

SOME ASPECTS ON ICT IMPLICATION IN GLOBAL INNOVATION

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Abstract: In the modern society based on knowledge the Information and Communication Technology (ICT) has played an essential role. ICT offers many opportunities for innovation. The purpose of this paper is to present some connection that we have identified through our research between Information Society and global innovation. In this respect we used two composite indicators: one for ICT – the "Networked Readiness Index" (NRI) published by World Economic Forum – and another for Innovation – the "Global Innovation Index" (GII) from the Global Innovation Report. A global innovation cannot be achieved without the implementation of a solid human infrastructure where ICT is a very important component.

Keywords: connection, innovation, ICT, GII, NRI.

1. Introduction

In the modern society the importance given to information plays an essential role and in understanding its implication first we should mention some concepts:

- Information Society or digital society is the society in which the creation, distribution, use of information has a significant impact on the economic, political, social, cultural etc environment (National Institute of Statistics). The basic aim is to create a society that includes all citizens' access to public services provided in electronic form by increasing capacity utilization of services of the information society, reforming business models and increasing operational efficiency through appropriate use of ICTs, namely increasing competitiveness in the business environment through advanced usage of ICTs.
- Information and Communication Technology (ICT) has been defined in the literature in different ways; thus O'Brien defines information technology as computer-based information systems, Laudon & Laudon considers computers and peripherals equipments the basis of modern information systems, and Van Cuilenburg argues that computer and telecommunications technology taken together form the information technology.

The information and telecommunications industry has become the backbone of the information society, both present and future (Pook L., 2006). According to the author the information and telecommunications industry created world wide networks interconnecting societies and individuals alike influencing social development and knowledge acquisition.

The question is how does ICT connect with innovation? ICT offers many opportunities and promises for innovation. One such business model built on ICT is mobile banking that has been successfully implemented in developing countries. According to Chandrajit Banerjee, in today's world, innovation is a subject of great importance because it stimulates sustainable growth in a highly competitive market (Global Innovation Report, 2014). Global

innovation cannot be achieved without the implementation of a solid human infrastructure where ICT is a very important component. Innovation is an inherently human endeavor. Education has a key role in innovation, and access to basic education and professional development is the key to the development of talents. Investing in education we can build a human infrastructure that leads to innovation and growth. Mikre (2011) highlights the benefits of ICT use in education, existing promises, and the limitations and challenges of integration to education systems.

Each European country has its own strategy for the Information Society, but there are significant differences between them, due in particular to initial technical, technological and economic conditions of each country, as well as to their human, economic or financially potential.

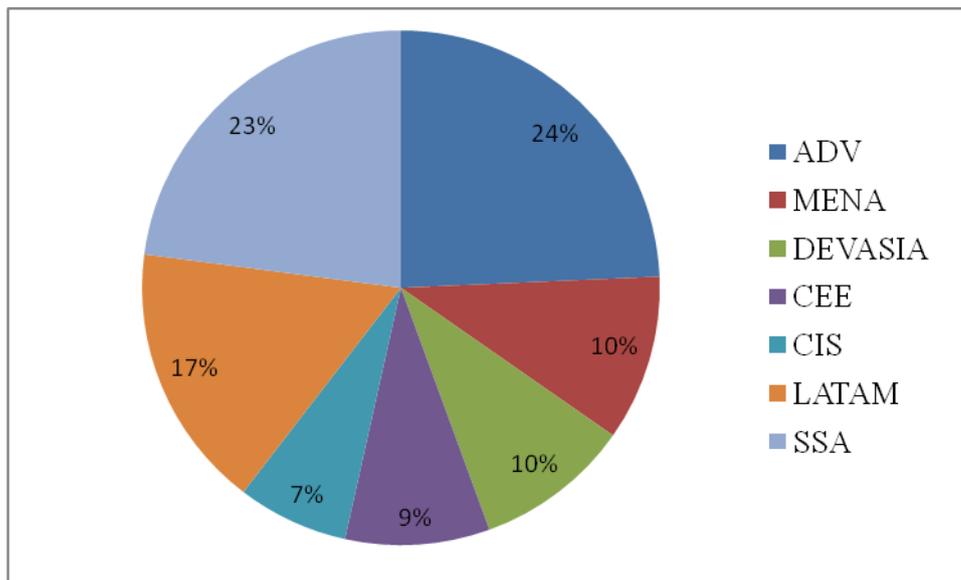
Advances in information and communication technologies (ICT) in recent years played a crucial role in transforming traditional education and making it more accessible, affordable, and effective globally (Ken Hu, Global Innovation Report, 2014).

This paper presents some connection that we have identified through our research between Information Society and global innovation. In this respect we used two composite indicators: one for ICT – the “Networked Readiness Index” (NRI) published by World Economic Forum – and another for Innovation – the “Global Innovation Index” (GII) from the Global Innovation Report.

