Non-infrastructural factors' importance for e-commerce expansion prospects in Central Europe

Abstract: E-commerce growth prospects are often evaluated from the view of IT infrastructure development, Internet access, use and costs. Contemporary research on that subject shows that ICT differences between developed and in-transition economies are growing narrow, but there is still a quite noticeable dissimilarity in IT education and skill levels, what could be an important obstacle for the further global e-economy progress and may considerably slow down the process of reducing the digital divide.

Keywords: digital divide, e-commerce, demand-side incentives.

1. INTRODUCTION

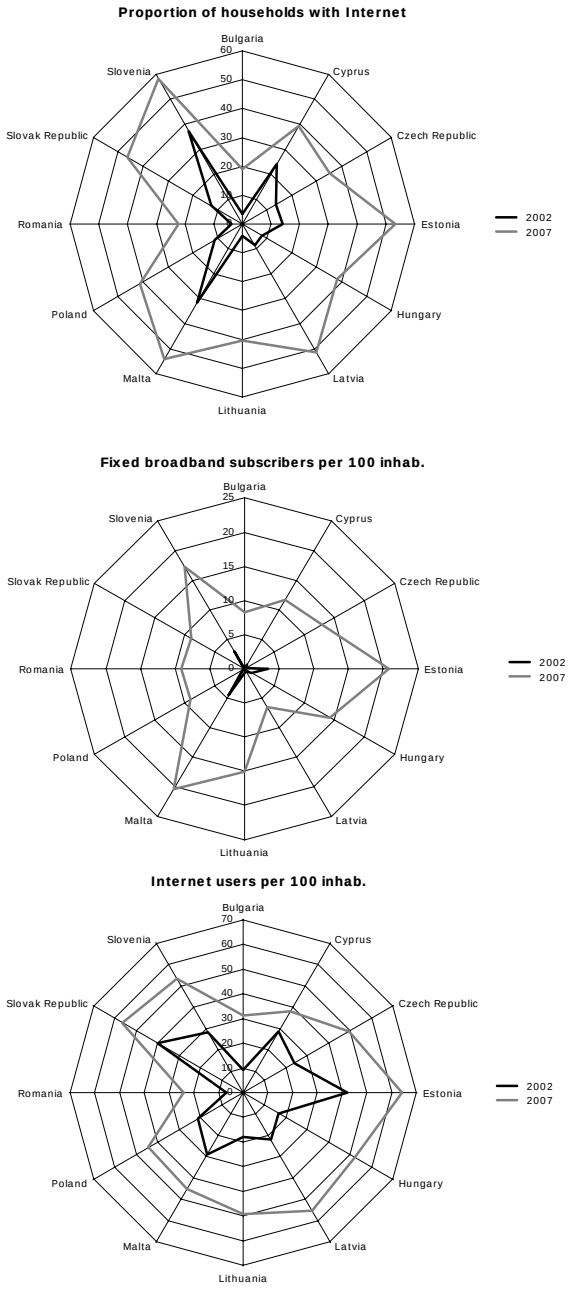
In the contemporary global economy one can witness a continual technology race, especially between multinational corporations based particularly in the developed countries. A technology gap between the rich developed countries and the poor developing ones still exists, and even keeps getting deeper, despite the different efforts and initiatives of governments and international institutions, for example World Trade Organization and the World Bank Group. In so called knowledge-based economy information gains in importance in comparison with the traditional production factors, i.e. labour and capital, therefore it is obvious and understandable that many governments, institutions and companies of different size and business scale make continuous efforts to increase competitiveness and to develop skills or market advantages useful in the digital era. The main goal of such activities is sustainable ICT infrastructure development (based on assumption that this is a necessary condition for true network society creation — see Kallinikos 2006), but it is impossible or at least difficult to achieve without enormous R+D expenditures and the specialized technical knowledge. Regardless of the institutional coordination for this process (one of the most recognized example is e-Europe initiative launched by European Commission in 2000 and its successor — i2010 strategy; see also Lembke 2002), magnitude of the digital divide — especially between developed and developing countries — remains huge (James 2003).[1] Although research made on this subject shows that the digital divide is closing in a general sense, the gap between countries with poor information and communication infrastructure and insufficient access to the Web and the technologically advanced countries is widening (this happens despite the undeniable progress made in mobile telecommunication and other ICTs in recent years). The probable reason of this phenomenon could be the education and skills backlog noticeable in developing countries, and so called internal digital divide, which means that the smaller but high educated part of this societies is able to use ICT technologies as efficiently as majority from the postindustrial countries, but there is still a huge group of inhabitants (living especially in rural areas) not properly equipped with even basic IT tools, without access to the Internet and the adequate skill and education level to derive profits from the global digital revolution. Proven strong relationship between ICTs and economic growth (James 2003, ITU 2007) could also be interpreted in favour of developed countries, leading to the conclusion of dominant role of the ICT infrastructure (supply-side incentives) in balancing development opportunities in the knowledge based economy. It appears that the supplementary factors (i.e. demand-side incentives) should be taken under consideration, for example technical skills of individuals, education level, or willingness to use Internet for non-entertainment reasons. Therefore, the common ICT differences between new EU member countries (emphasizing the position of Poland) and their prospective influence on e-commerce development prospects are the key objectives of this paper.

