Digital access and human development

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Abstract

Human development has traditionally been associated with factors in the economy, health, and education. In recent years, however, access to digital technologies has been considered a significant indicator of sustainable human development. It appears that an inclusive and active information society cannot be accomplished without providing digital access to a considerable majority of the society. It is also true that development goals of countries can be achieved better when government, private, and civil society combine their efforts through innovative strategies to establish productive communication regarding the effective uses of digital technologies. Improper strategies, on the other hand, carry the risk of widening the digital divide between the advantaged and disadvantaged groups so that the information gap results in increased inequalities between the rich and poor, as well as the high-educated and low-educated. Therefore, the overarching policy of contemporary societies should be making new technologies work for human development and social progress.
Keywords: digital access, information society, ICT, digital divide, human development.

1   Introduction

Throughout history, technology has played a vital role in human life. All technological advancements have improved the standard of living for the human race. The creation of new technologies has been an exciting part of both individual and social development. The widespread applications of various technologies for daily purposes also show that people have been generally receptive to the use of emerging technologies.

Although living standards of societies are often associated with the common use of current technologies, dissemination of these technologies to different groups and sectors in a society has been a challenging task for many countries.

This process has been influenced by a number of social, economic, and political factors. Some of them have increased the speed of dissemination, while others have slowed down or blocked it completely. In a way, the interaction between existing cultures and new technologies has determined the level of dissemination.

The information society is no exception. It has generally been characterized by omnipotent and omniscient technologies, mostly known as ICT (Information and Communication Technologies). Because most of these technologies have a computer component managing and maximizing communication, they have also been called "compunications" in recent years. Even this concept, whose lexicon stems from the words 'computer' and 'communications', reflects a clear linkage between the information society and digital media.

While digital technologies become embedded in everyday life, they enable most people to lead more productive and rewarding lives. These technologies can help all societies to solve long-standing economic and social problems, but they also bring new challenges. Those denied access to ICT skills become less and less capable of participating in a society that is increasingly technology dependent. If appropriate interventions are not developed and implemented, ICT will intensify societal divisions rather than close them. It is a serious concern that those who do not have access to ICT become information-poor and consequently economically poor. In contrast, those who have no difficulty in having access to ICT reach the most up-to-date information they need and consequently become economically wealthy [1].

It appears that the digital divide is simply a deepening of existing forms of exclusion in the society. Therefore, there is growing concern in the world that contemporary societies cannot afford a significant amount of digitally-disadvantaged group of people as the exclusion reduces the capacity of individuals to contribute to and benefit from society.

In other words, the world already suffers a number of inequalities, each creating its own disadvantaged minority. A digital divide or digital abyss should not be another one. Because the dynamics of global economy and information society require digital access to reliable information sources, the degree of such an access becomes a strong indicator of individual learning and social progress. High-level digital access generally means appropriate opportunities for human development, whereas low-level access portrays inadequate conditions.

2   Human development index

The human development index (HDI) is a comparative measure of poverty, literacy, education, childbirth, life expectancy, and other factors for countries worldwide. It is a standard means of measuring well-being, especially child welfare. The index was developed in 1990 by the Pakistani economist Mahbub ul Haq, and has been used since 1993 by the United Nations Development Programme (UNDP) in its annual reports [2].

The HDI measures the average achievements in a country in three basic dimensions of human development: (a) a long and healthy life, as measured by

life expectancy at birth; (b) knowledge, as measured by adult literacy (two-thirds weight) and the combined primary, secondary, and tertiary gross enrollment ratio (with one-thirds weight); (c) a decent standard of living, as measured by gross domestic product per capita at purchasing power parity in USD.

Each year, United Nations member states are listed and ranked according to these measures. The results usually put economically wealthier nations to the top of the list and poor countries go toward the bottom. Those high on the list often advertise it as an indicator of more attractive living conditions that should be preserved, while those low on the list perceive that their living conditions are not satisfactory and should be improved.

A closer look at the recent HDI shows that the top-ten countries in the list are: Norway, Iceland, Australia, Luxembourg, Canada, Sweden, Switzerland, Ireland, Belgium, and United States. These are the economically wealthiest nations in the world; with the exception of Australia, they all are from Western Europe and North America. The bottom-ten countries are: Mozambique, Burundi, Ethiopia, Central Africa, Guinea-Bissau, Chad, Mali, Burkina Faso, Sierra Leone, and Niger. All of these countries are from Africa and this comes as no surprise because these are the poorest countries by any indication [3].

The HDI has been seen as a popular indicator of social development and progress from its beginning. In recent years, however, it has been criticized and even considered to be misleading. Some researchers have argued that certain countries have prioritized and made crucial investments into digital technologies, although they are not among the economically-wealthiest nations. For example, South Korea ranks 28th in HDI but it ranks 4th in terms of digital access; it also has the top broadband penetration rate in the world. As another example, Slovenia, ties with France in digital access score, although it is not a wealthy nation. Hong Kong and Taiwan are not among the richest economies, but they have the same digital access values with Holland and Finland [4].

