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TOWARDS SUSTAINABLE ECONOMY THROUGH INFORMATION AND COMMUNICATION TECHNOLOGIES DEVELOPMENT: CASE OF THE EU

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Abstract. The global economy is facing a complex and outstanding challenge: the economic and financial crisis. The digital revolution represents the pillar for a competitive and sustainable global economy and Information and Communication Technologies can become a crucial factor for the economic recovery. The paper aims to highlight the significant contribution of Information and Communication Technologies to the development of sustainable knowledge economy. The paper achieves an analysis of ICT sector in the EU Member States. The comparative study is analyzing the correlation between the networked readiness, global competitiveness and ICT sector share in national economies in the EU27. The current paper also addresses main issues regarding digital marketing.

Keywords: Sustainable economy, knowledge economy, ICT market, competitiveness, correlations.

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JEL Classifications: O1, O3, O52.

1. Introduction

Worldwide, the economic, social, political cultural changes have had an increased pace with positive and powerful impact for individuals, companies and society. Europe 2020 Strategy (European Commission 2010) highlights Information and Communication Technologies (ICT) as an important pillar in view to overcome the financial and economic crisis and to enhance the EU economic growth and competitiveness, thus preparing the EU economy for the challenges of the future. Recently the relation between technology and economy has triggered a worldwide debate about the emergence of a digital and sustainable economy. Based on the wide range and intensively use of ICT, the economies are transforming into knowledge economies, where the activities concerning the generation, diffusion and application of knowledge represent a key aspect for the economic growth and development. The European Union Member States are facing significant challenges concerning the adaptation of their economies and the increase of their competitiveness both on the European and international market. Taking into consideration the need of the EU Member States to increase the productivity, to increase the components of knowledge for goods and services, to enhance the capacity of businesses in view to respond to changing demands, to facilitate the innovation of goods and services, to improve the skills and adaptability of labour force, ICT can bring a relevant contribution.

ICT revolution might be considered:
a revolution of productivity, with impact on ICT sector, industry and services which use ICT and total productivity factor;
a revolution of knowledge, creation, codification, diffusion of knowledge, its efficient use having positive

impact on the economic growth and competitiveness while the lack of access to connectivity and the latest new technologies is triggering digital divides and divides of knowledge;
revolution of learning leading to learning organisations, lifelong learning. The individuals, organisations, companies, countries are capable to create wealth corresponding to their capability to learn.
The features of this ICT revolution can be structured as follows:
accelerating the transactions, reducing the time of response to various requirements;
networking organisations;
generating significant opportunities for the economic activities, new products and services, for example multimedia services, banking and financial institutions, products incorporating the new high technologies.

The fast decline in the cost of ICT and their increased use in the acquisition, storage and processing of information trigger their connection to the knowledge economy. This connection is determined by the way these ICT influence the creation, use of knowledge in the economy as well as the exchange of information. Knowledge is crucial for organisations in view to coordinate the employees' activities and for achieving their objectives. For individuals, their knowledge is a fundamental component of their human capital, which determines their wage and employment opportunities. For governments, knowledge is crucial in policy making and implementing, policies that substantiate the country's economic and social development.

2. Knowledge economy

Joseph Stiglitz, who has been awarded the Nobel Prize for analysing knowledge as global public good, asserts: "knowledge is not only a public good, but also a global or international public good"…and thus we should recognize that knowledge is central to successful development" (Stiglitz 1999). As stated by Matei, A. and Matei, L. (2011), "the international community, through institutions like the World Bank, creates and disseminates a global public good – knowledge for development". The production and diffusion of knowledge goods, the creation of electronic networks and the emergence of markets represent convergent processes. According to the field literature, the concept of knowledge economy has been defined as follows:

"knowledge in comparison with natural resources, capital and low skill labour has acquired greater importance. Although the pace may differ, all OECD economies are moving towards a knowledge economy" (OECD 1996).

"in the knowledge economy, the generation and use of knowledge has a prevailing role in the creation of wealth" (DTI 1998).

Leadbeater (1999) asserts: "the knowledge driven economy does not just describe the high tech industries. It refers to new sources of competitive advantage applicable all fields, sectors, companies, regions, ranging from agriculture to software".

The knowledge economy comprises a mix of commercial production and knowledge goods which are created, disseminated and exchanged. On the one hand, the knowledge goods take the form of ideas and know-how and first creations of works of art, or in other words they are original goods; knowledge goods have little mass and their production is sustainable, requiring little or no industrial energy, being based on human capital. The knowledge goods can be copied, most of them with minimum resources, energy and time. On the other hand, the commercial digital goods are subject to the rules of scarcity (Mansel *et al.* 2009). The value of knowledge for an economy derives from sharing the knowledge. In this context, the capability to stock, diffuse and apply knowledge by means of ICT enables to companies to turn into account the properties of knowledge in view to obtain competitive advantage. Thus companies gain value from sharing knowledge inside the company and also sharing knowledge with suppliers and customers.

There is always a distinction between codified knowledge which is written and stored and tacit knowledge which is acquired on the job and it is present in the individual as know-how and experience. The diffusion of ICT in light of a systematic application of tacit knowledge represents an important characteristic of the knowledge economy. As identified by Melody (2003), the main characteristics of knowledge economy (Figure 1) are as follows:
the development and use of communication networks - *information infrastructure* – for knowledge economy activities;
conditions for the improved and increased generation and use of *information content* both as economic resource, and as product which is exchanged on market;
strengthening the *human capital* as main producer, repository, disseminator and applier of information and knowledge;

wide range of *applications* of ICT services in view to enhance productivity in all branches of economy both by reducing the transactional costs and by stimulating changes in the structure of organizations, branches of industry and market;
structure and efficiency of knowledge economy markets;
effect of the *international trade* for the global knowledge economy.

