CONTRIBUTIONS OF "KNOWLEDGE" IN WORLD ECONOMY

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Abstract
The effect of knowledge globally is reflected in the growth / development of national economies and improvement of living standards of the population. Arguments underlying this statement are reflected in the values held by certain indicators (Knowledge Economy Index, Gross Domestic Product, Index of Innovation, Knowledge Intensive Services etc.) and their effects on national economies. Factors contributing to the development of these indicators are the "key" to success in each economy and also part of their basic foundation. The explanation so far obliges us to analyze current global economic situation and its prospects. As a first step we will try to answer the question "What is the generator factor of growth / prosperity in different countries?" and to identify its evolution over time. A second stage of the study will represent an analysis in the architecture centers of power due to the competitive advantage held by certain countries / companies in creating wealth.
The study is based upon emergence and strengthening of competitiveness in the businesses and the national economy. Knowledge-intensive services' presence in the world's economies is a vital source of economic growth.

Key words: *innovation index, education index, technology index, information and communication, knowledge index*

JEL Classification: *E00, F00, I20.*

I. INTRODUCTION

The activities in a particular region in order to grow the economy and thus improve people's lives depend largely on the "element" knowledge. Knowledge is the main pawn in productivity growth and competitiveness of an economy. Today more and more authors consider that a part increasingly powerful in creating prosperity / wealth belongs to competitive advantage, given that "competitiveness is increasingly dependent on strategy and less by natural advantages" (Lawton, 1999, p.37). So we are talking about the role of knowledge and its importance in producing and selling competitive goods and services. So we can say that knowledge is the key element in increasing the competitiveness of world economies.

There are several definitions of the concept of knowledge economy. OECD – Organisation for Economic Co-operation (1996, p.7) describes knowledge economy as an economic system based "... directly on the production, distribution and use of information" by individuals / organizations. In other words, the OECD definition refers to economies that meet a maximum capacity of action of employees and companies for acquisition / exploitation of knowledge in four distinct directions: know-who, know-what, know-how, know-why. In the same register Ghirmai Kefala T. (2010, pp.68-75) highlights that "a knowledge economy is that in which the organization and the population accumulate, create, disseminate and use knowledge more intensively for a more efficient economic and social development" .

So, having the knowledge (by citizens, employees, country) leads to economic and social development, to the efficient production of goods and services, their marketing and offering lower prices to a larger number of citizens. Their effectiveness has led the transition to a knowledge economy, an economy based on knowledge because knowledge use produces benefits, ie value added (Peter Druker, 1969). Such benefits of exploiting knowledge (this resource materializes into inventions / innovations on new products / services performed by firms) differentiate countries in the world as growth potential and competitive position globally. Explanation of this effect is achieved by calculating the relatively recent global index of Knowledge Economy Index (KEI) and Knowledge Intensive Services index (KIS) (http://web.worldbank.org).

II. THEORETICAL ANALYSIS OF THE KNOWLEDGE ECONOMY

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number of pages. Use italics for emphasis; do not underline.

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III. KIS AND KEI, A SUCCESSFUL FORMULA OF NATIONAL ECONOMIES

Economic indices of knowledge today represent the strength of the economies of the world; shows the relative position of the world about the ability of each to create and exploit knowledge; More specifically, these indices are calculated by the World Bank based on the following pillars: education pillar, innovation pillar, the pillar of Information Technology and Communications (ICT) and the pillar entitled economic liberalization indicator (IER).

Calculations of these pillars showed that in world rankings (KEI analysis) are countries like Sweden, Finland, Denmark, Netherlands, Norway, New Zealand, Canada, etc. Romania ranks 44 (2012) of the total of 145 countries included in the ranking; countries like Russia, Brazil, Mexico, Thailand etc are on lower positions than Romania (http://web.worldbank.org). At the same time we mention that there are certain global economic power poles (North America, some Asian countries etc.) who hold a favorable position in the rating given by KEI indicator.

The presence of KEI indices provides information regarding the challenges and opportunities of the knowledge economy; relative positioning of a country on the KEI index will be clearly correlated with other indicators: the index of competitiveness, innovation index, indicators of quality of education etc.

