The Digital Divide among Under-Age Individuals: An Economic and Legal Approach

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**Abstract:** This study aims to provide insights for a better understanding of the digital divide. The factors which contribute to the widening of the digital divide are presented and age is shown to be significantly associated with the use of Information and Communication Technologies (ICTs). The existence of a digital divide among under-age individuals is proved based on the findings of a secondary research. These findings indicate the considerable differences among Northern, Central and Southern Europe, with regard to the use of the Internet by minors. The regulations and policies to bridge the digital divide among minors are an additional aspect of this study.

**Keywords:** Digital Divide, Digital Inequality, Information Society, ICT

1. **Introduction**

Participation in the information society is considered a fundamental human right, constitutionally guaranteed in several countries, including Greece (Alexandropoulou-Egyptiadou, 2007; Iglezakis, 2008). Necessary instruments for the function of the information society are the Internet and all the other ICTs. The ability to access and use ICTs appears to be an indispensable prerequisite for participation in the information society. But on the other hand, the digital divide is a reality that exists both in the developed and developing countries. In a recent report, the World Economic Forum indicated that 88% of all Internet users are from industrialized countries that comprise only 15% of the world’s population (Pick and Azari, 2008).

The digital divide is a new form of socioeconomic inequality. It is defined by the Organization for Economic Co-operation and Development (OECD) as the “gap between individuals, households, businesses, and geographical areas at different socioeconomic levels with regard both to their opportunities to access ICTs and their use of the Internet for a wide variety of activities” (2001). Debate about the digital divide started in the early 1990s with the distinction between ICT “haves” and “have-nots” (Rallet and Rochelandet, 2007; Wilhelm and Thierer, 2000). This topic was initially restricted to OECD countries, but now involves all countries by creating a new type of international inequality. There has been much discussion about the determination and analysis of the digital divide’s components (DiMaggio et al., 2004; Dewan and Riggins, 2005). While in the 90s the focus was mainly on infrastructural access, nowadays the focus is moving to the users and the factors that generate digital inequality. This term refers to socio-economic disparities inside the “online population”, such as the
quality and the cost of the connection to the Internet, the skills and the knowledge to find the required information, etc. The primary issue nowadays is not whether there is an Internet access but what people are able to do when they have access to the Internet. DiMaggio and Hargittai (2001) disassociated the inequality of access from digital inequality, while Attewell (2001) refers to this distinction as the “first-level” and “second-level” digital divide. Emphasis in both approaches is given on single factor analysis rather than integrative frameworks and measurements (Barzilai-Nahon, 2006). Despite the increasing attention and the plethora of academic literature on the digital divide, there has been no consensus on its causes and how to properly bridge it. In fact, little research has been performed on causation of technological differences among countries, and what empirical lessons can be learned to support leaders and policy makers in reducing the digital divide.

2. Factors Contributing to the Digital Divide
Measuring the digital divide is complicated since it is apparently composed of multiple dimensions. Let us mention some of these dimensions. According to James (2005), the traditional measurement of the digital divide in terms of direct access to ICTs makes sense only in the developed countries, but not in low-income countries, where people can have indirect access to the Internet through various intermediaries (e.g. listening to local radio stations which get information via the Internet). Guillen and Suarez (2005) examine the relationship of democracy and the Internet and argue that the more democratic the polity, the greater the Internet use. Quibria et al. (2003) point out that income, education and infrastructure are the most important variables with regard to the use of six kinds of ICTs. Liu and San (2006) found that the factors associated with the rapid diffusion of the Internet at the turn of the 21st century are lower cost of access, greater societal openness, political stability, literacy, urbanization, and utilization of TV sets. Noteworthy is the approach of Dasgupta et al. (2005), which emphasizes that long-term infrastructure may be more important than access to ICTs, especially for developing nations. An earlier finding, of great interest to our work, is that primary education has higher returns on investment than secondary and higher education, and this finding is even more valid for developing countries (Psacharopoulos, 1994). However, specific ICT factors were not included in this study.

So far there has not been a worldwide research concerning the factors which contribute to the digital divide. Besides, the factors widening the digital divide are not the same for each country in the world. This is why we adopted in our analysis the factors identified in the U.S.A. as the most important for the expansion of the digital divide. These factors concerning individuals, since they are different for businesses, are the income, age, education, race, household type, and geographical location (Sipior et al., 2002). Each of these is discussed in the following lines.
• Income: it is a fact that, ICT use rises as income rises. It was found that households with incomes of over $75,000 (early 2000s) are more than 20 times more likely to have access to the Internet than those at the lowest income level. Only 23% of low-income children have access to the Internet at home compared to 58% of children in high income families (Wilhelm and Thierer, 2000).