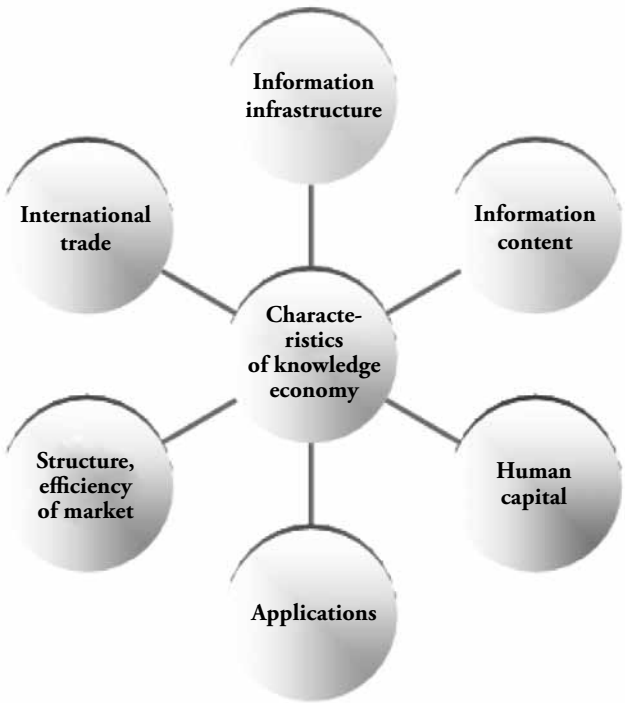

Fig.1. Characteristics of knowledge economy

Source: the authors

Concerning the first feature, the information structure represents the most important public utility in the economy of the 21st century. Taking into consideration the fact that electronic communication networks offer platforms for the delivery of services and content, the knowledge economy will become a network economy. The features of communication networks are economies of scale, major market imperfections, extensive positive externalities, low marginal costs. The conditions of access to information infrastructure in the knowledge economy at national and international level are powerfully affected by the government policies and their application. Regarding the information content, the stock of knowledge in society at any moment, in other words the skills and education, the detailed information about operation of production processes, the interrelations and interdependencies among the branches of economy, all represent a vital resource for economy. The value of this stock of knowledge in society depends on the manner of diffusion in society, the institutions which maintain, update, and extend this stock of knowledge, in other words the education and training system and research. Concerning the human capital, the increased investment in skilled workers is triggering continuous innovation in ICT and other many industries, dominated by software, services and content development. The development of the knowledge economy requires investments in human capital as a key priority policy issue for governments in view of creating competitive advantage on global markets, as well for enhancing the individual income and wealth. Of course the shape and direction of this key resource for knowledge economy is influenced significantly by the government policies. The main benefit of ICT consists not in their intrinsic value but in their applications for other goals. The productivity potential for a new knowledge economy lies in the potential for applying these technologies and services in view to change the way business is done, for example electronic commerce, the way organizations and industries are structured, and the way people choose to conduct their lives (Castells 1996, 1997, 1998). For example the banking and financing systems represent one of the major applications sector.

The structure and efficiency of the market are also triggering the development of the global knowledge economy. At the same time, key issues concerning the knowledge economy are focused on patent and copyright laws in light of protecting information products, services and content. It is worth to mention that taking into consideration the characteristics of market which are continuously evolving in the knowledge economy, it is necessary for the governments to update and develop adequate policies and regulations.

"The governments need to clear away the barriers of inherited policies and regulations that have become obsolete in the new economy, to facilitate the desired and to constrain the undesired market developments in the knowledge economy at both national and international levels, and to ensure that non-market policy objectives are implemented, for example universal access to the communication network" (Melody 2003; Sheehan 1997).

Table 1 achieves a synthesis in a comparative manner of the main issues in the industrial economy and in the knowledge economy, based on the fact that the

transformation from the industrial economy into a knowledge economy leads to changes in the mentality of individuals, organisations, countries, thus putting emphasis on different values and principles.

Table 1. Representation of the main issues in the industrial and knowledge economy

Issue	Industrial economy	Knowledge economy
Focus	Transformation of material resources	Improving and facilitating transaction capabilities, i.e. generating and communicating information in view to enable transaction
	Stability	Change management
Economy	Supply based	Customer based
Key drivers of economic growth	Capital	Knowledge, skills
Key drivers of technology	Automation	ICT, computerized design and production
Key factors of competitive advantage	Cost reduction by economy of scale	Human resources, differentiation strategies, institutional excellence
Competition	Size	Speed
Lifecycle of products and technologies	Long	Short
Market changes	Slow, linear	Fast, unpredictable
Marketing	Mass marketing	Differentiation
Investment in	Tangible assets	Skilled labour force

Source: the authors

3. ICT market size in the EU area

For the time being, the complexity of the actual global economic environment acknowledges and fosters the qualitative and quantitative aspects of growth, thus integrating the concept of ICT.

According to the field literature (Mansel *et al.* 2009), as well as to the latest academic researches, ICT represents a *General Purpose Technology*, holding the following features:
it has a powerful impact on competitiveness as it constitutes an *enabling technology*;
it leads to process and product *innovations*;
it improves the *business processes* along the whole value chain.
ICT represents a collection of technologies and applications, enabling electronic processing, storing, retrieval and transfer of information to a wide variety of users or clients.
Cohen *et. al.* 2002 assert that the main characteristics of ICT are as follows:
"very dynamic technological changes, with rapid penetration and adoption rates;
decreasing costs for new equipment;
a rapidly increasing range of applications and penetration in an increasing number of realms of professional and personal life;
an intertwined institutional market place, with the private sector acting in a decreasingly regulated environment (in most countries);
a production and services package dependent on a range of qualities of skilled human resources, and a convergence of technologies".