2. The Networked Readiness Index (NRI)

NRI index measures the propensity for countries to exploit the opportunities offered by information and communications technology (ICT) and seeks to better understand the impact of ICT on the competitiveness of countries. NRI has been published annually in the *Global Information Technology Report (GITR)* by the World Economic Forum in partnership with INSEAD since 2002 and in 2014 it has covered a record number of 144 economies/countries. The Report has accompanied and monitored ICT advances over the last decade as well as raising awareness of the importance of ICT diffusion and usage for long-term competitiveness and societal well-being. The 144 countries are grouped in 7 categories: ADV = Advanced economies, CEE = Central and Eastern Europe, CIS = Commonwealth of Independent States and Mongolia, DEVASIA = Developing Asia, LATAM = Latin America and the Caribbean, MENA = Middle East and North Africa, SSA = Sub-Saharan Africa (Figure 1).

Figure 1. Repartition of countries/economies

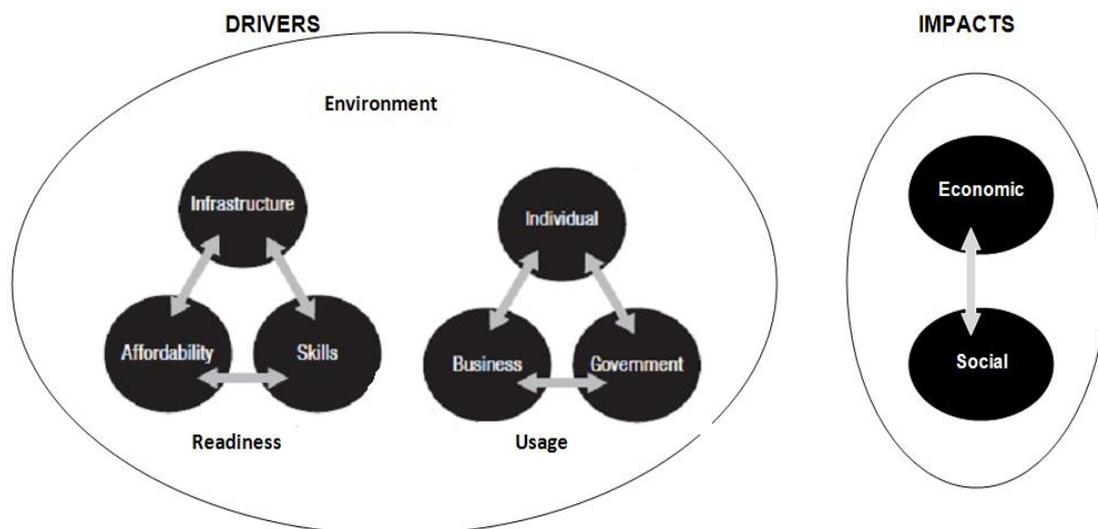


Source: World Economic Forum data processed by the author

NRI, since 2012, is a composite of 4 sub-indexes, 10 pillars and 54 indicators. The 4 sub-indexes are (Figure 2):

- the *environment* for ICT offered by a given country;
- the *readiness* of the economy’s key stakeholders (individuals, businesses, and governments) to use ICT;
- the *usage* of ICT among these stakeholders;
- the economic and social *impact* of ICT (sub-index introduced since 2012).