• Age: the most sensitive age groups with regard to online penetration are children up to twelve and seniors aged over 65 years. On the contrary, the age group with the highest online penetration comprises individuals between 35 and 44 years old. Internet usage among children rises with a considerably increasing rate; however, there are still significant differences among the European countries, which are actually the subject of this paper.

• Education: the differences in the level of education are in agreement with income disparities because most people who are poor are uneducated. Individuals with a university or college degree are more than 9 times more likely to use the Internet than those with an elementary school education. The dramatic difference in ICT use is due to literacy since the vast majority of online content is text-based.

• Race: it is also an important factor widening the digital divide, although it is not as important as the previous three factors. White individuals use the Internet much more than Blacks or Hispanics. According to the data from U.S.A., the gap in Internet access between White and Black households and White and Hispanic households actually increased in the early 2000s compared to 1990s.

• Household type: married couples with children less than eighteen years old have the highest Internet penetration, while female-headed households with children the lowest. This factor is associated with an increase in income, since it makes sense to suppose that married couples have higher income levels, taking for granted that both parents work.

• Geographical location: the location of residence within a country and the location of a country within a geographical region also affect ICT adoption. Urban areas tend to have better infrastructure and lower costs of ICT use in contrast with rural ones. Providing high-speed Internet access through traditional means to areas with a small population base is still expensive. Another factor that has been examined a lot is gender. The role of gender in accessing and using ICTs is often examined in parallel with age. However, most studies show that contrary to what happens with age, gender contributes less to the digital divide widening. The differences in ICT use, regarding gender, are mainly illustrated between older men (over 50) and younger women (up to 45). Men over 50 years old are more likely to use the Internet than women of the same age, while women up to 40s make a greater use when compared with men of the same age (National Telecommunication and Information Administration, 2002).
3. Under-Age Individuals and ICTs

It is unquestionable that the digital divide has to be confronted. Bridging of the digital divide must be achieved by enabling the conditions for everyone to take part in the information society, i.e. e-inclusion (Commission of the European Communities, 2007). As we already noted, the examination of the digital divide nowadays revolves around the types of users. Following this, our analysis focuses on a very vulnerable social group, under-age individuals. This is due to the following reasons: minors are the prospective users of the next generation of digital technologies, as well as they constitute a social group which is affected a lot by many external forces, such as family, school environment, friendships, etc. It is true that most parents did not grow up using ICTs, so they do not know how to teach their children to use computers responsibly and effectively. In addition, in most countries, schools do not contribute to a deep understanding of new technologies. Consequently, a number of minors are able to exploit ICTs at a high rate, whereas others use them in an inappropriate way (stealing, for instance, music, movies or software through peer-to-peer networks or launching a destructive Internet virus), and finally some others fear the new technologies. E-inclusion is especially significant for minors since they will be the citizens of the future worldwide information society. The appropriate education of minors (and their parents and teachers as well) in order to access and appropriately use ICTs, and the adequate legal environment are some of the necessary means towards e-inclusion.

As previously noted, the scope of this paper is to demonstrate the digital divide among minors, as well as the steps that have been taken towards the direction of encouraging their e-inclusion. We present data with regard to the use of ICTs by under-age individuals and examine the most important factors that contribute to the different usage rates. Analyzing these factors is a prerequisite to making suggestions on how to bridge this digital divide. These suggestions will include specific measures in order to fight e-exclusion of minors, taking into consideration the necessary precautions for the secure accessibility and use of ICTs.

The approach followed in this paper is an adaptation of the model presented by Korupp and Szydlik (2005), taking into account the particular needs of under-age individuals. Three main factors determine the digital divide among under-age individuals: human capital, the family context and the social context. Human capital is associated with the general education and the individual performance on specific computer courses. There is a positive relation between a person’s human capital and his or her private use of computers or the Internet. Getting acquainted with computers at school increases an under-age individual’s likelihood of using a computer or the Internet for his or her private needs. The family context also plays a significant role concerning ICT penetration to minors. It is a fact that, the home environment where people are raised determines their habits towards new technologies. The family composition,
income or principles are only some of the many components of the family context, which specify the limits of ICT usage by minors. Parents sometimes do not make the right decisions, as for example when they forbid their children to have access to the Internet trying to protect them from unwanted information. The best way of doing so would be to control the access to unwanted sites. The third factor explaining the use of a computer or the Internet by an under-age individual is the social context. Friendships, groups where minors belong to, as well as the school environment are basic determinants of the social context. We should point out that, as school environment we mean the social contacts and any kind of interaction at school, since the level of education is associated with the human capital. Giving a broader meaning to the social context, determinants such as the generation, gender, ethnicity, and region should also be included. While generation is not so important in our analysis, since all minors have more or less the same characteristics, each one of the other three determinants has its own part in the widening of the digital divide among minors.

