

The Development of Information and Communication Technologies Sector in the Context of the New Economy

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Abstract

Information and communication technologies have a vital contribution to the development and performance of the new economy, as they are an engine of productivity and competitiveness that characterize all economic sectors. Information and communication technologies are constantly evolving, being a vector of organizational change, of economic and social growth.

In this context it is necessary to define the indicators measuring ICT development and spread nation-wide, to study and compare the impact of ICT on the competitiveness of nations. Studying the diffusion of information and communication technologies in both business and the individual level is a major concern for statistical institutes and international organizations. Representative indicators that measure the growth and spread of ICT are Network Readiness Index (NRI), the Index of Digitization and the ICT Development Index.

Key words: Index of Digitization, Information and Communication Technology, Network Readiness Index, new economy



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INTRODUCTION

In contrast to industrial economy based on direct transactions and physical assets, in the new economy transactions are digital, allowing virtual relationships and new business environments that were not possible before. The increase in the new economy is supported by several factors, compared with the industrial economy. Traditional physical factors like work, capital reserves, and natural resources were very important during the industry. They are important in the new economy, but there are new factors with essential role such as information, innovation, information and communication technologies, intangible assets.

The ICT sector has experienced exceptional growth in recent years due to the expansion of computer networks, Internet development, and high technology sector. ICT development influences the new economy's infrastructure, competitive market behavior, organizational processes emphasizing the essential contribution of ICT to determine the competitiveness of organizations and nations. Given that ICT contributes to reducing costs, increasing competitiveness and productivity, investment in this sector will generate growth and new employment across the economy.

The ICT sector has a major contribution to economic development. In 2010 world exports of ICT goods accounted for 12% of all goods traded. Regarding ICT services, telecommunications industry revenue in 2010 reached 1.5 trillion which is 2.4% of world GDP.

In the specialized literature there is no universally accepted definition of information and communication technologies. The most relevant of all is: "collection of technological fields that develop simultaneously and interdependently." Among the most important areas are included computer science, communications and electronics. Department of Trade and Industry of Great Britain believes that "information technologies enable the collection, storage and transmission of information in the form of voice, image, text and numbers using microelectronics, by combining informatics with telecommunications." To summarize, ICT is mainly based on two main components: information technology (hardware and software), communications technologies (communication standards, networks, optical transmission, wireless transmission, etc.).

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DEFINITION OF "NEW ECONOMY" CONCEPT

The new economy requires expansion of digital information and the Internet as a medium for working in a wide range of services and activities (software, banking and financial services, commercial transactions etc.). The new economy is also defined by the following expressions:

- " Digital economy " - as concerns goods and services whose production, development and sales depend essentially on digital technologies;
- " Information economy " - because the information is central in all areas such as research, legal services and banking, financial services etc.
- " Virtual economy " - as the environment in which the transactions take place is not physical, but virtual;
- " Internet economy " - because the working environment is the Internet;
- " Relational economy " or " network economy " - as the major challenge now is not only effective computerization, but especially making a connection between computers.

The digital revolution has allowed the union of two fundamental areas, until recently considered divergent and opposing: informatics and communications. Thus, Castells (2000) considered "informatics and telecommunication progress enabled an obscure technology that has not practical application apart informatics, to become the emblem of a new type of society - the network society."

American authors Kling and Lamb (1999) propose a new typology in their attempt to systematize the study of a new phenomenon. Thus they suggested the use of "information economy" to the range of goods and information services (from education and research to advertising and show business). They also recommended the concept of "digital economy" for those goods and services where research - development - production - sales are vitally dependent on digital technology. Regarding the concept of the new economy, same authors considered appropriate to use the interaction between the "information economy" and "digital economy" to emphasize the resulting consequences such as economic growth, low inflation, and low unemployment.