The HDI is taken into consideration when making a number of global decisions. However, some of the developing countries become potentially disadvantaged due to their low HDI score, even though they are better than certain developed countries in terms of the factors more relevant to such decisions. It means that HDI may not be a sufficient indicator of development so that digital access should be part of the worldwide comparisons of countries.

3 Digital access index

With a growing emphasis on reducing the digital divide, countries often want to compare their status with others, set targets, and measure progress. Digital Access Index (DAI) is the first global index to rank ICT access, covering a total of 178 economies. It was designed to help measure the overall ability of individuals in a country to access and use ICTs. It classifies countries into one of four categories: high, upper, medium, and low. It allows countries to see how they compare to peers, depending upon their relative strengths and weaknesses.

Scientists at the International Telecommunication Union (ITU) developed the DAI. This index is built around five basic factors covering eight variables that

impact a country's ability to access ICTs. These are: (a) *Infrastructure* (fixed and mobile telephone subscribers per 100 inhabitants); (b) *Affordability* (Internet access price as percentage of GDP, one hour usage per a working day is the basis; (c) *Knowledge* (adult literacy rate after age fifteen and the combined primary, secondary and tertiary school enrollment ratio); (d) *Quality* (international Internet bandwidth per capita and broadband subscribers per 100 inhabitants); (e) *Usage* (Internet users per 100 inhabitants after age ten).

Until recently, limited infrastructure has been regarded as the most important barrier to bridging the digital divide. Quality has also been discussed as a part of the technical capability of infrastructure. However, there are many studies suggesting that affordability and knowledge are equally important factors and vital prerequisites for effective usage of new technologies [4].

4   Global variations in digital access

There is increasing evidence of ever-widening variation in digital access, both within and between nations and regions of the world. Certain groups, communities, and countries are by-passed from the opportunities that digital technologies provide. The *haves* are the rich and the well-educated of the developed world, while the *have-nots* consist of the poor and the illiterate in the developing world.

Such a by-passing will leave huge numbers of unconnected people outside the information society so that the national governments, civil organizations, corporations, and international institutions must act decisively to create a just knowledge-based society in which everyone has an opportunity to participate. Unfortunately, the global situation of digital access is very different from our expectations and wishes. Based upon the recent ITU data, Table 1 demonstrates the percentages of the computer and the Internet users around the world.

Table 1:   Percentages of the computer and the Internet users.

Continent	Computer User	Internet User
Africa	1.74	2.63
America	12.52	28.34
Asia	6.39	8.21
Europe	28.48	31.23
Oceania	50.84	51.72
World Average	**9.63**	**13.30**

It appears that approximately 10 percent of the world population has personal computers. The percentage is higher when it comes to Internet users, about 13 percent. However, there are dramatic differences between continents. Half of the population in Oceania and about one-third of Europeans have personal computers. On the other hand, only 2 percent of Africans, 6 percent of Asians, and 13 percent of Americans own personal computers.   The percentages of Internet users are higher in these continents.   It means that

millions of people in these continents do not own a personal computer, but somehow they have access to the Internet, mostly through public institutions and Internet cafes.

According to the recent statistics of the ITU, there are about 548 million personal computers and 268 million Internet hosts in the world. However, 842 million Internet users are reported. It seems that approximately half of the computers in the world are connected to the Internet, and each connection is used by three persons.

The situation differs according to continents. Generally speaking, there is a single computer user per Internet connection in America. For each Internet connection, there are 11 users in Asia, 9 users in Europe, and 4 users in Oceania. However, the number of Internet users far exceeds (52 times) the number of Internet connections in Africa. This situation may be due to inadequate infrastructure, high percentage of illiteracy, difficulty in affordability, low quality and limited dissemination of services.

4.1 High-access countries

These are the countries whose DAI values are above 0.70. There are 25 countries in this category; of these, 15 are in Europe, 6 are in Asia, 2 are in America, and 2 are in Oceania. Average score of the high-access countries is 0.77. It is important to note that there is no single African country in this category, and a big majority of them are economically well-developed countries.

Table 2:   The top 25 countries and their DAI values.