2. NETWORK INFRASTRUCTURE IN NEW EU MEMBER COUNTRIES

Despite the European Commission strong engagement in the process of creation the most innovative and networked economy in Europe, there is still a long way to go. The most obvious differences in the information and telecommunication infrastructure development can be noticed between EU-15 countries and new members, which in majority accessed European Union in May 2004 (as everyone knows, Bulgaria and Romania became EU members in 2007). Of course, a few years of EU membership is probably too little time for these countries to be successful in catching-up other EU members, not even mentioning the most technologically developed economies like the United States or Japan.

Figure 1 shows the selected IT infrastructure development data for new EU members (12) and their changes between

2002 and 2007. Such network-based indicator representation has been chosen, because other indicators used to be published in the context of information age and network society (e.g. households with television, daily newspapers per 1,000 people or personal computers per 100 people — see World Bank 2008) seem to be improper or slightly outdated, when it comes to the digital gap measurements between EU members (i.e. intra-European digital divide). It should be emphasized that in the modern societies a personal computer possession rate or printed newspapers per inhabitants rate do not count so much as quick access to digital content and developed possibilities of information processing, analysing and dissemination.



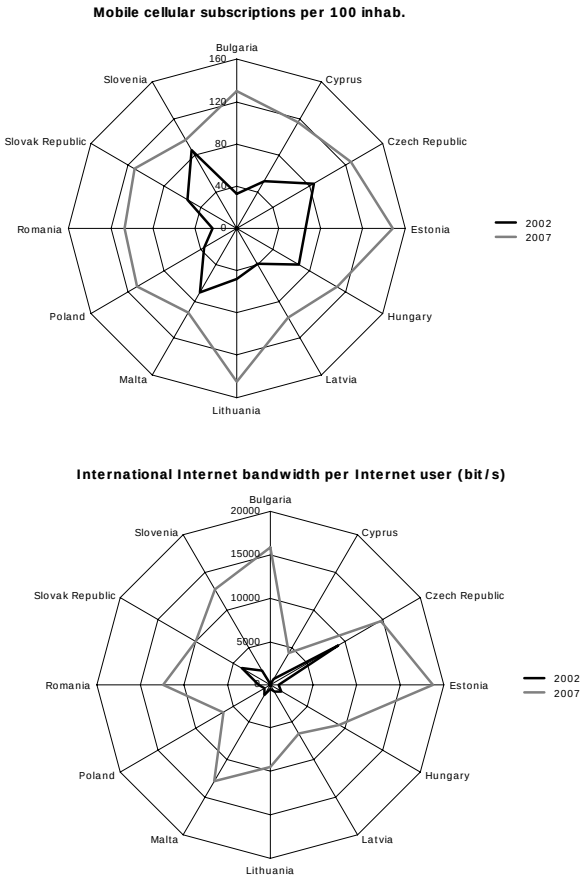


Fig. 1. Selected Internet access indicators of 12 new EU member countries in 2002 and 2007 (ITU data).