Bari I. (2005) believes "the new economy is a broad concept that describes an economy in which both the final product and its intermediate states consist of information and modern digital technology provides global access to all information available at a time. These new technologies are designed to potentiate the efficiency of conventional business practices and facilitate the emergence of new processes and products". New economy cannot be reduced only to the digital economy and the Internet, as this concept limits understanding of complex phenomena related to the organization, management, organizational culture, leadership.

In addition to the knowledge and information society objectives, humanity must reach the stage of a society ecologically sustainable. This objective on which human survival depends cannot be achieved without knowledge and knowledge management. Environmental problem of humanity, global and local, cannot be solved within the knowledge society and the important elements of the new economy will be imposed by environmental concerns, not only information.

The new economy incorporates technological dimension (based on information and communication technologies) with use in all economic, social, political activities and immaterial dimension or knowledge dimension (based on intangible assets).

INDICATORS THAT MEASURE ICT DEVELOPMENT

Since 2000, World Economic Forum, in the research "The Global Information Technology Report" studies the impact of ICT on economic development and nations' competitiveness to provide investors and decision-makers a conceptual framework to adopt the strategies in the context of an economy based on Internet.

NRI indicator is divided into four major components, each being defined in pillars such as:

- 1) ICT environment with the pillars: policy and regulation, business environment, infrastructure and digital content;
- 2) Availability to ICT that decomposes into accessibility and skills pillars;
- 3) ICT use with the pillars: personal use, business use and government use;
- 4) Impact of ICT that decomposes into pillars of economic impact and social impact.

The 2012 report ranks 144 countries according to the NRI. NRI measures the impact of ICT on other sectors of the economy

Table 1. Countries' rankings according to Network Readiness Index

No.	Country	NRI 2012	NRI 2011	Dynamic rate in 2012 compared to 2011 (%)
1	Finland	5.98	5.81	2.93
2	Singapore	5.96	5.86	1.71
3	Sweden	5.91	5.94	-0.51
4	Netherlands	5.81	5.60	3.75
5	Norway	5.66	5.59	1.25
6	Switzerland	5.66	5.61	0.89
7	United Kingdom	5.64	5.50	2.55
8	Daenmark	5.58	5.70	-2.11
9	USA	5.57	5.56	0.18
10	China	5.47	5.48	-0.18