Rank	Country	Score	Rank	Country	Score
01	Sweden	.85	14	Singapore	.75
02	Denmark	.83	15	Japan	.75
03	Iceland	.82	16	Luxembourg	.75
04	South Korea	.82	17	Austria	.75
05	Norway	.79	18	Germany	.74
06	Netherlands	.79	19	Australia	.74
07	Hong Kong	.79	20	Belgium	.74
08	Finland	.79	21	New Zealand	.72
09	Taiwan	.79	22	Italy	.72
10	Canada	.78	23	France	.72
11	United States	.78	24	Slovenia	.72
12	United Kingdom	.77	25	Israel	.70
13	Switzerland	.76			

4.2 Upper-access countries

The countries whose DAI values are between 0.50 and 0.70 are considered upper-access countries. There are 40 countries in this category and their average score is 0.58; of these, 16 are in Europe, 7 are in Asia, 15 are in America, and 2

are in Africa.   Upper-access countries represent specific regions of their continents; namely Central and Eastern Europe, the Gulf States in Asia, the Caribbean and emerging Latin American nations. The difference between high-access and upper-access countries is that the latter often have an imbalance in a certain category; for example, they may have a high level of infrastructure availability but a low level of affordability.

4.3 Medium-access countries

The countries whose DAI values are between 0.30 and 0.50 are listed in this category. There are total of 58 countries in this group; of these, 8 are in Europe, 22 are in Asia, 15 are in America, 11 are in Africa, and 2 are in Oceania. These countries are mostly from Southeast Asia, Latin America, and North Africa including the Middle East. The average score of the medium-access countries is 0.41. It appears that the most important characteristic of these countries is their shortage of infrastructure. Some countries in this category are liberating their ICT markets, connecting public institutions to the Internet, and providing free access to their citizens.

4.4 Low-access countries

These are the countries whose DAI values are below 0.30. Of the 55 countries in this category, 38 are in Africa, 11 are in Asia, 2 are in America, and 4 are in Oceania. The average score of these countries is 0.16. It is worth to note that a big majority of the low-access countries are in Africa and there is no single European country in this category. The low-access countries are generally the poorest of the world, and they have a minimum level of access to the information society.

Table 3:   The bottom 25 countries and their DAI values.

Rank	Country	Score	Rank	Country	Score
154	Djibouti	.15	167	Mozambique	.12
155	Rwanda	.15	168	Angola	.11
156	Madagascar	.15	169	Burundi	.10
157	Mauritania	.14	170	Guinea	.10
158	Senegal	.14	171	Sierra Leone	.10
159	Gambia	.13	172	Central Africa	.10
160	Bhutan	.13	173	Ethiopia	.10
161	Sudan	.13	174	Guinea-Bissau	.10
162	Comoros	.13	175	Chad	.10
163	Ivory Coast	.13	176	Mali	.09
164	Eritrea	.13	177	Burkina Faso	.08
165	Dem. Rep. Congo	.13	178	Niger	.04
166	Benin	.12			

Apart from insufficient and low-quality infrastructure, the price for an hour of Internet access usually exceeds the average daily income in these countries. However, one thing is very clear: As knowledge level increases in a country the Internet penetration rate goes up, and this trend is strongly related to efforts for improving literacy as well as school enrollment ratio [4].

A closer analysis demonstrates that among the top 25 countries in HDI, 22 of them are also in the highest DAI category. Of the last 25 countries in the HDI, 20 of them are also among the bottom 25 countries with the lowest DAI values. With this fact in mind, we calculated the correlation coefficient between HDI and DAI values of the 178 countries and it has been found to be extremely high and significant ($r=0.94$). It means that the ranking of a country in the HDI is the same or very close to it's ranking in the DAI, which yields strong predictions.

5   Social agenda for digital reform

The participants of the World Summit on the Information Society, assembled in Geneva from 10-12 December 2003, declared their desire and commitment "to build a people-centered, inclusive, and development-oriented information society, where everyone can create, access, utilize and share information and knowledge". The declaration of the summit also emphasized that such a society would "enable individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life".

If this is the common goal for the world regarding the technology-dependent and knowledge-driven society, the concepts of human development and digital access should certainly be interlinked. In the networked society, economic well-being is knowledge-based and the knowledge is mostly gained through digital technologies. If information is the greatest source of wealth, then individuals, companies, and nations should invest in the assets that produce and process knowledge [5]. In other words, efforts toward sustainable human development should target empowerment of all individuals in all respects without any discrimination.

Establishing infrastructure that obtains physical access to hardware and software is a serious problem for many countries. They spend significant amount of financial resources for technical aspects of ICTs. However, technology is of no use without proper knowledge and skills [1].

Several centuries ago, the industrial revolution had required some level of literacy and numeracy. Nowadays, the digital revolution requires its own kind of literacy. It seems that traditional literacy is not enough anymore and technological literacy is a requirement for everyone in the information society. Those with little or no digital literacy skills are usually denied access to powerful new forms of learning and information sources. Therefore, the neglect of ICT training, which tends to lag behind physical investment, is often considered a major obstacle for digital access.

It is as simple as this: Even if everyone in the world could have a free personal computer and reliable Internet access, this would not mean anything for

a great number of people because the technology could not empower individuals who are illiterate about it and lack the skills necessary for its use. If the universal goals of sustainable development for all individuals and countries in the world are to be accomplished, digital technologies should be made available for everyone and potential users should be equipped with the necessary skills.

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