Positioning of the different countries depending on the development of a knowledge-based economy will be based on Table no. 1. The table contains the classification Top of the 10 countries of the world based on the score aggregated KEI Index (knowledge economy), index EIR (The "economic liberalization"), the Education Index, Index Innovation and Index ICT (Information Technology and Communications).

Table no. 1 – Top 10 economies for each pillar of KEI index – 2012 globally

Rang	KEI	IER	Innovator	Education	ICT
1	Sweden	Singapore	Switzerland	New Zealand	Bahrain
2	Finland	Finland	Sweden	Australia	Suedia
3	Denmark	Denmark	Finlanda	Norway	Luxemburg
4	Olanda	Sweden	Singapore	Republic of Korea	UK
5	Norway	Hong Kong	Denmark	Greece	Netherlands
6	New Zealand	Switzerland	SUA	Sweden	Finland
7	Canada	Canada	Netherlands	Iceland	Switzerland
8	Germany	Norway	Israel	Taiwan	Germany
9	Australia	Luxembourg	Taiwan	Ireland	Taiwan
10	Switzerland	Austria	Canada	Spain	Hong Kong

Source: http://siteresources.worldbank.org/INTUNIKAM/Resources/2012.pdf p.5

According to data provided by the World Bank it results that Sweden retains leadership (KEI index with a value of 9.43) as the most advanced knowledge economy in the world. Sweden is ranked 2nd in the world in terms of Innovation pillar and ICT pillar (due to increased royalty payments and receipts, articles in science and technology and patents, due to the increasing number of internet users, the number fixed and mobile phone / thousand inhabitants, the number of computers / thousand inhabitants.) At the same time a decrease of pillar education due to lower gross rate education in secondary education in 2000 from 152% to 103% in 2012.

From the data recorded in Table 1 it is noted that Nordic countries occupy the top places in the world IER indicator. We note that all four KEI pillars (knowledge economy) are well developed and balanced; Sweden, Finland, Denmark and Norway are characterized by their particularly strong performance in the EIR pillar and the education index value ranges them as the first 15 countries.

Regarding the USA we mention that it recorded in the last two decades falls on all four pillars of KEI index. KEI index fell from No. 1 in 1995 to 4th in 2000 reaching 12th position in the ranking of 2012; remains relatively strong in innovation index (position 6) being supported by a large number of patents granted USPTO (United States Patent and Trademark Office), articles published in journals of science and technology (nominated score of 9.1), high payment and collection of fees (9.36 nominated score); ICT pillar is decreasing slowly from 8.76 to 6.76; IER pillar fell due to weakening in general and non-tariff barriers.

Thus we find that the presence of different variables (gross enrollment rate of young people in the secondary sector, mean years of schooling, the gross enrollment rate of young people in tertiary education, the number of landlines and mobile / thousand inhabitants, the number of internet users / thousand inhabitants, the number of computers / per thousand inhabitants, the number of articles published in the journals Science and Engineering / 1000 inhabitants, the number of patents granted by the USPTO, increased royalties, etc.) in the structure of knowledge economy index highlights the position in the ranking of different countries " Top 10 economies globally. "

Indicator assessment identified increases and decreases of variables of the four pillars of KEI indicator (table no. 2.) which imposed solutions / strategies that led to improved values.

Table no. 2 - Increases and decreases of variable components of the four pillars of KEI indicator - -Top 10 economies globally

Country	KEI Position change	KEI 2012 Rank	IER Position change	IER 2012 Rank	Inov Position change	Inov 2012 Rank	Educ. Position change	Educ. 2012 Rank	ICT Position change	ICT 2012 Rank
Saudi Arabia	+26	50	+17	50	0	84	+30	58	+45	21
Oman	+18	47	-9	44	+26	57	+15	74	+19	55
Macedonia	+16	57	+34	59	+10	69	-12	78	+17	48
Azerbaijan	+15	79	+24	103	+14	89	+8	53	+26	76
Albania	+14	82	+50	71	+8	101	-16	83	+37	72
Algeria	+14	96	+23	115	+8	99	+21	71	+21	89
Rwanda	+14	127	+45	95	+10	134	+2	137	+3	143
Belarus	+11	59	+21	114	+5	60	-1	33	+20	47
Romania	+9	44	+20	40	+10	53	+19	29	+5	59
Russian Federation	+9	55	+55	117	+11	40	-17	44	+19	44