Computer use for an under-age individual mainly involves playing games interactively or alone, and with regard to the Internet searching for information. Recent surveys on the use of ICTs by children between 6 and 13 years old show that 70% play games on computers, 50% use computers for their homework, 44% use them for learning programs, and 33% draw and write on the computer or surf on the Internet (Medienpädagogischer Forschungsverbund Südwest, 2003). Respective surveys on teenagers (12-18 years old) reveal that 41% play computer games, 44% use the Internet for e-mail, 26% use it for instant messaging, 22% for educational and occupational purposes, 31% seek for information, 23% download news or music, and 36% in order to do their schoolwork (Medienpädagogischer Forschungsverbund Südwest, 2004). Comparing the results of these surveys, which were conducted approximately the same time period, it is apparent that younger children devote mostly their time in entertainment, while teenagers have several common online activities with adults.

4. Regulations and Policies to Bridge the Digital Divide Among Minors

At EU level, the importance of e-Inclusion was recognised in i2010 and Member States, the European Commission, industry, and NGOs representing users have undertaken several actions to advance e-Inclusion. A landmark was the 2006 Ministerial “Riga Declaration” on ICT for an inclusive information society, which set concrete targets for Internet usage and availability, digital literacy, and accessibility of ICT by 2010, preparing the ground for a legislative framework, common all over the European Union (EU). However, despite all these valuable initiatives, progress is still lacking and most of Riga targets may not be achieved. Fragmentation of efforts and lack of collaboration continue to persist (Commission of the European Communities, 2007). An e-Inclusion Ministerial
Conference took place from 30 November to 2 December 2008 in Vienna, in order to accelerate progress towards digital inclusion and provide a forum to discuss policies to achieve an inclusive, barrier-free, information society and the related social and economic benefits.

Participation in the information society is a human right, constitutionally guaranteed in several countries, including Greece. The right to e-participation includes the aspect of e-inclusion. The imperative to promote e-inclusion is enshrined in Greek Constitution (Revision of 2001), which in the article 5A par. 2 provides for a social right to e-participation. The above mentioned article states that “All persons are entitled to participate in the Information Society. Facilitation of access to electronically circulating information, as well as of production, exchange and diffusion thereof constitutes an obligation of the State”.

According to the above mentioned article, the Greek State is obliged to take positive actions in order to make equal and active access to the Information Society possible for all (Iglezakis, 2008; Mitrou, 2006; Papakonstantinou, 2006; Kontiadis, 2002) and the benefits from e-Government and e-Democracy. Greece has not developed a particular strategy for digital inclusion, but it introduced specific related projects, mainly in telemedicine, homecare etc. It also launched initiatives concerning the development of ADSL and Wi-Fi networks, the subsidy of acquirement of technological equipment by professionals, students etc. (Iglezakis, 2007). Although there is no specific rule related to e-inclusion, the article 5A of Greek Constitution constitutes a legal basis for policies against digital divide.

E-Inclusion is especially significant for minors, since they will be the citizens of the future worldwide Information Society. The efforts of the legislator should focus on the appropriate information and education of minors, in order to access and use ICTs. Special interest is given to those living in rural areas, having disabilities or belonging in ethnic minorities. Abilities to approach ICT technologies are also offered to their parents and teachers through special training programs. Additional means towards e-Inclusion include programs to subsidise electronic equipment and access to the Internet for minors. Significant factor to the achievement of e-inclusion guarantees safe access and use of the Internet to minors. In this particular area, EU and its member states have done noteworthy steps.

At EU level, the European Schoolnet (2009) is an organization, established in 1996, which aims to the support of teaching and learning in European schools, mostly through ICTs. This organization aims to: a) build one rich, multi-language European community for the innovation and cooperation in educational politics and practice, b) constitute a European gate amongst national and regional educational networks and the facilities they offer, c) encourage technical innovation, interoperability and common standards and, finally, d)
create a strong and efficient European organization that offers synergy and added value to a networked educational world.

In Greece, the Hellenic Ministry of National Education and Religious Affairs (MoE) has launched a coordinated effort for the utilization of ICTs and their incorporation into the daily educational procedure. This effort is implemented in the fields of the third Community Support Framework mainly from the Operational Program of Information Society, under the direct supervision of the General Secretary of the Hellenic MoE and with the support of the Hellenic MoE Information Society office and the "Strategy for ICTs in Education" Committee. It is constructed onto four lines of action: a) installation and support of network and computational equipment, b) development of software and digital content for educational and administrative purposes (educational software, information systems, Internet content etc.), c) training of the educational community on ICTs, targeting to the utilization of the above areas, d) modernization of administration areas. This initiative aims to: a) the incorporation of ICTs in the teaching process, b) the support of the Informatics lesson taught in high schools, senior high schools and technical schools, c) the support of every cognitive area through the use of ICTs, d) the elimination of digital illiteracy and variations on ICT skills (Ministry of National Education and Religious Affairs, 2009). In addition, the Information Society Office of the MoE deals with the exploitation of ICT supportive technologies in special needs education, in particular for pupils with hearing, visual, kinetic or intellectual disabilities.