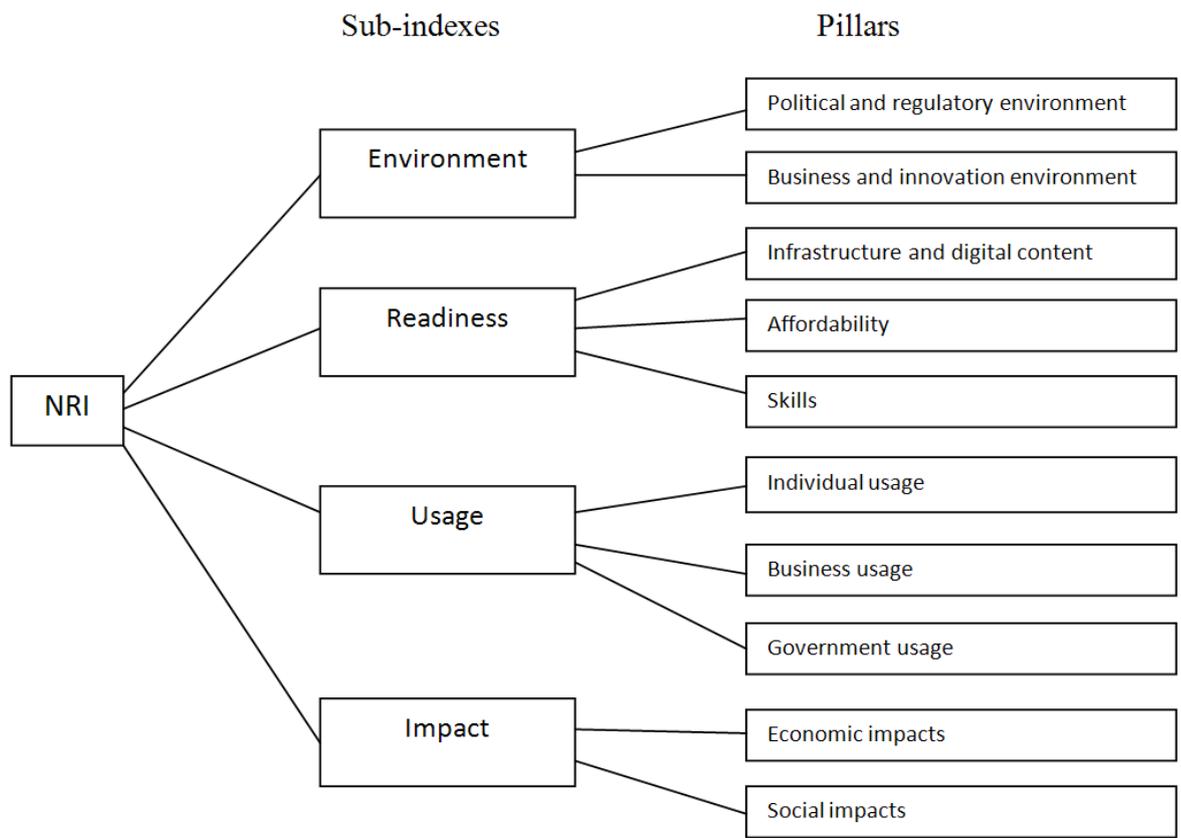
Figure 2. The Networked Readiness Index framework



Source: World Economic Forum

As we can see in Figure 2 the NRI includes features related to access and usage that cover not only affordable ICT infrastructure but also digital resources, including software and skills.

Figure 3. The 4 sub-indexes and the 10 pillars of the NRI



Source: World Economic Forum

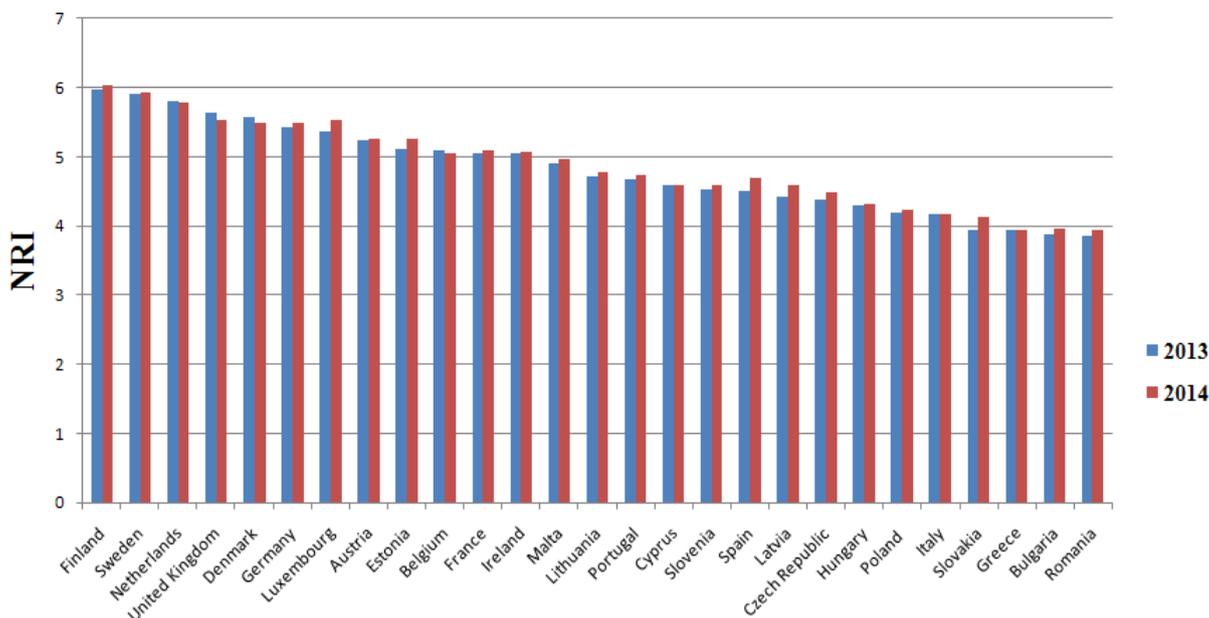
Two groups of economies dominate the NRI: Northern European economies - Finland, Sweden, Norway, Denmark, Iceland – and the Asian economies – Singapore, Taiwan, the Republic of Korea, Hong Kong. In the top chart of the NRI Finland ranks the first and Singapore is ranked on the second place in the world top chart.

