult literacy rate					
	Secondary		Tertiary							
	2007	2008	2007	2008	2007	2008	2007	2008		
Romania	87.5	88.0	58.3	65.8	97.6	97.6				

Source: The National Regulatory Authority for Communications and Information Technology (ANRCTI) – Statistical data report for 2006 – 2008

TABLE 6 - ROMANIA - THE EVALUATION OF "INTERNET USERS (PER 100 PEOPLE)" ACCORDING TO THE INTERNATIONAL HUMAN DEVELOPMENT INDICATORS

Year	2000	2005	2006	2007	2008
Romania (no. internet user / 100 people)	3,6	16,6	20,8	24,3	28,8
Romania Percentile in the sample	60,30%	62,30%	62,50%	60,90%	60,40%
Rank for Romania	53	71	70	74	73
No. of countries in the year sample	173	187	185	187	188

Even having reported these positive increases, Romania still lags behind in terms of computer penetration and electronic communications infrastructure access. Concerning Internet access, the situation is quite critical, both for households and for enterprises. A major difference is noticed between SMEs and large enterprises where 90% of large enterprises have access to Internet, while only 50% of SMEs use this mean of communication. This has a negative impact on national competitiveness, as computer usage and Internet access are important factors for the economic development. The Romanian progress in information society and its future opportunities are far from being satisfactory. The lagging behind especially regards Internet access, Information Society services and up-take of IT applications in economy. Those significant

infrastructure gaps are remediable only through major investments, both from private companies and from public institutions.

4. CONCLUSIONS

There is a major difficulty to measure the real extent of the digital divide, having in view the various reasons for growing this fracture (of economic, social, cultural and infrastructure reasons). The interest of evaluation the size of the discrepancy of a specific country as compared to the performers in the field is given by the benefits of pointing out the aspects in which the country lags or fails to enroll in the trends. Being a complex phenomenon, the measuring of digital divide supposes a multiple facets approach, which involves various procedures of aggregations; it also involves a time prospective as the technological advance is associated, by evidence, with shortening of the gap in the endowments dispersion in ITC devices and, with an increased readiness of population in using the internet information facility for personal and professional purposes.

The digital divide remains high on the agenda of national and international ICT policy makers, and one of the key objectives is contribute to monitoring the digital divide, and highlighting crucial areas to be foster by investments and management attention. Key success factors include the adoption of a harmonized legal and regulatory framework and common technological platforms among EU member states.

Adopting common, well-engineered guidelines, and customizing them to individual countries' characteristics and needs, enabled Member States to stimulate their ICT sectors through fostering competition among service providers and increasing demand among end-users. While these data on ICT infrastructure and access provide an overview of ICT market developments, they constitute only part of the story and are not sufficient to fully understand progress made by countries towards becoming information societies. As infrastructure and access become more widespread, it is increasingly important to obtain more and better information about the use of ICTs and their impact on economic and social development, thus covering the demand side as well as the supply side of the market.

Nowadays, digital divide refers more to a social divide that develops according to who has access, enough competence and experience to benefit from digital services, modern electronic networks and who does not have all these or is unable to successfully and efficiently use ICTs. The concern with the digital divide is that may create a vicious circle in which it amplifies the already existing social inequalities cumulatively. Paradoxically, ICT tools are being employed to solve the problem of the digital divide, even though these same tools generated and amplified it through creating inequality in the area. Yet, the cutting off the digital divide means increasing the quality of life as ICT penetration significantly foster the competitiveness of a given country. The availability of ICT tools, actual usage as well as online contents and services can help to decrease social exclusion and create equal opportunity for participation in the information society.

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