Source: The Global Information Technology Report 2012-2013

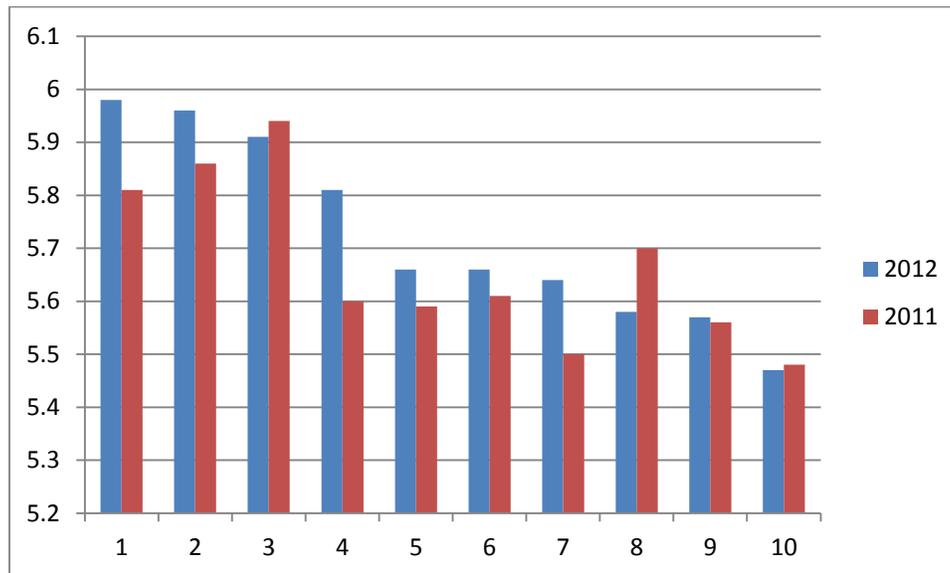


Figure 1: NRI evolution in 2011 and 2012

Studying ranking of countries (Table 1) it appears that two groups of economies dominated by NRI hierarchy: economies of Northern Europe and the so-called Asian Tigers. Four of the five Nordic countries dominate the top (Finland, Sweden, Norway and Denmark) followed in 17th place to fifth Nordic country Iceland. All five Nordic countries excel in the component infrastructure and digital content. For the first time Finland ranked top by NRI showing increases to two-thirds of the 54 indicators of NRI. Romania ranks 75 out of 144 with a score of 3.86 in 2012 to 3.90 in 2011.

Digitization Index created by Booz & Company is a composite index that calculates the digitalization rate of countries using 23 indicators that measure the following attributes:

- Ubiquity: the extent to which consumers and businesses have universal access to digital services and applications;
- Accessibility: the extent to which digital services are available to as many people as possible;
- Reliability: quality digital services available;
- Speed: the extent to which digital services can be accessed in real time;

- Use: ease of using the digital services and the ability of local organizations to foster the adoption of such services;

- Skills: the ability of users to integrate digital services in their lives and businesses.

Booz & Company in the study "Digitalization Industry" has researched the degree of digitization of 15 industries in Europe.

Table 2. Ranking industries by Digitization Index in 2012

Industry branch	Digitization Index	Dynamic rate in 2012 compared to 2011
Financial Services and Insurance	53.5	1.8
Automotive	53.1	3.7
Computers and Electronics	52.9	1.7
Media and Telecommunications	51.2	0.4
Equipment and Machinery	48.0	2.6
Trade and Retail	45.2	1.1
Chemicals	44.7	2.5
Basic Manufacturing	43.6	3.1
Business and Administrative Services	41.3	2.2
Utilities	40.9	0.4
Real Estate, Rental and Leasing	38.6	2.0
Transportation and Logistics	38.5	0.7
Consumer Goods	36.4	1.0
Hotels and Restaurants	36.0	3.0
Construction	35.9	1.5

Source: http://www.booz.com/media/file/BoozCo_The-2012-Industry-Digitization-Index.pdf

The leader industries (Financial Services and Insurance, Automotive, Computers and Electronics, Media and Telecommunications, Equipment and Machinery) use digital goods and services being natively exposed to digital technologies. The midfield industries (Trade and Retail, Chemicals, Basic Manufacturing, Business and Administrative Services, Utilities) are less exposed to direct business-to-consumer digital pressure, but utilize technology more selectively, especially in optimization process. Real Estate, Rental and Leasing, Transportation and Logistics, Consumer Goods, Hotels and Restaurants, Construction are old-economy sectors, based on intensive labor and are expected to be found at the bottom of the ranking.

International Telecommunication Union published since 2008 the study "Measuring the Information Society" that presents the performance ranking of countries according to the ICT Development Index. ICT Development Index is a composite index comprising 11 indicators with the primary goal to monitor and compare countries according to ICT development. The main objectives of the ICT Development Index are the measurement of:

- The level and time evolution of ICT development in each country compared to other countries;
- Progress of ICT development in developed countries and developing ones;
- The potential development of ICT and the extent to which countries can use ICTs to enhance growth and development.

Recognizing that ICTs can be a factor of development if applied and used properly is critical for countries that are moving towards the knowledge society. The development of ICT and transformations that the country must go through to become a knowledge-based society are:

- Stage 1: ICT training (which reflects the level of access to ICT);
- Stage 2: ICT intensity (which reflects the level of ICT use in society);
- Stage 3: The impact of ICT (indicating the results of efficient use of ICT). Advancing through these stages depends on a combination of three factors: availability and access to ICT infrastructure, high levels of ICT use and the ability to use ICT effectively. Accordingly, the first two steps above are the two major components of ICT Development Index: ICT access and use of ICT. To reach the final stage and maximize the impact of ICT is necessary third component of the ICT Development Index namely skills.