The performance of these Northern European economies in terms of ICT readiness is due to the fact that they own excellent digital infrastructures and robust innovation systems, and this allows them to score very highly in ICT use - with almost universal Internet use, for example - and in innovation performances.

Asian economies reflect outstanding business and innovation environments that are consistently ranked among the most conducive to entrepreneurship in the world.

Further on we describe the situation of NRI in EU-27 countries for the period 2013 - 2014.

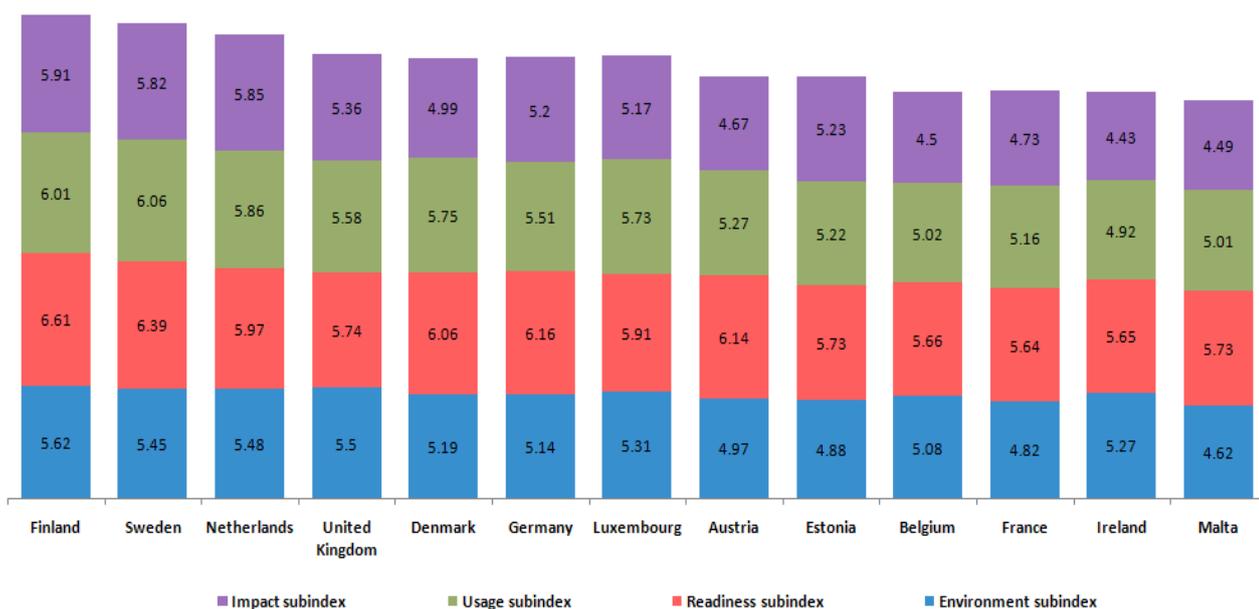
Figure 4. The Networked Readiness Index (NRI) for EU-27 countries in 2013-2014

