Igor Mkrtumyan
imkrtumyan@isoc.am

ICT Development Index of Armenia
(Extracts from the paper "Measuring the Information Society, The ICT Development Index, ITU 2009")

International Telecom Union (ITU) developed an Information and Communication Technology (ICT) Development Index (IDI), which is a composite ICT development index that the most thoroughly characterizes national economics. Compared to individual indicators, the composite index allow grouping several key performance indicators into one single figure that captures a variety of information society developments and provides a more comprehensive picture of where countries stand in their evolution towards an information society.

IDI allows countries to benchmark their information societies. With the revolutionary spread of ICTs during the past two decades, and the resulting impact on societies and economies, international calls for monitoring and benchmarking have increased. At the same time, the availability of Internet-related data globally has increased, making it feasible to construct a composite index that combines several indicators into one single statistical value. [1]

The index measures:
• The *development of ICT* in countries and relative to other countries.
• The *level of advancement of ICT* in *all* countries (i.e. the index is global and reflects changes in both developed and developing worlds).
• The *digital divide*, i.e. differences among countries with different levels of ICT development.
• The *development potential* of ICT or the extent to which countries can make use of ICT to enhance growth and development, based on available capabilities and skills.

A useful conceptual framework to describe the process countries are going through in their evolution towards information societies is based on the basic three-stage model:
Stage 1: ICT readiness, reflecting the level of networked infrastructure and access to ICT,
Stage 2: ICT intensity, reflecting the level of use of ICTs in the society, and
Stage 3: ICT impact, reflecting the result of efficient and effective ICT use.

ICT Development Index is a composite of:
- ICT Readiness (infrastructure, access)
- ICT Use (intensity)
- ICT Capability (skills)

- ICT Impact (outcomes)

Selection of indicators and statistical processes for constructing the IDI

Based on the above described framework, the selected indicators correspond to the following three subcomponents of the index (or sub-indices):
- ICT infrastructure and access.
- ICT use (primarily by individuals, but also households, businesses, others as data become available in the future) and the intensity of use.
- ICT skills (or capacity necessary to use ICTs effectively). For each type of subcategory, a list of potential variables (or indicators) was established, from which a final selection of 11 indicators was made.

The selection was based on:
- The availability of the data (and their quality) for a large number of countries, given that the index should be as global in nature as possible. Since the ICT data availability in the majority of developing countries is poor, this was the main restrictive factor in the selection.
- The results of multivariate analyses carried out. Principal components analysis (PCA) was carried out to analyze the underlying nature of the data, to explore whether the different dimensions are statistically well-

balanced and to reveal how different indicators are associated and change in relation to each other. Annex 1 provides a detailed description of the results of the PCA.

- The relevance of a particular indicator for contributing to the main objectives and conceptual framework of the index. For example, the selection of indicators should reflect the situation in all countries (developed as well as developing).

- The recommendations made by experts and participants at the 6th WTIM (2007).

ICT infrastructure and access

Indicators included in this group provide an indication on the available ICT infrastructure and individuals' access to basic ICTs. The following indicators were selected. Data for all of these indicators are collected by ITU.

1. Fixed telephone lines per 100 inhabitants
2. Mobile cellular telephone subscriptions per 100 inhabitants
3. International Internet Bandwidth (bit/s) per Internet user
4. Proportion of households with a computer
5. Proportion of households with Internet access at home

ICT use and the intensity of use

1. Internet users per 100 inhabitants
2. Fixed broadband Internet subscribers per 100 inhabitants
3. Mobile broadband subscribptions per 100 inhabitants

ICT skills and the capacity to use ICTs effectively

1. *Adult literacy rate*
2. *Secondary gross enrolment ratio*
3. *Tertiary gross enrolment ratio*

Adult literacy rate

According to the UIS, the "*Adult literacy rate* is defined as the percentage of population aged 15 years and over who can both read and write with understanding a short simple statement on his/her everyday life. Adult illiteracy is defined as the percentage of the population aged 15 years and over who cannot both read and write with understanding a short simple statement on his/her everyday life."[3]

Gross enrolment ratio (secondary and tertiary level)

According the UIS, "The *gross enrolment ratio* is the total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school-year."

The following data are describing the indices of Armenia in 2007:

Economy	Rank	IDI
Armenia	72	3.12
IDI access sub-index		
	Rank	Access
	66	3.85
IDI use sub-index		
	Rank	Use
	111	0.22
IDI skills sub-index		
	Rank	Skills
	54	7. 46

Armenian ICT index was ranked 72 out of 154 countries.

ICT Price Basket methodology

1. Fixed telephone sub-basket

2. Mobile cellular sub-basket
3. Fixed broadband Internet sub-basket

ICT Price Basket 2008

| Rank | Economy | ICT Price Basket Value** | Sub-baskets | | | GNI per capita* |
			Fixed (% of GNI per capita*)	Mobile (% of GNI per capita*)	Broadband (% of GNI per capita*)	
93	Armenia	8.0	2.3	3.8	17.8	2'640

Statistical tables of indicators used to compute the IDI

Access indicators

		Fixed telephone lines per 100 inhabitants	Mobile cellular subscriptions per 100 inhabitants	International Internet bandwidth per Internet user (bit/s)	Proportion of households with computer	Proportion of households with Internet
	Armenia	20.9	62.5	2'712	41.2	6.1

Use indicators

		Internet users per 100 inhabitants	Fixed broadband subscribers per 100 inhabitants	Mobile broadband subscriptions per 100 inhabitants
	Armenia	6.2	0.3	-

Skills indicators

| | | Gross enrolment ratio | | Adult literacy rate |
		Secondary	Tertiary	
	Armenia	89.5	35.5	98.9

The IDI of Armenia is better than NRI [2] but once again we see that the absence of correct data worsens the image of Armenia in the eyes of investors in ICT field. There is a need to commit the Armenian Statistical Service (ArmStat) to collect up-to-date ICT data for Armenia and closely cooperate with ITU to provide them the newest data.

It is also very important to know modern methods of surveys based on small samples as a thorough survey of population of Armenia costs a lot of money. If there are such methods the ISOC Armenia can regularly organize surveys to get up-to-date data.

Reference:
1. Measuring the Information Society, The ICT Development Index, ITU 2009
2. What are the reasons of Armenia NRI low figures? I.Mkrtumyan, CSIT2009.