It can be noticed that between 2002 and 2007 all the presented values improved significantly, even for the newest EU members — Bulgaria and Romania. It's worth stressing the best outcomes in the IT infrastructure development achieved by small countries like Baltic states, which have made significant improvements in their evolution towards becoming information societies. For example, proportion of households with Internet in Lithuania increased almost 10 times — from 4.1 per cent in 2002 to 40.3 per cent in 2007, and Internet bandwidth per Internet user in Estonia increased from approx. 1 kbit/s in 2002 to nearly 19 kbit/s in 2007. As regards the international Internet bandwidth per Internet user, mobile cellular subscriptions per 100 inhabitants, and Internet users per 100 inhabitants, Romania and Bulgaria are among the leaders, but the possible explanations could be their infrastructural backlog (especially in IT field) and the fulfilled opportunity to catch up other Central European countries in the course of preparations to EU membership.

Compared with the indicators for all new EU members, outcomes of Poland look a bit disappointingly. In 2002 all five indicator values fell far below the averages for 12 countries in question. After five years three values reached average level or were slightly better — proportion of households with Internet (41 per cent), Internet users per 100 people (44 users) and mobile cellular subscriptions per 100 people (109 subscriptions). One of the worst results among

12 new EU members was Internet bandwidth per Internet user (only 6.3 kbit/s in comparison with new EU-12 average of approx. 11 kbit/s). It's worthy of mention that according to ITU data, in 2007 world leader in this category was Luxembourg (9.6 Mb/s), and "old" EU members average bandwidth per user (for 14 countries excluding Luxembourg) reached nearly 39 kbit/s. Among 27 EU members only Cyprus had lower Internet connection speed per user (4.2 kbit/s). The values above are confirmed by Eurostat data concerning broadband penetration rate[2] — in 2008 the lowest rates among EU-27 countries were for Bulgaria (9.5), Poland and Slovakia (9.6 both), compared to EU-27 value of 21.7.

Table 1. ICT Development Index (IDI) for the leading countries and new EU members (2002 and 2007)

Economy	Rank 2007	IDI 2007	Rank 2002	IDI 2002
Sweden	1	7.50	1	6.05
South Korea	2	7.26	3	5.83
Denmark	3	7.22	4	5.78
Netherlands	4	7.14	6	5.43
Iceland	5	7.14	2	5.88
Norway	6	7.09	5	5.64
Luxembourg	7	7.03	21	4.62
Switzerland	8	6.94	7	5.42
Finland	9	6.79	8	5.38
United States	10	6.78	10	5.27
Estonia	26	5.97	31	3.93
Slovenia	28	5.88	22	4.47
Malta	30	5.54	29	4.04
Lithuania	33	5.29	43	3.17
Hungary	35	5.19	36	3.49
Latvia	36	5.01	39	3.30
Cyprus	37	4.97	33	3.78
Slovakia	38	4.95	35	3.51
Poland	**39**	**4.95**	**37**	**3.34**
Czech Republic	40	4.88	34	3.74
Bulgaria	45	4.37	51	2.74
Romania	46	4.16	60	2.48

Source: ITU 2009.

To the similar conclusions one can come after analyzing ITU data concerning ICT Development Index (see Table 1). The IDI index is used to present digital divide between countries, and its formula includes three sub-indices — ICT access, use, and skills (with the weights 40, 40, and 20 per cent, respectively). First ten economies in the ranking presented in Table 1 are distinguished by highest IDI values, and have high level of ICT access and use and high ICT skills. According to ITU, the high IDI 33 economies (with index values above 5.29) accounted for 15 per cent of the world's population in 2007 and included twenty-one European countries (among them four new EU members, i.e. Estonia, Slovenia, Malta, and Lithuania), ten Asia and Pacific economies, as well as Canada and the United States. The others new EU countries, including Poland, were classified in the upper group (IDI values between 3.41 and 5.25), because they achieved an elevated level of access to and use of ICTs, and ICT skills, for a majority of their inhabitants (ITU 2009).