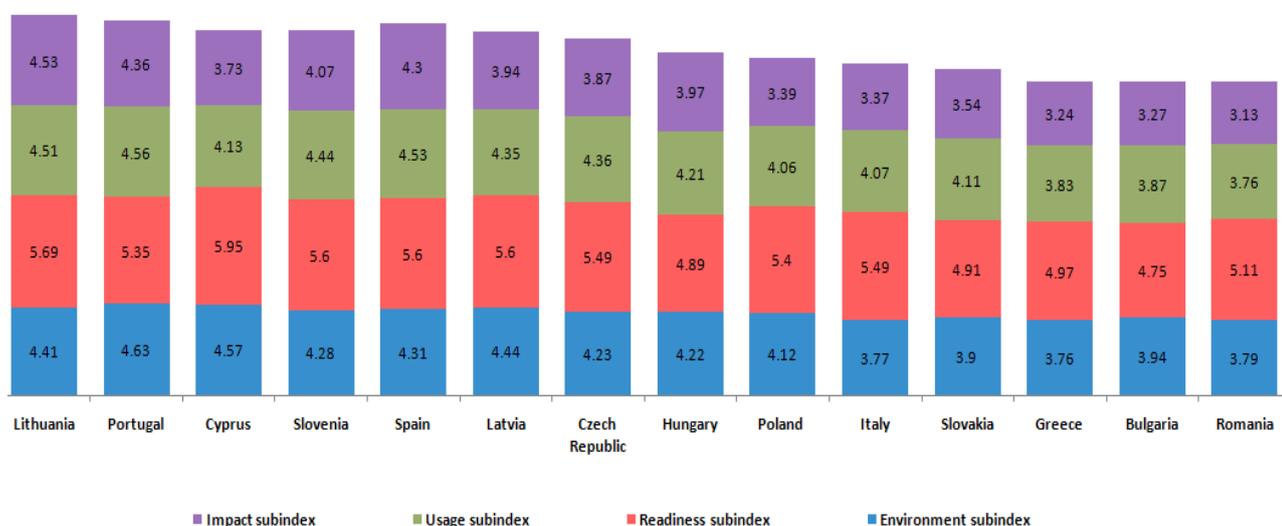


Source: World Economic Forum data processed by the author

The score between 5.4 - 7.0 is the best possible outcome and between 1.0 - 3.3 is the worst outcome. In the European top chart Finland is placed first, and Bulgaria and Romania, on the 71st and 75th places, close the EU rankings, with lower rates of ICT uptake and unstable environments that prevent their potential for higher economic and social returns. However in Romania the NRI score increased from 3.86 in 2013 to 3.96 in 2014 and this is a gratifying fact.

Figure 5. Distribution of the 2014 NRIs for EU-27 countries into their constituent sub-indexes





Source: World Economic Forum data processed by the author

The digital divide in Europe among countries is bigger for businesses and narrower across governments. Overall, governments in most EU Member States have recognized the importance of developing ICTs and offer a fairly large number of public services online. The most important consequence is that digital strategies should focus not only on developing ICT infrastructure but also on creating the right conditions for an effective use of ICTs to stimulate innovation, competitiveness, and social inclusion.

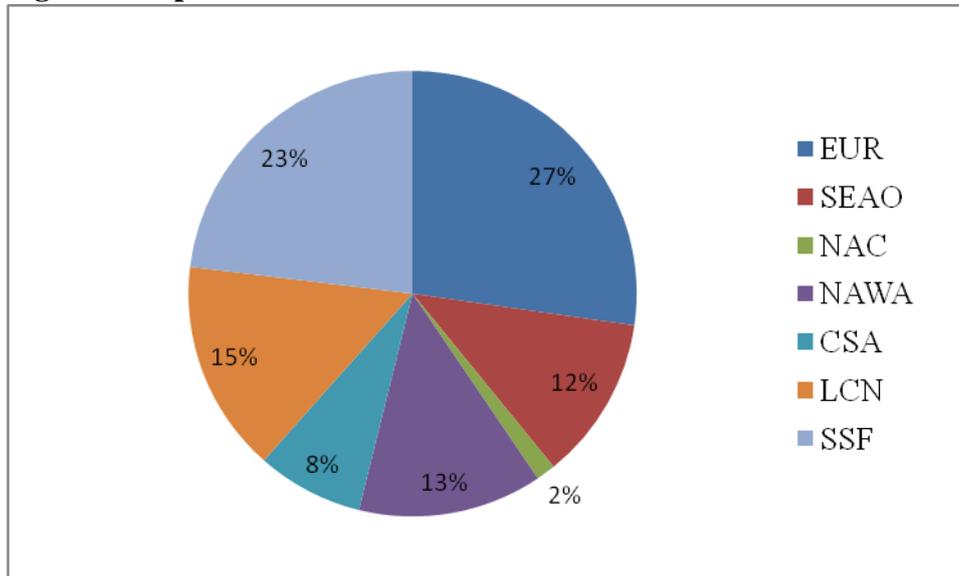
3. The Global Innovation Index (GII)

The Global Innovation Index (GII) reveals a rich dataset to analyze the global innovation trends. The GII 2014 issued the 7th edition and is co-published by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO, a specialized agency of the United Nations).

GII in 2014 has covered 143 countries/economies around the world and used 81 indicators.

Those 143 countries/economies are grouped in 7 categories: EUR = Europe, NAC = Northern America, LCN = Latin America and the Caribbean, CSA = Central and Southern Asia, SEAO = South East Asia and Oceania, NAWA = Northern Africa and Western Asia, SSF = Sub-Saharan Africa (Figure 6).