Source: KAM 2012. Reconstructed from the KAM's "KEI and KI indexes" mode www.worldbank.org/kam p.7

We note that Romania has made some remarkable changes in the four pillars of the knowledge index. The data provided by http://web.worldbank.org/kam p.7 website shows that Romania has climbed nine positions in KEI index, reaching 2012 on the 44th with an index value of 6.82. Significant improvements have occurred in the education index (from position 48 in 2000 to position 29 in 2012) due to increased gross enrollment value of youth in the secondary sector. Progress in innovation pillar were due to rapid growth in the number of articles published in the journals Science and Engineering / 1000 inhabitants, of increasing fees etc. and also led to a climb of 10 positions in the Innovation pillar (from position 63 in 2000 to position 53 in 2012). ICT pillar grew by 5 positions in the period 2000-2012 due to increasing number of fixed and mobile phones / thousand inhabitants, the number of internet users / thousand inhabitants, the number of computers / thousand inhabitants.

Also, a significant increase of 26 positions in KEI pillar was recorded in Saudi Arabia (in 2012 reaching the 50th position with an index value of 5.96); education pillar increased by 30 positions as a result of increased gross enrollment value of youth in the secondary sector; There has been a consolidation of the ICT pillar due to increasing computer / thousand inhabitants, increasing the number of landlines and mobile / thousand inhabitants, increasing the number of internet users / thousand inhabitants.

The results from the World Bank conclude that the positioning of the main countries of the world according to KEI index and the four pillars underlying the calculation of this indicator is somewhat fluctuating from year to year. This is explained by macroeconomic strategies and how companies and individuals react to certain government policies. We note that some countries have improved their relative position on the KEI and / or some of the four pillars, other countries have decreased their relative position on the KEI and / or certain components on education. At the same time it is observed that most of the big winners are mainly middle-income countries. Also, countries that have the value of GDP / capita relatively modest and fluctuating (around 7000-8000 $ / capita to $ 10,000-12,000 / capita) are positioned in terms of KEI at the middle of the ranking. We discuss also some partial correlation between the structure of national economies and the position held by KEI ranking. We consider that some developed countries of the world (Sweden, Netherlands and other EU countries, USA, Canada, Japan, etc.) have extremely strong KIS sectors participating with 20-25% to annual GDP.

As regards to countries of the world in developing state (Romania, Russia, Brazil, China, etc.), they have more modest KIS sectors as a share or participation in annual GDP and as level of exploitation of knowledge, such positioning being modest in KEI.

Knowledge-intensive services sector is representative of modern economies; it carries out activities aimed at the creation, accumulation and dissemination of knowledge. KIS sector has developed significantly in recent years and has made a significant contribution to increasing innovation and competitiveness. This sector has a specific contribution to economic development; it allows reducing constraints and renewed growth. The

contribution of this KIS sector is not just to create jobs; it is in fact the main added value, even if it cannot be accurately reflected in the accounting statements.

Please note that the services knowledge intensive sector comprises business activities conducted by firms / organizations in order to meet market requirements; the specificity of this sector lies in the fact that those firms make use of advanced knowledge and / or technologies for the proposed services. Thus we found that the types of activities found in KIS structure are computer services, research and development services, and management services related to accounting, architectural services, engineering, technical services, advertising and market research etc. (Milles et al 1995 pp. 81-112). Achieving these activities within KIS sector is carried out by scientists, engineers and experts of all kinds; Knowledge-intensive services is the most intensively specialized services segment in the whole economy (Figure No.1.)