As defined by OECD, ICT sector comprises ICT manufacturing and ICT services (OECD 2011). The most important benefits of ICT derive from their effective and efficient use. At the same time, ICT investments are enhancing the labour productivity. The use of ICT allows the companies to enhance their efficiency and to make them more competitive. Making efficient the channels of distribution, intensifying the collaboration and partnerships, by a rapid pace of financial transactions, by achieving more dynamic and transparent processes, ICT can speed up the flow of products and services. It is worth to remark that ICT constitutes one of the leading sectors in the EU, influencing powerfully the economic growth. In this respect, it is worth to mention:

For the EU as a whole, the ICT sector on GDP, in other words the value added at factor cost in the ICT sector as percentage of total value added at factor costs represents 4.74% as average for the 2006-2010 period (Table 2). In 2011above three quarters of persons aged 16-74 have used the computer in the EU Member States. The highest weight of the persons aged 16-74 who have used the computer is in Sweden (96%), Denmark, Luxembourg and the Netherlands (94%), and the lowest is in Romania (50%), Bulgaria (55%) and Greece (59%). In most EU Member States the share of young people who used a computer was above 95%. The weight of individuals in the EU who designed a computer software was 10% among the persons aged 16-74 and 20% among the young ones (Eurostat 2012).

Table 2. GDP, ICT sector size and the share of ICT sector in national economies in the EU Member States during 2006-2010 period

Country	GDP 2006*	ICT 2006*	%ICT on GDP. 2006	GDP 2007*	ICT 2007*	% ICT on GDP. 2007	GDP 2008*	ICT 2008*	% ICT on GDP. 2008	GDP 2009*	ICT 2009*	% ICT on GDP. 2009	GDP 2010*	ICT 2010*	%ICT on GDP. 2010	Ave. GDP*	Ave. ICT*	Ave. %ICT on GDP
Austria	259.00	11.42	4.41	274.00	10.30	3.76	282.70	9.07	3.21	274.80	9.21	3.35	286.20	9.99	3.49	275.34	10.03	3.64
Belgium	318.70	15.94	5.00	335.60	16.38	4.88	346.10	16.82	4.86	340.40	16.27	4.78	354.40	16.98	4.79	339.04	16.48	4.86
Bulgaria	26.50	1.54	5.81	30.70	1.84	5.98	35.40	1.90	5.36	34.90	1.98	5.67	36.00	1.99	5.52	32.70	1.85	5.67
Cyprus	14.70	0.66	4.50	15.90	0.63	3.97	17.20	0.60	3.48	16.80	0.63	3.73	17.30	0.62	3.60	16.38	0.63	3.86
Czech Rep	118.30	5.68	4.80	131.90	6.11	4.63	154.30	7.07	4.58	141.50	6.52	4.61	149.30	6.86	4.59	139.06	6.45	4.64
Denmark	218.70	11.13	5.09	227.50	11.92	5.24	235.10	12.30	5.23	223.90	11.72	5.24	235.60	12.33	5.23	228.16	11.88	5.21
Estonia	13.40	0.62	4.64	16.10	0.74	4.57	16.30	0.74	4.52	13.90	0.63	4.55	14.30	0.65	4.53	14.80	0.68	4.56
Finland	165.70	13.60	8.21	179.80	16.42	9.13	185.60	13.10	7.06	172.50	13.96	8.10	179.70	14.52	8.08	176.66	14.34	8.12
France	1798.10	79.84	4.44	1886.80	83.40	4.42	1933.20	80.03	4.14	1889.20	79.54	4.21	1932.80	82.72	4.28	1888.02	81.15	4.30
Germany	2313.90	107.60	4.65	2428.50	114.63	4.72	2473.80	103.16	4.17	2374.50	98.78	4.16	2476.80	106.75	4.31	2413.50	106.24	4.40
Greece	208.80	5.72	2.74	222.70	6.04	2.71	232.90	5.87	2.52	231.60	6.06	2.62	227.30	5.84	2.57	224.66	5.91	2.63
Hungary	89.60	5.74	6.41	99.40	5.80	5.84	105.50	6.24	5.91	91.40	5.37	5.88	97.10	5.72	5.89	96.60	5.78	5.99
Ireland	178.30	12.55	7.04	189.90	12.00	6.32	179.90	11.10	6.17	160.60	10.03	6.25	155.90	9.68	6.21	172.92	11.06	6.40
Italy	1493.00	58.82	3.94	1554.20	59.99	3.86	1575.10	56.07	3.56	1519.70	55.32	3.64	1553.20	57.62	3.71	1539.04	57.59	3.74
Latvia	15.90	0.49	3.11	21.00	0.65	3.09	22.80	0.66	2.89	18.50	0.51	2.78	17.90	0.49	2.76	19.22	0.56	2.93
Lithuania	24.10	0.78	3.22	28.70	0.77	2.70	32.50	0.71	2.19	26.60	0.65	2.43	27.50	0.76	2.78	27.88	0.74	2.66
Luxemb.	33.90	1.80	5.31	37.40	1.93	5.17	39.40	1.98	5.03	37.40	1.91	5.10	40.30	2.04	5.07	37.68	1.93	5.14
Malta	5.00	0.24	4.70	5.40	0.25	4.60	5.80	0.26	4.56	5.80	0.27	4.58	6.10	0.28	4.57	5.62	0.26	4.60
Netherlands	540.20	36.73	6.80	571.70	36.59	6.40	594.50	36.92	6.21	571.10	38.89	6.81	588.40	36.83	6.26	573.18	37.23	6.50
Poland	272.10	10.34	3.80	311.00	10.64	3.42	363.20	11.95	3.29	310.40	10.31	3.32	354.30	11.90	3.36	322.20	11.08	3.44
Portugal	160.80	6.42	3.99	169.30	6.74	3.98	171.90	6.58	3.83	168.50	6.50	3.86	172.60	6.77	3.92	168.62	6.60	3.92
Romania	97.70	3.51	3.59	124.70	4.31	3.46	139.70	4.67	3.34	118.20	4.02	3.40	124.00	4.18	3.37	120.86	4.15	3.43
Slovakia	44.50	2.11	4.74	54.80	2.64	4.81	64.40	2.90	4.51	62.80	2.88	4.59	65.70	3.06	4.66	58.44	2.72	4.66
Slovenia	31.00	1.27	4.11	34.50	1.41	4.08	37.20	1.27	3.41	35.30	1.32	3.75	35.40	1.27	3.58	34.68	1.31	3.78
Spain	985.50	37.45	3.80	1053.10	40.65	3.86	1087.70	40.79	3.75	1047.80	38.04	3.63	1051.30	38.79	3.69	1045.08	39.15	3.75
Sweden	318.10	21.92	6.89	337.90	22.10	6.54	333.20	21.52	6.46	292.40	18.63	6.37	349.20	22.38	6.41	326.16	21.31	6.53
UK	1943.80	162.70	8.37	2054.20	181.80	8.85	1008.70	84.23	8.35	1564.50	132.67	8.48	1706.30	146.74	8.60	1655.50	141.21	8.53
EU 15	**729.10**	**39.23**	**5.38**	**768.17**	**40.87**	**5.32**	**711.99**	**35.39**	**4.97**	**724.59**	**37.03**	**5.11**	**754.00**	**38.53**	**5.11**	**737.57**	**38.19**	**5.18**
EU 25	**462.60**	**23.08**	**4.99**	**489.65**	**23.80**	**4.86**	**459.96**	**20.97**	**4.56**	**463.68**	**21.65**	**4.67**	**483.80**	**22.64**	**4.68**	**471.94**	**22.43**	**4.75**
EU 27	**432.94**	**21.52**	**4.97**	**459.14**	**22.27**	**4.85**	**432.37**	**19.63**	**4.54**	**435.00**	**20.27**	**4.66**	**453.89**	**21.15**	**4.66**	**442.67**	**20.96**	**4.74**