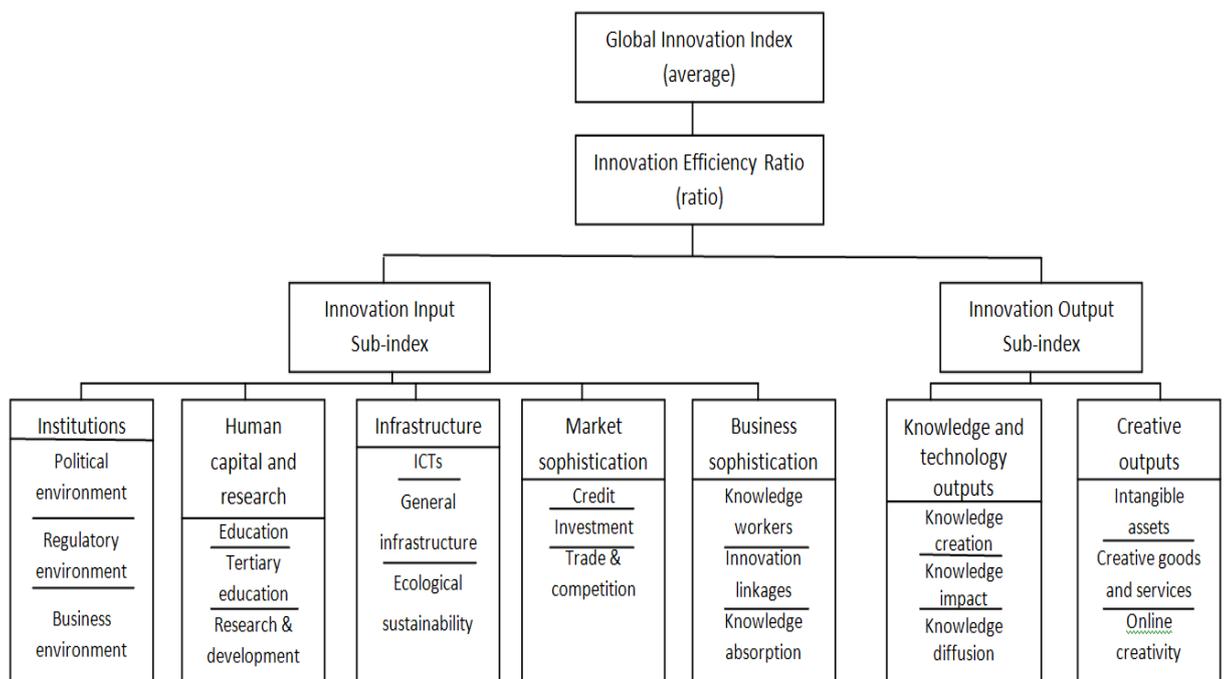
Figure 6. Repartition of countries/economies



Source: World Economic Forum data processed by the author

The GII is a composite indicator that relies on seven pillars that ranks countries/economies in terms of their enabling environment to innovation and their innovation outputs.

Figure 7. The Global Innovation Index (GII) framework

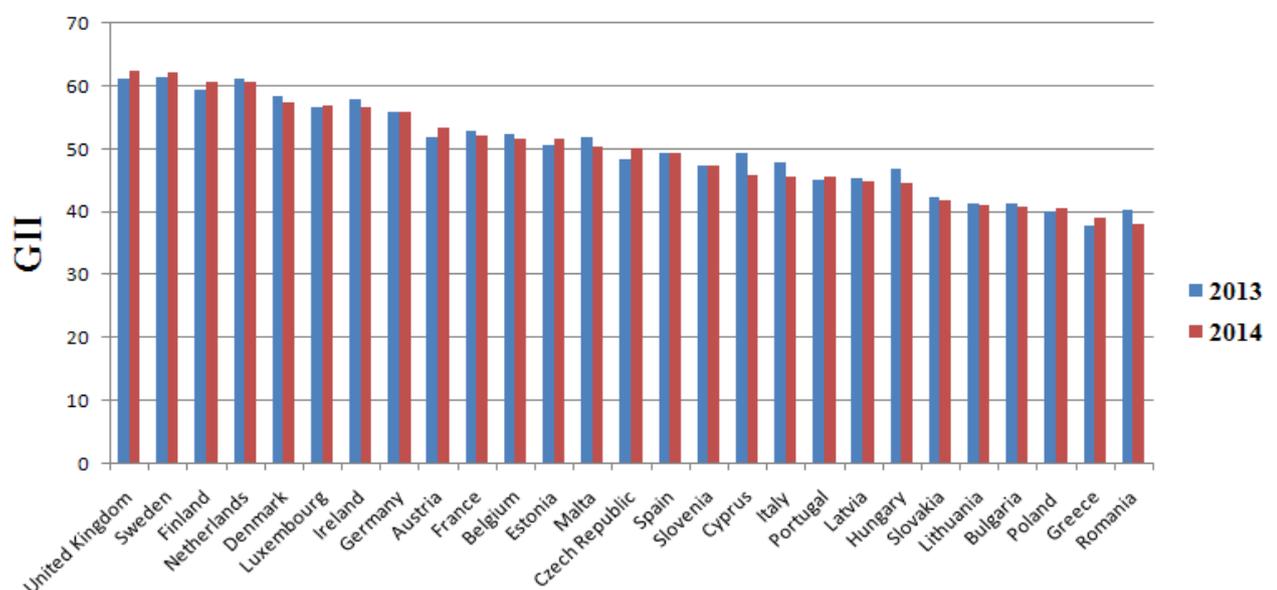


Source: World Economic Forum

In 2014, Switzerland is the leader of the global top chart followed by the United Kingdom, Sweden, Finland, the Netherlands, the United States of America (USA), Singapore, Denmark, Luxembourg and Hong Kong (China). These economies from around the world