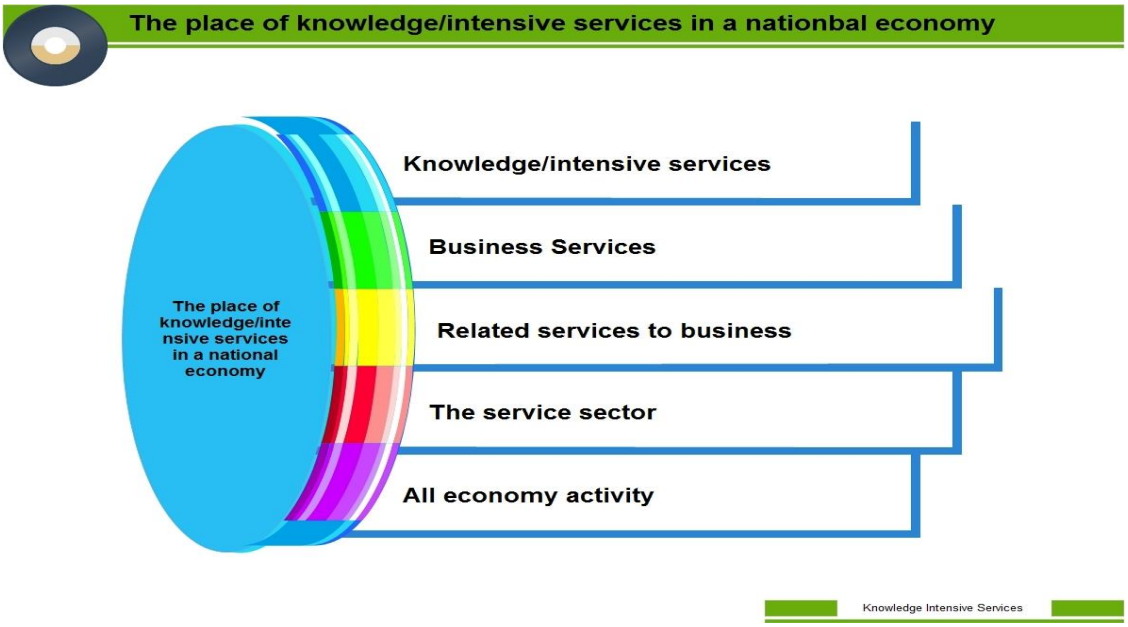

Figure no.1. Positioning of knowledge-intensive services in a national economy
Source: own creation

We find that these services are holding information and their owners have the opportunity to use the knowledge that their customers do not possess or do not possess in all the necessary quantities. The use of these services by specialized companies offers a multitude of opportunities (economic); in manufacturing firms the competitive advantage comes from their ability to provide integrated packages of goods and services. The presence of these "integrated companies" and the percentage that we have among companies with 100 employees (or more) confirm their importance in world economies.

The result of the study carried out by Professor Andy Neely (http://www.cambridgeservicealliance.org 2013 Table no. 3) shows that the highest percentage of firms that offer complete packages of goods and services can be found in the US (30.64% of 28 606 firms). On a secondary but distant place is UK with a percentage of 28.44% of the 3467 companies, followed by Germany which holds 25.34% of the 4080 companies and France with a percentage of 18.01% of 2149 companies. We note that the highest percentage in BRIC group of integrated companies is owned by India (24.22% of the 1375 companies) followed by Russia with a share of 19.23% of 234 companies, China with 14.30% of 2210 companies and Brazil 10.94% of 384 companies.

Table no. 3–Business categories depending on activities (global situation)

Country	Production company	Integrated companies	Services companies	Total companies
France	1638 (78,22%)	387 (18,01%)	124 (5,77%)	2149
Germany	2907	1034	139	4080[1]

	(71,25%)	(25,34%)	(3,41%)	
UK	2189 (63,14%)	986 (28,44%)	292 (8,42%)	3467
USA	18436 (64,45%)	8765 (30,64%)	1405 (4,91%)	28606
Brazil	331 (86,20%)	42 (10,94%)	11 (2,86%)	384
China	1875 (84,84%)	316 (14,30%)	19 (0,86%)	2210
India	1026 (74,62%)	333 (24,22%)	16 (1,16%)	1375
Russia	182 (77,78%)	45 (19.23%)	7 (2,99%)	234
Totally	28584	11908	2013	42505

1. When the country of primary operations is different, companies figure drops to 4067 (as 13 companies are incorporated in Germany, but the country carrying out primary operations is another).