Source: the authors

Table 2 provides a comparative empirical analysis of GDP, ICT sector size and share of ICT sector in national economies for the EU Member States during 2006-2010 period. Table 2 reveals that the national trends concerning the dynamics of ICT sector are quite different in comparison with the national economic performance. In 2006 the ICT sector contributed with 4.97% to EU GDP, in 2007 with 4.85%, in 2008 with 4.54%, in 2009 with 4.66% and in 2010 with 4.66%. We notice that in 2008 the economic crisis has slowed down the European economy profoundly and the ICT sector did not represent an exception.

Regarding the average of ICT sector size during 2006-2010 period, UK, Germany, France, Italy, Spain, Netherlands record the higher values, while at the other extreme we find countries as Malta, Latvia, Cyprus. Concerning the average of share of ICT sector in national economies for 2006-2010 period, the highest share of ICT sector in economy is in UK (8.53%), Finland (8.12%), Sweden (6.53%), Netherlands (6.50%). At the other extreme, the lowest average value is in Greece (2.63%), Lithuania (2.66%), Latvia (2.93%), Romania (3.43%), Poland (3.44%). The average share of ICT sector in national economies in EU15 is 5.18%, while the value for EU25 is 4.75% and for EU27 is 4.74%.

Professor Baltac, President of CEPIS - Council of European Professional Informatics Societies, Brussels, Belgium and Vice-Chairman of WITSA - World Information Technology and Services Alliance, Arlington, USA states that the actual ICT development is characterised by several trends: spread of mobile applications, communication in broadband becomes a rule, the content in networks and Internet is continuously increasing, web services become platform of transactions (Baltac 2011). In this context, as asserted by Baltac, Romania should encourage ICT developments in view to promote the knowledge economy. "Romania should do efforts in light to increase its IT readiness, which refers to connectivity, information security, improvement of e-business environment and development of human potential. Thus, Romania should encourage large-scale access to Internet and ICT in general on an affordable geographical and social base. Also it is important to improve the access and use of Internet for business and education, to develop the business environment through a better legislation, to speed-up the development of digital infrastructure, Internet, telecommunications, including e-commerce infrastructure, large scale investment in training and educating people, to promote digital literacy and e-education, to improve security of information and databases. The Government should continue to provide incentives for investments in the IT infrastructure, to make investments in the public education and continue e-government projects" (Baltac 2012). In Romania, the successful e-government projects refer to national system of electronic payments, single electronic contact point, and electronic system of public procurement, e-job, e-tax, info kiosks, computerised system for high-schools, and computerised system for transport authorisations.

4. Comparative study

4.1 The networked readiness

The networked readiness framework was developed by the World Economic Forum in view to evaluate how 138 countries worldwide turn into account ICT. This framework (The Global Information Technology Report 2010-2011) measures:
"the contribution of national environment to ICT development and diffusion, including the broad business climate, regulatory aspects, the soft and hard infrastructure;
the extent of preparation for the use of ICT by the three main national stakeholders in a society (i.e., individuals, the private sector and the government) in their daily activities;
the current use of ICT by the above three stakeholders".