As emphasized above, the third component, ICT skills, was included with the least weight of 20 per cent. This component of the index should include indicators that capture the level of ICT skills in countries, but such data currently are not collected by most developing countries. The only available, but quite good proxy was therefore the level of education and literacy. On the other hand, this component value could be underestimated, because of mentioned lack of data and internal complexity of "skills" definition (ICT skills not only comes from education level and literacy, but can be shaped by socio-cultural environment, interests, hobbies, and other hard-to-measure and often subjective factors).

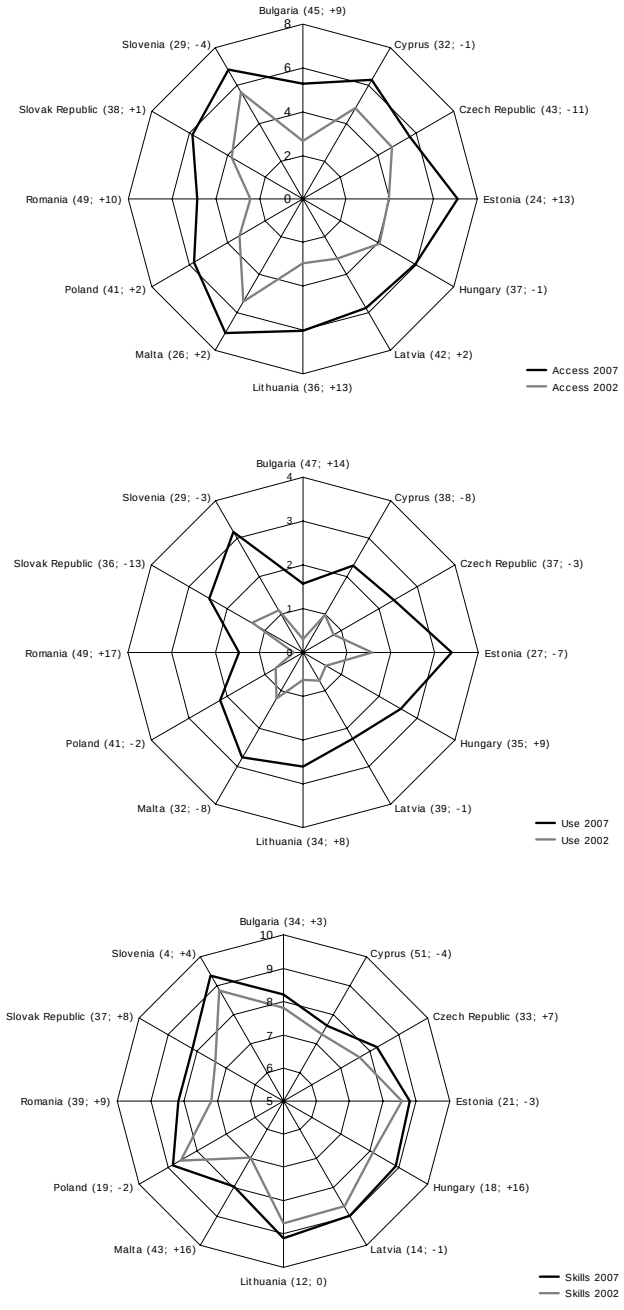


Fig. 2. IDI sub-indices for 12 new EU member countries and their change between 2002 and 2007 (ITU data)

Figure 2 shows sub-indices value changes between 2002 and 2007 for new EU member countries (first number in parenthesis denotes sub-rank in 2007, second — its change in comparison with 2002). However the access and use sub-indices for this group are relatively low (in both categories Estonia is the leader, with rank 24 and 27 respectively), there was a noticeable value improvement for all reported countries. The extent of skills index changes looks quite the contrary — in 2007 five countries including Poland were located in the leading twenty (with huge progress of Hungary), but in reported period index values changed only slightly (no more than by 10 per cent, with exceptions of Malta, Romania and Slovakia).