Table 3. ICT Development Index- indicators and share

ICT Access (40%)	
1. Fixed-telephone lines per 100 inhabitants	20%
2. Mobile-cellular telephone subscribers per 100 inhabitants	20%
3. International Internet bandwidth (bit/s) per Internet user	20%
4. Percentage of households with a computer	20%
5. Percentage of households with Internet access	20%
ICT Use (40%)	
6. Percentage of individuals using the Internet	33%
7. Fixed (wired)- broadband Internet subscriptions per 100 inhabitants	33%
8. Active mobile- broadband subscribers per 100 inhabitants	33%
ICT Skills (20%)	
9. Adult literacy rate	33%
10. Secondary gross enrolment ratio	33%
11. Tertiary gross enrolment ratio	33%

Source: International Communication Union

Table 4. Ranking countries by ICT Development Index (ICTDI)

No.	Country	ICTDI 2011	ICTDI 2010
1	Korea	8.56	8.45
2	Sweden	8.34	8.21
3	Denmark	8.29	8.01
4	Iceland	8.17	7.96
5	Finland	8.04	7.89
6	Netherlands	7.82	7.60
7	Luxembourg	7.76	7.64
8	Japan	7.76	7.57
9	United Kingdom	7.75	7.35
10	Switzerland	7.68	7.39

Source: International Communication Union

Korea is leading the rankings in both 2011 and 2010. It takes first place regarding the ICT use and skills, being the only country that exceeds the index score of 8 to ICT Use. Regarding ICT skills index, it excels as scores of the three indicators, highlighting the importance of education in access to the Internet (it has the highest percentage of households worldwide with Internet access: 97%). Korea has made a political priority for ICT development, integrating their use in many aspects of society. Korea Communications Commission works continually to turn the country into an intelligent center of power, effectively governing a dynamic and competitive telecommunications market.

In ranking, Romania ranks 52 out of 155 with a score of 5.13 in 2011 and 4.89 in 2010.

According to recent market studies, Romania lags behind most of EU Member States the ICT sector due to lack of a coherent government vision on ICT development. Despite progress in recent years, Romania still faces strong inequalities between urban and rural areas in terms of access to modern information and communication technologies and digital literacy.

According to Eurostat data (Table 5), recent years have seen a rapid growth at the number of people with skills, observing exceeding the European average in terms of basic computer skills. But when it comes to medium or advanced skills, according to data from 2012, Romania lags behind the EU with a share of

13% compared to the EU average of 25% for average competences and 8% of the EU average of 26% for advanced skills.

Table 5. Statistics regarding computer skills

Year	The share of people with basic computer skills (%)		The share of people with average computer skills (%)		The share of people with advanced computer skills (%)	
	EU	Romania	EU	Romania	EU	Romania
2007	13	14	24	10	23	5
2009	14	17	29	10	25	9
2011	14	15	25	14	27	10
2012	16	14	25	13	26	8

Source: Eurostat

The business environment in Romania is affected on the one hand by the lack of a national strategy for economic development in the medium and long term and on the other hand the frequent changes in legislation. Exchange of information between state institutions are not based on accurate, verifiable and unique information because of the lack of a system unit and a common database, used by all public institutions which affect both the policies and decisions of these institutions and the quality implementation

CONCLUSIONS

The current technological revolution caused major changes to trade and financial relations, mode of production and consumption. Unlike traditional economy where mass production had a central role, the new economy represents a higher stage in the evolution of human civilization, based on developments in information and communication technology sector focused on the intensive use of information. The rapidity with which the information society transforms into a society of information and knowledge leads to a new vision of the new economy. This new approach takes into account ICT sector, Internet market, the effect of information on the Internet on all economic agents, the effect of knowledge as an economic factor which requires recognition of the importance of intangible assets in the creation of economic value and the requirements to achieve a sustainable society. To get the benefits of the new economy, appropriate structural reforms are needed in society, government and economy, as well as a sector of information and communication technologies well-organized.

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