The networked readiness framework was created in light to valorise the complex ICT reality and to identify common factors enabling countries to effectively use technology. The framework aims to provide guidance to policymakers and national stakeholders on the factors that they should take into account in view to fully valorise ICT in their competitiveness and economic growth strategies. It is based on the latest academic research, management literature, and ongoing work of international organizations.

The principles substantiating the networked readiness index (NRI) are as follows:

An ICT contributively environment is a key precondition of networked readiness. The successful use of ICT is enabled by the country's overall environment for innovation and ICT, comprising the market conditions, regulatory framework, and infrastructure (both physical and human).

Networked readiness requires a society-wide effort. The governments should establish an innovation-friendly environment and should define the ICT vision for the future.

ICT readiness leads to ICT usage and increased impact. All national actors should use ICT effectively in their daily activities.

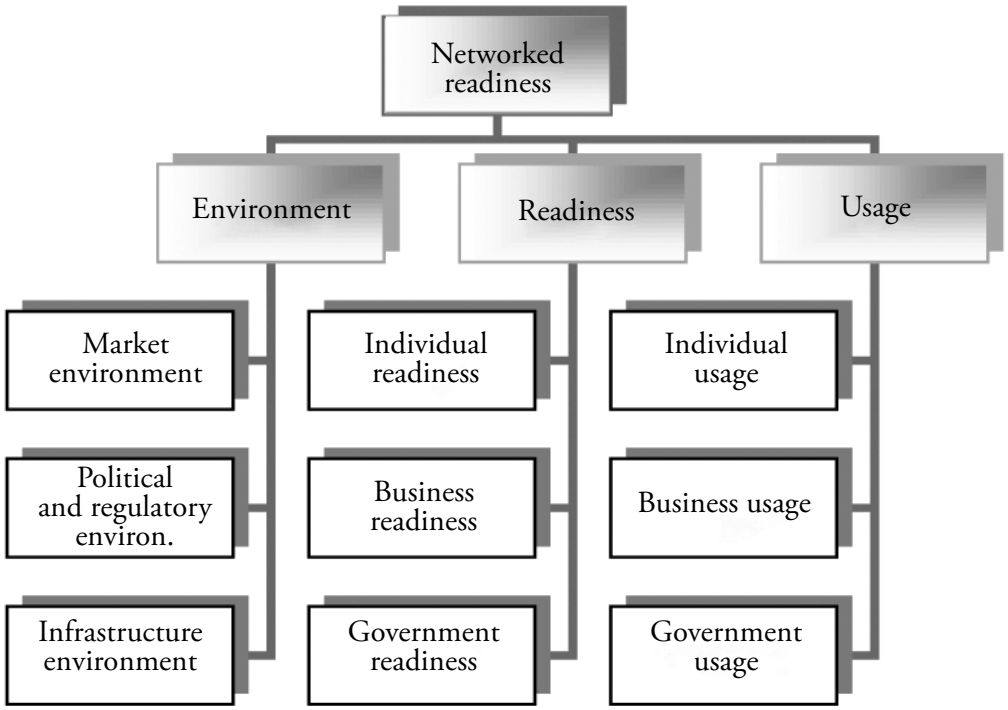

Fig. 2. Networked Readiness Index

Source: the authors

Figure 2 provides a representation of the networked readiness framework, which comprises three dimensions: environment, readiness, and usage/impact. The environment component includes the market, regulatory and infrastructure pillars, while the readiness and usage components are composed of three pillars, divided for individuals, businesses and government. The final NRI score is a simple average of the three composing sub-indices scores.

Table 3. Networked Readiness Index in the EU Member States during 2006-2011 period

Country	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	Average
Austria	5.2	5.2	5.2	4.9	4.9	5.08
Belgium	4.9	4.9	5	4.9	4.8	4.90
Bulgaria	3.5	3.7	3.8	3.7	3.8	3.70
Cyprus	4.1	4.2	4.5	4.5	4.5	4.36
Czech Rep	4.3	4.3	4.5	4.3	4.3	4.34
Denmark	5.7	5.8	5.8	5.5	5.3	5.62
Estonia	5	5.1	5.2	4.8	4.8	4.98
Finland	5.6	5.5	5.5	5.4	5.4	5.48
France	5	5.1	5.2	5	4.9	5.04
Germany	5.2	5.2	5.2	5.2	5.1	5.18
Greece	4	3.9	4	3.8	3.8	3.90
Hungary	4.3	4.3	4.3	4	4	4.18
Ireland	5	5	5	4.8	4.7	4.90
Italy	4.2	4.2	4.2	4	4	4.12
Latvia	4.1	4.1	4.1	3.9	3.9	4.02
Lithuania	4.2	4.4	4.4	4.1	4.2	4.26
Luxembourg	4.9	4.9	5.1	5	5.1	5.00
Malta	4.5	4.6	4.8	4.8	4.8	4.70
Netherlands	5.5	5.4	5.5	5.3	5.2	5.38
Poland	3.7	3.8	3.8	3.7	3.8	3.76
Portugal	4.5	4.6	4.6	4.4	4.5	4.52
Romania	3.8	3.9	4	3.8	3.8	3.86
Slovakia	4.1	4.2	4.2	3.9	3.8	4.04
Slovenia	4.4	4.5	4.6	4.5	4.4	4.48
Spain	4.4	4.5	4.5	4.4	4.3	4.42
Sweden	5.7	5.7	5.8	5.7	5.6	5.70
UK	5.5	5.3	5.3	5.2	5.1	5.28
EU 15	5.0	5.0	5.1	4.9	4.8	4.96
EU 25	4.7	4.7	4.8	4.6	4.6	4.68
EU 27	4.6	4.7	4.7	4.6	4.5	4.62

Source: the authors, based on The Global Information Technology Reports 2006-2007, 2007-2008, 2008-2009, 2009-2010, 2010-2011

We remark from Table 3 that the Nordic countries, Sweden (5.7), Denmark (5.62), Finland (5.48), and the Netherlands (5.38) represent the best performers, leading the ranking of NRI average for the 2006-2011 period. They are followed by UK (5.28), Germany (5.18) and Austria (5.08).