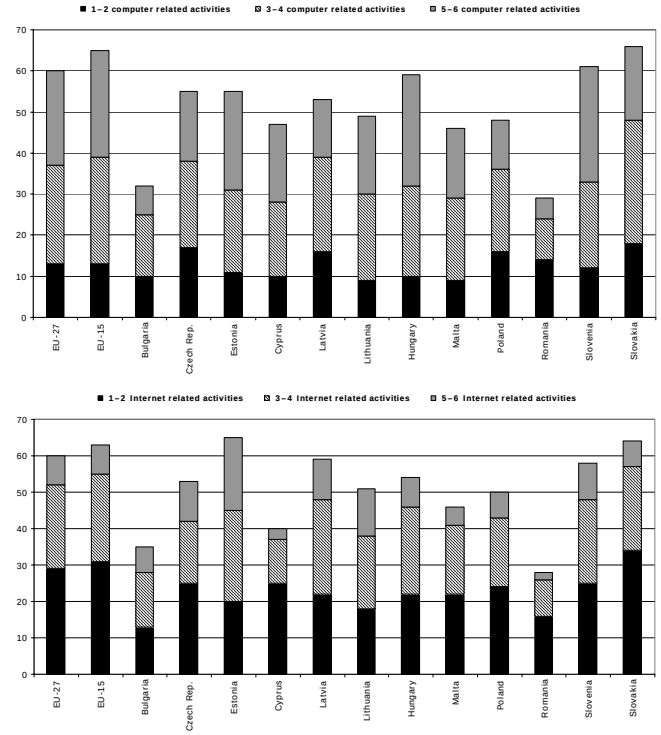


Fig. 3. Skills composition for computer and Internet related activities in new EU members (2007, Eurostat data)

While looking at the recent Eurostat data concerning individuals' level of computer and Internet skills[3] (see Fig. 3), one can notice quite impressive divergences between reported countries. As regards the computer skills, only outcomes for Slovakia, Slovenia, Hungary, Czech Republic, and Estonia are close to EU-15 ones. Poland's outcomes are not satisfactory at all, especially when compared to EU-27 values — percentage of individuals in Poland who have carried out 5 or 6 of the computer related activities is one of the lowest in the group. In other words, only 48 per cent of Polish population is familiar with the easiest computer activities, 12 percentage points less then EU-27 total outcome. Composition of Internet skills for new EU members is even worse, and the only positive exceptions are Slovakia, Slovenia and Baltic states (especially in the category of 5-6 Internet related activities). Presented results justify the conclusion that citizens of new EU countries are in general able to perform simple Internet and computer related tasks, but lack of sufficient knowledge and IT experience can be a serious problem for e-commerce and e-government dissemination among the rest of population (UNCTAD 2007). According to Polish national statistics for 2007, 48 per cent of the total number of individuals aged 16 to 74 can use Internet search engines, 35 per cent is able to send e-mails with attachments, 25 per cent participates in chats and forum discussions, 12 per cent uses peer-to-peer (P2P) programs, and only 7 per cent of them can create Web pages (GUS 2008). It appears that this predominant unfamiliarity with Internet and its tools (especially among inhabitants of rural areas) could be considered unsatisfactory when more serious tasks are to complete, for example tax form online filling and submission or e-election participation possibilities.

This conclusion can be supported by data presented in Fig. 4. While interacting with public authorities, the main purpose is obtaining information from their websites (over 25 per cent for EU-27), but only 16 and 12 per cent of users visit them online for downloading official forms and sending filled forms, respectively. In the group of new EU members, Estonia, Slovakia and Slovenia have the highest percentages, Bulgaria, Romania, Poland and Czech Republic — the lowest ones. As mentioned above, Estonia has the highest IDI rank among all new EU member states, what is the result of well developed IT infrastructure and high intensity of ICT use, comparable to many developed countries. For example, in 2007 Estonia and Lithuania have one of the highest mobile subscription penetration rates globally (148 per cent up from 65 per cent and 146 per cent up from 47 per cent in 2002, respectively) (ITU 2009). On the other hand, Estonia like Nordic countries and other Baltic states occupies high position in skills (digital literacy). It seems that Estonian successful combination of developed IT infrastructure, skilled citizens and supply-side incentives encouraging to interaction with public authorities (online availability rate of 20 basic public services reached 70 per cent in 2007 — see Table 2) could be considered as a vivid evidence that as far as e-government development possibilities are concerned the IT infrastructure is a necessary condition, but not a sufficient one (see also McDaniel 2004).