appear to have high income as a common factor explaining their dominance and stability at the top. The GII model used by the high income economies reflects the fact that innovation is a multifaceted phenomenon with several input drivers and different output results. These innovation leaders are almost in top ranked in all pillars and sub-pillars. Global innovation divides exist between world regions. The average GII scores for Northern America (58.11), Europe (47.23), South East Asia and Oceania (41.72) and are significantly higher than those for other regions such as Northern Africa and Western Asia (35.73), Latin America and the Caribbean (32.85), Central and Southern Asia (27.48) and Sub-Saharan Africa (27.45). For these innovation divides between regions are responsible the human capital, the creative outputs pillar and the research pillar.

Figure 8. The Global Innovation Index (GII) for EU-27 countries in 2013-2014



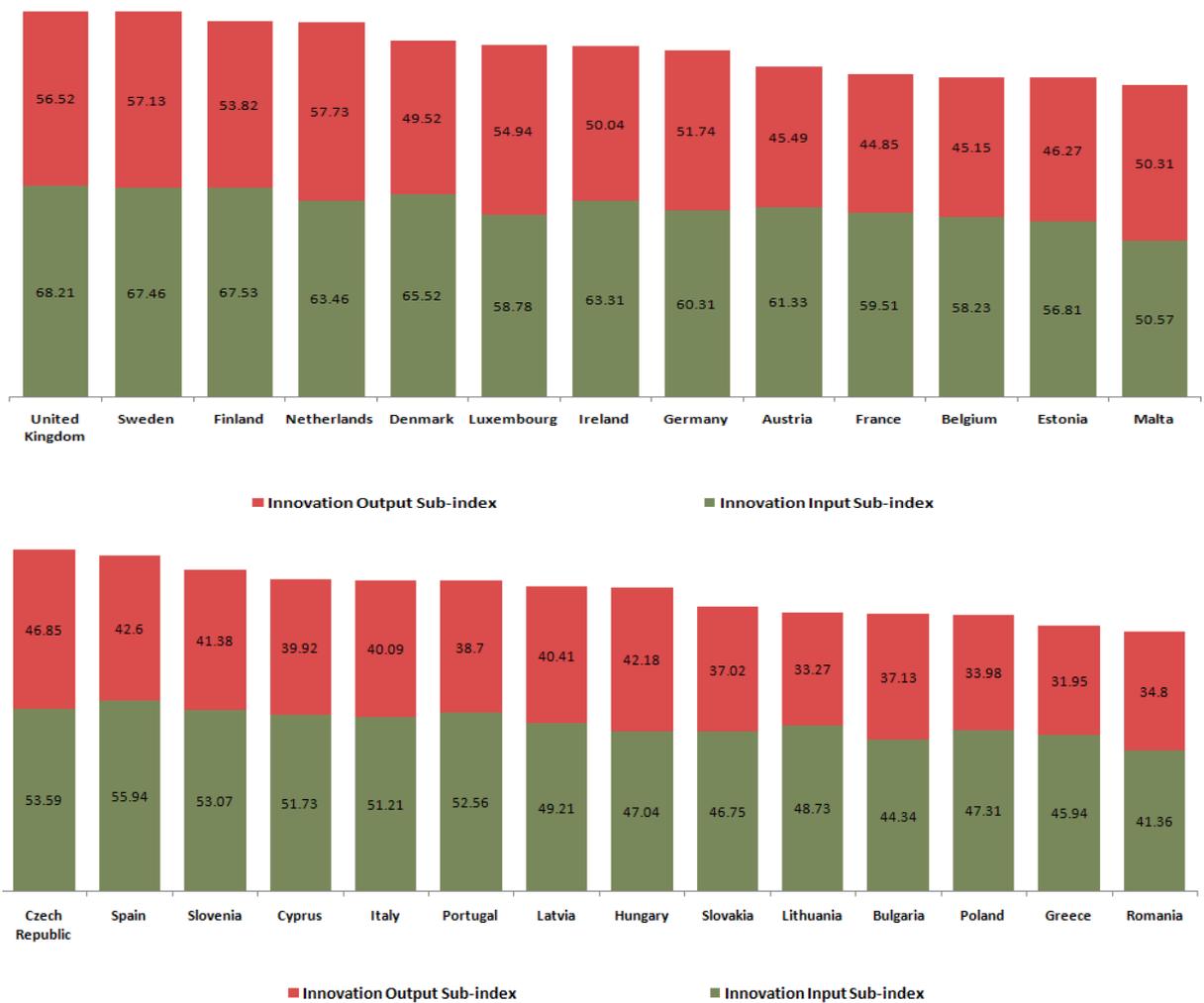
Source: World Economic Forum data processed by the author