Other significant policies of the Greek government towards e-inclusion are the following Actions with the contribution of EU: a) the Action “parents.gr” (2009), which offers to parents of pupils (secondary education) free computing lessons, as well as subsidised connection to the Internet for two months. By the end of March 2009, 43.000 parents have participated to the program. b) the Action “see it digitally” (2006-2008). This offers subsidies for laptops amounting to 80% of their market value to students entering Universities and Technological Institutions achieving high grades, or suffering from serious illnesses. By the end of March 2009, 15.871 students have participated to the program, c) according to a ministerial decision (153.604/ΨΣ11182–B/7.10.2008), subsidized training programs in the area of ICTs are offered to students entering Universities and Technological Institutions achieving high grades, or suffering from serious illnesses.

5. Research findings

A secondary research was undertaken to gain insight into the digital divide among under-age individuals within the EU and more importantly, to contribute to narrowing the divide. Concerning the methodological part of this research, the EU was divided into three groups: Northern Europe, Central Europe and Southern Europe. The variable measured was the percentage of under-age
individuals who used the Internet on a regular basis (in order to avoid the random use of the medium) in the years 2006, 2007, and 2008. For the purposes of our research, the most recent data available at the time of writing have been chosen, published by Eurostat (2009). It should be mentioned that, there were no data available for United Kingdom, Germany, France, Belgium, and Luxembourg. The research findings are presented in Figures 1, 2, and 3. In each figure, the last two columns represent the Internet use in the EU of 15 countries (EU-15) and the EU of 27 countries (EU-27), allowing the readers to compare the values of each region’s countries with the average values of EU. The mean value in EU-15 for the three years period is 89.6% and in EU-27 87.6%. It can be seen that there are significant differences among the three regions. In Northern Europe, most percentages of Internet use reach approximately 100%. The only exception in this finding is Ireland. It is true that, people in north European countries are much more familiar with the use of ICTs. This is mostly due to the high level of education and training, the development of telecommunications infrastructure, as well as the mentality, particularly of younger people, to fully exploit the tremendous possibilities of the Internet. In Central Europe, the percentages are lower compared to Northern Europe, since the highest values range about 90%. Slovakia seems to have the highest Internet use, while Romania the lowest. The situation in Southern Europe is completely different. According to the findings, under-age individuals in south European countries use the Internet to a much lower extent. This is particularly obvious in Bulgaria, Cyprus, Greece and Italy, while Malta, Portugal and Spain have higher percentages. The mean value in Greece for this time period is 78%. There are many causes for this inequality in Southern Europe. Noteworthy are the higher cost of Internet access and the much lower family income, although the finding for Cyprus was quite surprising.

**Figure 1**: Internet use by under-age individuals in Northern Europe
6. Conclusions

According to the findings of the secondary research (described in the previous section) there are significant differences among Northern, Central and Southern Europe, with regard to the use of the Internet by minors. These findings give us evidence of the existence of a digital divide among minors. Under-age individuals use the Internet to a great extent, much more than seniors, however this extent is contingent upon certain factors, such as the geographical region of the country where they live. Determining and analyzing such factors could be a suggestion for further research, since this study deals only with the digital divide among minors, based on the geographical location of their countries.

It could be said that the digital divide is a generational phenomenon that will disappear in time. If so, age is not a relevant variable. The next generation will have spent more of their lives surrounded by computers, improving skills and
gaining confidence in the use of ICTs. However, we need to be cautious in this perspective. There is evidence that the digital divide changes to a different kind of inequality, where the primary issue will be not whether there is an Internet access but what people are able to do when they have access to the Internet. Differences in the ways people use ICTs will remain and may increase, as the rate of emergence of innovations and new applications of digital technologies increases.

It is obvious that there is no single solution to bridge the digital divide. It is not just a problem of individuals’ choices of having or not having connections to the Internet, nor is it the economic affordability of Internet services. It is an issue of how central the Internet is in individuals’ everyday lives and particularly the habits and interests of young people. It is an issue of whether business and government leaders will recognize the importance of bringing everyone and particularly minors onto the information society. It is also an issue of whether and to what extent the society and every one of us will deal with the problem of differences in ICT usage based on age, as well as ethnicity, gender, geography or cultural preferences.

References