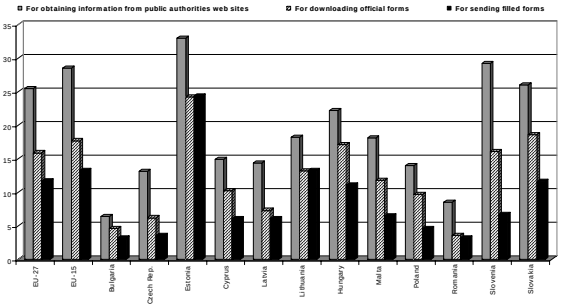


Fig. 4. Purposes of using the Internet by individuals for interacting with public authorities (2008, Eurostat data)

Albeit in both ICT access and ICT use rankings Poland is positioned relatively high, the scope of interaction with public authorities in Poland is rather small (see Fig. 4). Possible cause of this could be insufficient online availability of public services — only 25 per cent in 2007, compared to

48 per cent for new EU members and 68 per cent for EU-15 (see Table 2). On the other hand, prospects for quicker e-commerce development appear to be rather gloomy, too. With 44 per cent of population aged 16 to 74 using Internet in 2008, only 12 per cent of individuals used this channel to order/purchase goods or services (still the only category, in which the result of Poland is higher than new EU-12 countries average). According to GUS (2008), the main purposes of Internet use in Poland (2007) are e-mail sending/receiving, searching information about products and services, multimedia and files sharing, chat and forum participation and e-publication reading. The only e-commerce related activities are e-banking use and selling on e-auctions (13 and 5 per cent of individuals aged 16 to 74, respectively).

Table 2. Selected indicators of Internet use and public services availability in new EU member countries

Economy	Internet use (% of individuals) 2008	Goods or services ordered/bought for private use (% of individuals) 2008	Percentage of online availability of 20 basic public services 2007
EU-27	56	24	59
EU-15	60	29	68
Bulgaria	33	2	15
Czech Rep.	51	13	55
Estonia	62	7	70
Cyprus	35	7	45
Latvia	57	10	30
Lithuania	50	4	35
Hungary	56	8	50
Malta	46	16	95
Poland	**44**	**12**	**25**
Romania	26	3	35
Slovenia	52	12	90
Slovakia	62	13	35
New EU-12 average	48	9	48

Source: Eurostat.

3. KEY PROBLEMS WITH DIGITAL SOCIETY CREATION

The general conclusion is as follows: in sustainable e-commerce and e-government development not only IT infrastructure and access conditions are the most important factors, but technical abilities and social incentives as well. Because of high level of data aggregation, insufficient detailed information and differences in economic and social growth in reported countries it is extremely hard to appoint any general prerequisites or edge conditions for e-commerce and e-government progress. It seems that e-commerce issues are more popular and better known, but the activities for digital inclusion and increasing public awareness of e-government matters are no less important in the course of modern digital society creation process.

Using Poland as an example, the main difficulties in promoting e-commerce and e-government initiatives and stimulating their development by demand-side incentives could be formulated as follows:

1. *High level of software piracy and low public awareness of copyrights and intellectual property rights*. According to BSA, Poland is still among the world leaders in digital piracy (with 56 per cent piracy rate in 2008), and the estimated piracy losses in our country increased almost twice in period 2004–2008 (from 379 to 648 million USD). To bring this problem to the public's attention Polish patent office organized anti-piracy conferences. Since young people and students are the most active group in using new technologies (they are particularly keen on mobile and Internet innovations), BSA and the local Polish anti-piracy coalition continued the second stage of a "be original" anti-piracy campaign targeted at high school pupils (BSA 2009). As for the relationship between the software piracy and the demand for software and multimedia, the highest digital piracy level the lowest sales volume of the genuine software. Therefore, IT companies and official resellers tend towards increasing prices in Polish market, compensating in this way inevitable losses caused by users of illegal digital product copies. As result of this action are one of the highest software and multimedia prices in the European Union, what can be considered as an "unmerited punishment" for genuine products' buyers. Another side-effect of the piracy could be a delay in new software and multimedia (i.e. movies, music and games) products launch to Polish market, or offering IT products equipped with less features and functionalities.