Global innovation divides can be found also in European countries. United Kingdom is the first in the European top chart, and Greece and Romania on the 50th and 55th place closing the EU rankings with lower rates of GII.

The Innovation Efficiency Ratio serves to highlight those economies that have achieved more with less as well as those that lag behind in terms of fulfilling their innovation potential. In Romania the Innovation Efficiency Ratio is 0.84 that indicates a strengthening in this respect. In Romania the median of the Innovation Efficiency Ratio is 0.74, which places the country among the upper-middle-income economies.

The development of ICT enables people to have access to information, to learn online, build their skills. The 3rd pillar named Infrastructure of the GII with a score 41.7 in Romania includes Information and communication technologies indicators with a score 37.8, where the index of E-participation has the smallest value 7.9 indicating a weakness of the system.

Figure 9. Distribution of the 2014 GIIs for EU-27 countries into their constituent sub-indices



Source: World Economic Forum data processed by the author

The leading countries are among the high income economies. The progress of these countries depends not only on an economy’s level of development in science, technology and innovation, but also on the depth of its penetration into society as well as the intellectual potential of the population, its competence in creating and applying new knowledge, and its ability to perceive essential achievements in science, technology and innovation daily practices.

4. Conclusions

The main aim of NRI is to measure the ability of countries to leverage information and communication technologies for improved competitiveness and well being.

The NRI contains aspects of how ICT are transforming the economy and society. Despite the fact that ICT involves the development of new skills, new competencies, the question of access and usage remains important - especially for developing countries, given their need to reduce the digital divide. Consequently, several European countries lead the NRI rankings: Finland, Sweden, Netherlands, and Denmark. Although the situation differs from one country to another in European countries, they all seem to face difficulties in developing and benefiting from their digital potential. Despite the fact that Romania is ranked the last in

the EU top chart, the values of NRI are increasing, and this shows that it is a country with emerging economies.

The human factor is responsible for innovation and growth. Successful innovation requires the population to obtain a higher level of education, to be more creative, and to stimulate their ability to perceive essential achievements in science, technology, and innovation and implement those in daily practices. Romania is placed among the upper-middle-income and emerging economies.

A global innovation cannot be achieved without the implementation of a solid human infrastructure where ICT is a very important component.

5. References

- [1] Crișan, D. A., Preda, A., Coculescu, C., Altăr-Samuel, A. N., (2010) *Some aspects concerning the correlation between ICT and innovation in Europe*, The Annals of the University of Oradea. Economic Sciences, TOM XIX, Nr. 2, December, pp. 1183-1189
- [2] Global Innovation Report (2013) *The Global Innovation Index 2013: The Local Dynamics of Innovation*, Available at <http://www.wipo.int>
- [3] Global Innovation Report (2014) *The Global Innovation Index 2014: The Human Factor In innovation*, Available at <https://www.globalinnovationindex.org>
- [4] Mikre, F., (2011) *The Role of Information Communication Technologies in Education: Review Article with Emphasis to the Computer and Internet*, Ethiopian Journal of Education and Sciences, Vol. 6, No. 2, pp. 109-126,
Available on <http://www.ajol.info/index.php/ejesc/article/viewFile/73521/62437>
- [5] O'Brien, J. A., (2000) *Introduction to Information Systems: Essentials for the Internetworked E-Business Enterprise*, McGraw-Hill Education
- Laudon, K. C., Laudon, J. P., (1999) *Management Information Systems: Organization and Technology*, Prentice-Hall
- [6] Pook, L., (2006) *A comparison of Bulgaria's and Romania's information infrastructures for EU accession*, Proceedings of the International Conference on Economics, Law and Management, ICELM-2, Targu Mures, pp. 25-37
- [7] The Global Information Technology Report 2014: *Rewards and Risks of Big Data*, Available at <http://www3.weforum.org>
- [8] The Global Information Technology Report 2013: *Growth and Jobs in a Hyperconnected World*, Available at <http://www3.weforum.org>
- [9] Van Cuilenburg, J. J., Scholten, O., Noomen, G. W., (1998), *Știința comunicării*, Editura Humanitas, București