The above countries are very successful not only in Europe but also in the world as they have succeeded to integrate ICT within their competitiveness and growth strategies. They all have a very innovation-friendly environment, with transparent regulations and top educational and research systems, which are working closely with the industry. Moreover, their focus on innovation and ICT diffusion in the government agenda has triggered remarkably high ICT penetration rates and the creation of high-tech and innovative products. The picture for the EU 15 group is more nuanced, with different degrees of success in turning into account ICT. Among the EU accession 12, Estonia (4.98) has the best ICT performance, compatible with the European and international best practices. ICT has been used by Estonian government as a key factor for its social and economic development. ICT diffusion and access have been ranked high on the national agenda, and the e-government services are widespread.

At the other extreme, we find countries such as Bulgaria (3.70), Poland (3.76), Romania (3.86), Greece (3.90) which are registering the lowest values. For Bulgaria, Poland, Romania, their market and regulatory environments represent weaknesses, revealing at the same time a lack of a coherent government vision on ICT development and diffusion. The average for EU 15 is 4.96, for EU 25 is 4.68 and for EU 27 is 4.62, which means that the EU accessing 12 have to do greater efforts in view to reach the level of EU 15.

As a general picture, we remark that almost all EU Member States have recorded an ascending trajectory until 2009, when the economic and financial crisis had a powerful impact also on ICT.

4.2 Competitiveness

The European Commission (1999) defines competitiveness as "the ability to produce goods and services which meet the test of international markets, while at the same time maintaining high and sustainable levels of income". Porter (2007) also asserts: "the most intuitive definition of competitiveness is a country's share of world markets for its products" A lot of approaches is provided by scientists, which we not consider deeper in this paper (e.g. Makštutis *et al.* 2012; Balkytė, Tvaronavičienė 2010; Borsekova *et al.* 2012). The World Economic Forum's annual *Global Competitiveness Reports* which analyse and benchmark the factors emphasising the national competitiveness, stimulate the debate of all stakeholders concerning the best strategies and policies in view to overcome the obstacles to improved competitiveness. The World Economic Forum has substantiated its competitiveness analysis on the Global Competitiveness Index (GCI), which measures the microeconomic and macroeconomic fundamental elements of national competitiveness.