2. *High and therefore unacceptable for many potential users costs of Internet access*. According to ITU's ICT Price Basket 2008 ranking, Poland has one of the highest telecom service prices in EU-27, especially as regards the fixed telephony and fixed broadband Internet (ITU 2009). On the other hand, the mobile telephony development observed in recent years may contribute to increasing mobile services and Internet access, particularly in rural areas traditionally poorly equipped with the cable telecommunication infrastructure. Thanks to the highest recent growth, Poland has now reached levels of mobile penetration above the developed country average (UNCTAD 2007). It is worthy to remark that common broadband wireless access and decreasing IT service prices could have been encouraging to much frequent use of the other digital opportunities, such e-health, e-work or e-learning (Castells 2001).

3. *Unsatisfactory computer literacy and language skills, especially in rural areas*. Apart from infrastructure underdevelopment in rural areas, other important factors are level of education and the skills improvement possibilities (James 2003). According to GUS (2008), in 2007 only 25 per cent of individuals aged 16 to 74 developed their ICT skills at schools or universities; the

most popular education methods were still "learning-by-using" or teaching by relatives or friends. Since knowledge sharing chances in small towns and villages are significantly lower than in the urban agglomerations, educational institutions of all levels have to be more engaged in the process of IT knowledge dissemination (not only among the students, but in local community as well), at the same time contributing to diminishing inter-regional digital divide. Of course, another crucial issue is foreign language skills, since a great deal of information available via Internet is published in English, Spanish and other less popular languages. Therefore, foreign language abilities are a civilizational imperative for successful use of the Web vast resources.

4. *Ignorance of Internet use and ICT-related benefits.* According to GUS (2008), in last three years the most important reason of not having Internet access in Polish households was a lack of such a need (in 2007 declared by 41 per cent of households without Internet access). It appears that a prominent role in digital society idea propagation should be played by widely comprehended mass media. People of different education, profession and dwelling place ought to be aware of the fact that Internet both allows to save time and money, and creates unlimited opportunities for personal improvement (see also Castells 2001).

5. *Anxiety of unsatisfactory security level of Internet interactions, identity theft risk and other cyber threats*. Numerous Internet security researches conducted in recent years have led to the conclusion that the weakest link in even sophisticated network security systems is the user itself. For that reason, spreading the safe and common-sense attitudes concerning Internet use should also be a mass media key responsibility, instead of repeatedly informing of cybercrimes and in this way escalating a feeling of constant menace. People should be persistently and by different manners informed that Internet use is fairly safe, assuming that the basic precautions are strictly followed.

Manuel Castells, one of the most outstanding contemporary sociologists studying the new communication technologies and their impact on economic and social transformations, during his recent interview said that in the course of network society creation "the most important are brains, infrastructure can wait" (Castells 2009). It seems to be a succinct and adequate conclusion of this paper.

ENDNOTES

[1] The OECD (2001) defined the term "digital divide" as the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities. The digital divide reflects various differences among and within countries.

[2] According to Eurostat, the broadband penetration rate describes the number of dedicated, high-speed connections per 100 inhabitants. Broadband lines are defined as those with a capacity equal or higher than 144 kbit/s.

[3] According to Eurostat, level of basic computer skills are measured using a self-assessment approach, where the respondent indicates whether he/she has carried out specific tasks related to computer use, without these skills being assessed, tested or actually observed. Six computer-related items were used to group the respondents into levels of computer skills in 2006: copy or move a file or folder; use copy and paste tools to duplicate or move information within a document; use basis arithmetic formula (add, subtract, multiply, divide) in a spreadsheet; compress files; connect and install new devices, e.g. a printer or a modem; write a computer program using a specialized programming language. On the other hand, level of internet skills are measured using a self-assessment approach, where the respondent indicates whether he/she has carried out specific tasks related to internet use, without these skills being assessed, tested or actually observed. Six Internet-related items were used to group the respondents into levels of Internet skills in 2005 and 2006: use a search engine to find information; send an e-mail with attached files; post messages to chatrooms, newsgroups or any online discussion forum; use the Internet to make telephone calls; use peer-to-peer file sharing for exchanging movies, music etc.; create a web page.

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