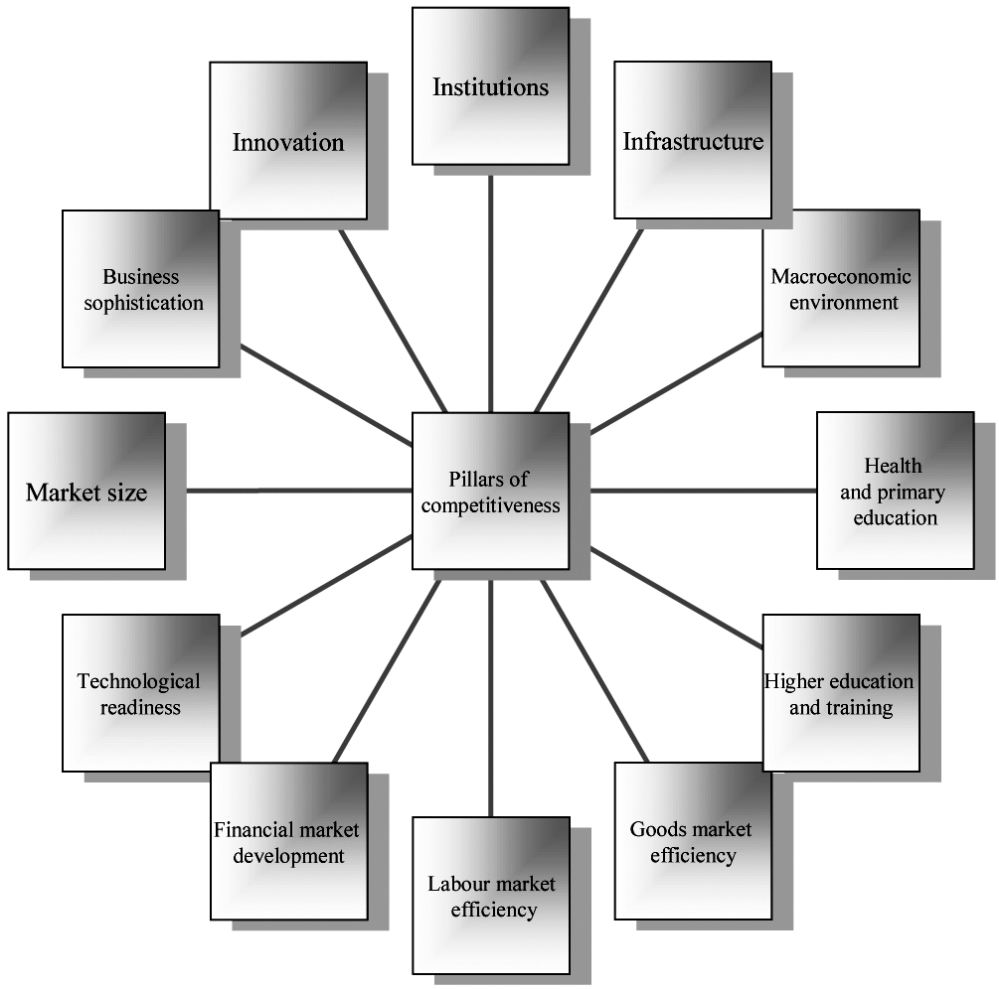

Fig. 3. Global Competitiveness Index

Source: the authors

As revealed by Figure 3, GCI comprises 12 key elements: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication, innovation. They are powerfully interrelated and tend to reinforce each other, and a weakness in one area often has a negative impact on other areas. For example, a strong innovation capacity will be very difficult to achieve without a healthy, well-educated and trained workforce, which is keen to assimilate new technologies, and without sufficient financing for R&D or an efficient goods market that makes possible to undertake new innovations to market.

Table 4. Global Competitiveness Index during 2006-2011 in the EU

Country	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	Average
Austria	5.3	5.2	5.2	5.1	5.1	5.18
Belgium	5.3	5.1	5.1	5.1	5.1	5.14
Bulgaria	3.9	3.9	4	4	4.1	3.98
Cyprus	4.4	4.2	4.5	4.6	4.5	4.44
Czech Rep	4.7	4.6	4.6	4.7	4.6	4.64
Denmark	5.7	5.6	5.6	5.5	5.3	5.54
Estonia	5.1	4.7	4.7	4.6	4.6	4.74
Finland	5.8	5.5	5.5	5.4	5.4	5.52
France	5.3	5.2	5.2	5.1	5.1	5.18
Germany	5.6	5.5	5.5	5.4	5.4	5.48
Greece	4.3	4.1	4.1	4	4	4.10
Hungary	4.5	4.3	4.2	4.2	4.3	4.30
Ireland	5.2	5	5	4.8	4.7	4.94
Italy	4.5	4.4	4.4	4.3	4.4	4.40
Latvia	4.6	4.4	4.3	4.1	4.1	4.30

Lithuania	4.5	4.5	4.4	4.3	4.4	4.42
Luxembourg	5.2	4.9	4.9	5	5	5.00
Malta	4.5	4.2	4.3	4.3	4.3	4.32
Netherlands	5.6	5.4	5.4	5.3	5.3	5.40
Poland	4.3	4.3	4.3	4.3	4.5	4.34
Portugal	4.6	4.5	4.5	4.4	4.4	4.48
Romania	4	4	4.1	4.1	4.2	4.08
Slovakia	4.5	4.4	4.4	4.3	4.2	4.36
Slovenia	4.7	4.5	4.5	4.6	4.4	4.54
Spain	4.8	4.7	4.7	4.6	4.5	4.66
Sweden	5.7	5.5	5.5	5.5	5.6	5.56
UK	5.5	5.4	5.3	5.2	5.3	5.34
EU 15	5.2	5.1	5.1	5.0	5.0	5.0
EU 25	5.0	4.8	4.8	4.7	4.7	4.8
EU 27	4.9	4.7	4.7	4.7	4.7	4.7

Source: the authors, based on The Global Competitiveness Reports 2006-2007, 2007-2008, 2008-2009, 2009-2010, 2010-2011

We notice from Table 4 that the top performers are also the Nordic countries, Sweden (5.56), Denmark (5.54), Finland (5.52), followed by Germany (5.48), Netherlands (5.40), UK (5.34), Austria (5.18), fact which confirms the fact that they are the most competitive economies in the EU. Table 4 reveals that the weak performers are Bulgaria (3.98), Romania (4.08), Greece (4.10), Latvia (4.30), indicating that they are the last competitive countries in EU 27. Among the EU accession 12, Estonia (4.74) is the best competitive economy.

4.3 Comparative empirical analysis of share of ICT sector in national economy, networked readiness and competitiveness

We provide an analysis for the share of ICT sector in national economy, networked readiness and competitiveness in EU27.

Table 5. Averages for share of ICT sector in national economy, networked readiness and competitiveness in the EU 27 during 2006-2010

Country	Average % ICT on GDP	Average NRI	Average Competitiveness
Austria	3.64	5.08	5.18
Belgium	4.86	4.90	5.14
Bulgaria	5.67	3.70	3.98
Cyprus	3.86	4.36	4.44
Czech Rep	4.64	4.34	4.64
Denmark	5.21	5.62	5.54
Estonia	4.56	4.98	4.74
Finland	8.12	5.48	5.52
France	4.30	5.04	5.18
Germany	4.40	5.18	5.48
Greece	2.63	3.90	4.10
Hungary	5.99	4.18	4.30
Ireland	6.40	4.90	4.94
Italy	3.74	4.12	4.40
Latvia	2.93	4.02	4.30
Lithuania	2.66	4.26	4.42
Luxembourg	5.14	5.00	5.00
Malta	4.60	4.70	4.32
Netherlands	6.50	5.38	5.40
Poland	3.44	3.76	4.34
Portugal	3.92	4.52	4.48
Romania	3.43	3.86	4.08
Slovakia	4.66	4.04	4.36
Slovenia	3.78	4.48	4.54
Spain	3.75	4.42	4.66
Sweden	6.53	5.70	5.56
UK	8.53	5.28	5.34
EU 15	5.18	4.96	5.0
EU 25	4.75	4.68	4.8
EU 27	4.74	4.62	4.7

Source: the authors

Analysing the averages for share of ICT sector in national economy, networked readiness and competitiveness (Table 5, Figure 4), we draw the following conclusions: the values for networked readiness and competitiveness are almost on a par for most EU27, being in a direct correlation.

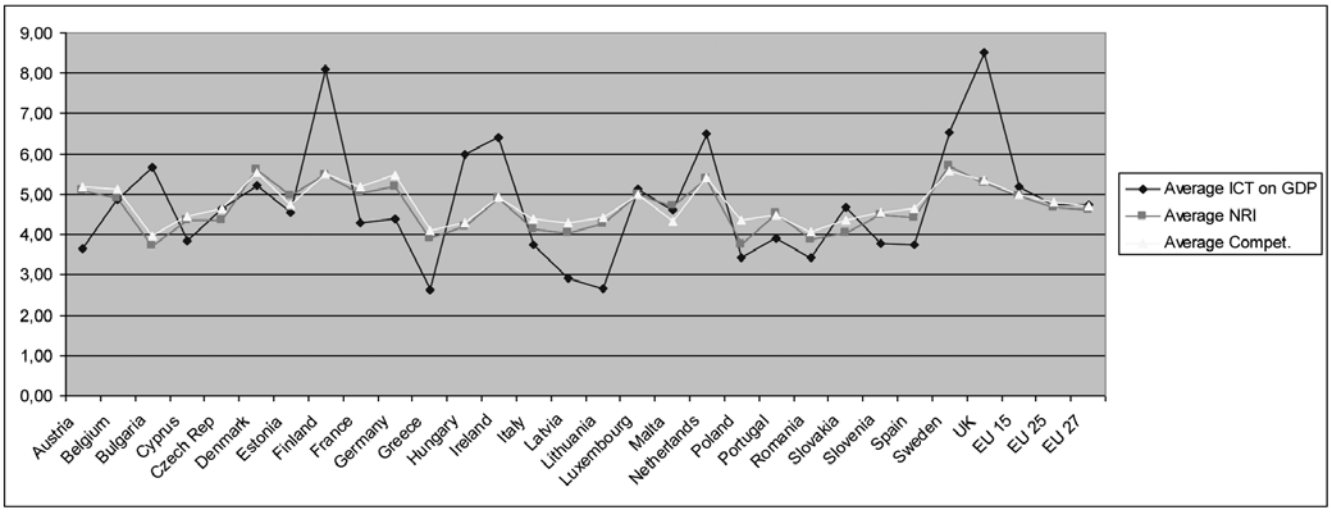

Fig. 4. Representation of the averages for share of ICT sector in national economy, networked readiness and competitiveness in the EU 27 during 2006-2010

Source: the authors

As revealed by Figure 4, the countries that have a much higher value for share of ICT sector in national economy in comparison with the other two elements analysed (NRI and GCI) are as follows: Finland, Hungary, Ireland, Netherlands, Sweden, UK. At the other extreme, Cyprus, Greece, Latvia, Lithuania represent the countries recording a lower value for the share of ICT sector in national economy in comparison with NRI and GCI. It is worth to mention that Estonia is the best performer among EU accession 12 at networked readiness, competitiveness and ICT sector share in GDP.

5. Digital marketing

A recent study of the European Policy Centre – EPC, 2010 revealed important conclusions concerning the European wide economic potential of the Digital Single Market: the digital economy represents an important factor for growth and innovation; EU digital market is fragmented, comprising 27 individual digital markets and the EU economy is not turning into account the benefits of the digital economy; the Digital Single Market enables cross-border trade, enhances the competition, enlarges the consumers' choice; it brings benefits to the public sector by better use of ICT and digital services in the public sector and improvement of public service quality and effectiveness. It is worth to mention that the actual consumers are displaying a new behaviour, as they are connected to the digital world, thus we may speak about the generation C: those connected, communicating, content-focused, computerized, and community-oriented. In Romania, according to an analysis (Digital Marketing Report 2012), the main issues concerning digital marketing are as follows:

Online marketing: In Romania, the types of projects have been diversified to a great extent, the integrated projects are prevailing. The online methods represent an increased component of the marketing mix. In future probably it will be 10% traditional, 90% online and in online it will be 10% online and 90% new generation online communities.

Online advertising: diversification and efficiency oriented. In 2011, 22 million euro was spent, without advertising on Google and for 2012 the forecast is an increase by 3-5%. The fields with the highest investments are telecommunications, financial system, and car industry. The main challenges consist in developing new instruments in view to compete at international level.

Mobile marketing: the customers' interest is higher. There have been recorded small steps. Once with the penetration of smart phones, it will increase the number of requests and the value of the budgets invested. The trend of mobile marketing is increasing.

Conclusions

The vision is to have a Europe with consistent connectedness, always on access to knowledge and open to innovation.

ICT has revolutionized how the stakeholders at all lev-

els work interact and conduct their lives and activities. ICT has demonstrated its revolutionary power as a key factor for change, modernization and innovation.

As revealed by the paper, ICT are playing a significant role in the economic growth and competitiveness.

The ICT social and economic benefits are not confined by national borders as the latest technologies enable to the best and brightest people in each country to have access worldwide.

Governments, which once focused on the concrete issues of building infrastructure and providing access to citizens, are beginning to recognize that technology itself is not as important as the socio-economic achievements it can engender - for example e-health programs, e-government services. Both public and private organisations have also recognized that ICT is not just a factor for cost-cutting and more efficient activities, but it represents an essential factor in view to open the dialogue with consumers and other stakeholders through various types of digital communication: digital marketing, mobile advertising, social networks, e-commerce.

ICT in the sustainable knowledge economy will be successful through the huge joint efforts of all stakeholders in the EU countries: parliaments, governments, ministries, agencies, universities, industry, private sector, political parties, NGOs, media, individuals.

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