Source: http://www.cambridgeservicealliance.org/uploads/downloadfiles/2013%20November_Servitizatio

Regarding the level servitization we note that the IT sector of the US has the highest percentage (53.41% of servitization companies) and the lowest level of (servitization) integrated firms is found in Brazil in the health sector (3.33% of servitization companies) and in Russia discretionary sector (5.26% of servitization / integrated companies). (table no. 4.)

Table no.4 – Integrated companies (globally)

Primary sector	France %	Germany %	UK %	SUA %	Brazil %	China %	India %	Russia %
Discretionary intake	8,78	12,89	20,10	16,60	4,08	13,25	11,95	5,26
Energy	38,46	13,64	32,06	36,74	45,45	28,57	45,16	26,67
Health	17,27	25,65	30,94	33,68	3,33	18,12	34,51	20,00
Industry	32,81	39,99	41,89	35,93	28,36	18,38	43,77	38,64
Technological information	31,76	37,80	37,97	53,41	13,33	25,08	66,67	25,00
Materials	12,14	15,76	20,45	27,01	10,99	9,72	13,37	16,42

Source:http://www.cambridgeservicealliance.org/uploads/downloadfiles/2013%20November_Servitization%20in%20Germany.pdf

We assume that in the future these trends will vary between sectors KI (B)S depending on the level of expertise and innovation of their conclusion based on the fact that knowledge intensive companies are frequently involved in innovation activities / service.

IV. PERFORMANCE IN INOVATION

Innovation services defined in the Oslo Manual and OECD (Organization for Economic Co-operation and Development) "Guidelines for Collecting and Interpreting Innovation Data" as "the implementation of a new or significantly improved (good or service), or a process, a new marketing method, or a new organizational method in business practice in employment organization or external relations ". For OECD "the importance of innovation in the services sector and services sector's contribution to economic growth is increasingly recognized ..." (OECD 2005, p.38).

Because of innovative services production and consumption occur simultaneously, we find that the distinction between process and product in the KIS is often impossible. Degree of innovation of products / services depends on their adaptation to customer needs and measuring the degree of innovation is not simple (Hipp / Grupp 2005, pp. 517-535). Moreover we can say that there is great diversity of innovation processes in services, or different methods can be detected of innovation in services (cf. Kanerva et al 2008: 11 ff, Milles 2001). Making innovations in the service sector is often done ad hoc, interactive and innovation is the key factor in achieving human factor. Preserving and protecting inventions (against counterfeiting) meets difficulties due to the fact that intellectual property protection mechanisms in services are different from those in manufacturing (Howells, 2001, pp. 55-79). One possibility is the use of innovative services protection of copyright and to a lesser extent patents. They can be considered as protection services the following elements: name and trademark, etc.

The impact of innovations in the national economy is achieved in an annual increase of 1.7% during 2006-2013, growing considered by community officials as unsatisfactory. The effects of this increase can be found in EU Member States classification into four groups of innovators (figure no.2.): Innovative leaders, innovators of Grade II, moderate innovators and modest innovators.

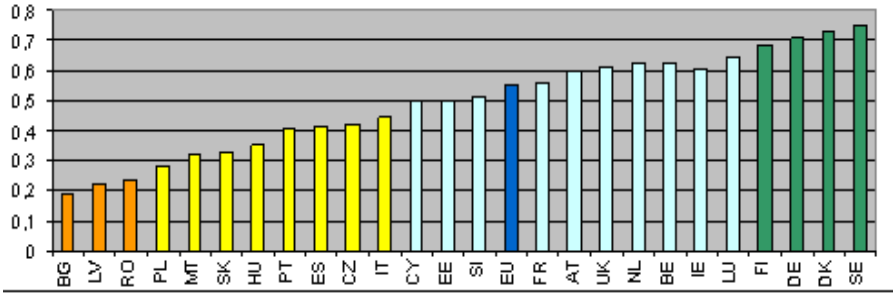

Figure no.2. – Innovation capacity of EU member states
Source: Innovation Union Scoreboard 2014
http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf

Innovation performance of EU (European Union) Member States and performances in the strengths and weaknesses of their innovation systems are found in the Innovation Union Scoreboard ratio statistics - IUS. Thus, countries which achieved high performance in innovation - innovation leaders are Denmark, Finland, Germany and Sweden stating that the innovation performance of these countries are higher than the EU average; Countries falling in innovators second class are: Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, the Netherlands, Slovenia and the United Kingdom - they are supporters of innovation with performance innovation above average or close to the EU average; moderate innovators are found among the following countries: Croatia, Czech Republic, Greece, Hungary, Italy, Lithuania, Malta, Poland, Portugal, Slovakia and Spain - the performance of these countries is below the EU average; between modest innovators there are: Bulgaria, Latvia and Romania - the performance of these countries in innovation are lower than the EU average.

Improving innovation performance occurred with the launch of Europe 2020 (European Commission, 2010) and the launch of the Innovation Union (European Commission 2013). Therefore, the performance of the innovation leaders is the result of a national balanced research, development and innovation, something that should be considered by policy makers of each country.

Also mention that results at EU level can be extrapolated and also compared to the global innovation performance (figure no 2.).

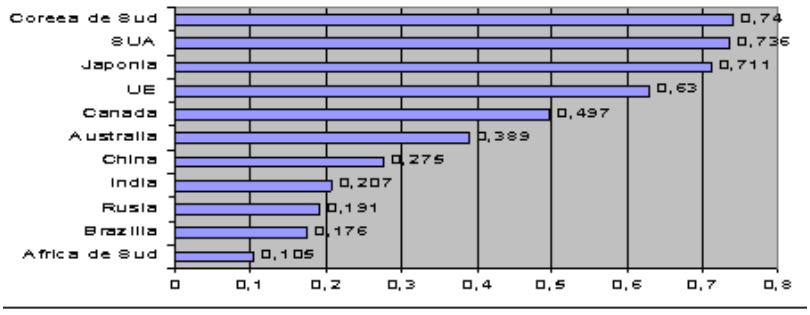

Figure no. 3 Innovation performance internationally for 2010/2011
Source: EC – Innovation Union Scoreboard 2014,
http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf

Following these comparisons is noted that the US, Japan and South Korea outperform European Union innovation. China's performance is much lower in innovation. In making those assessments were used 12 simple indicators that formed a composite index; these indicators is the number of new doctorates, the number of university graduates, the number of publications international community, most cited publications, expenditure on research and development in the public system, Research and development expenses in the public sector, joint publications of the public and private system, the number of patents obtained under PCT (Patent Cooperation Treaty - Treaty International Patent Cooperation investment), changes in society brought about by patents obtained under PCT, the contribution of exports of Medium and High Technology (MHT) in the commercial balance, exports in knowledge intensive service sector, foreign income from patents and licenses.

The results of the European Union across from the performance of innovative oblige policy makers from EU countries to address the systemic problems that persist in innovation to achieve a better balance of performance between all categories of indicators that make up the composite indicator used in evaluating the performance of innovation in Innovation Scoreboard.

V. CONCLUSION

Finally, we say that the analysis of the indicator of knowledge revealed that the Nordic countries are the best performers in terms of KEI indicator, while Romania and other countries in developing state ranked among countries with poorer performance in the exploitation of knowledge for growth.

At the same time we do the assessment that there is some correlation between the structure of a country's economy and its position in the KEI ranking. The effects of correlations showed that some developed countries of the world have strong KIS sectors and participate in creating a remarkable percentage of GDP.

As a result of these findings we consider necessary the urgent development and implementation of macroeconomic policies, strategies leading to an improvement in living standards and economic growth. EU policy makers have required states to address the systemic problems that persist in innovation and achieve a better balance performance between all categories of indicators that make up the composite indicator used to measure innovation performance Innovation Scoreboard.

We believe that both the European Union and developing countries (EU members) must strengthen ICT as a driver of economic growth and the whole mechanism of access to new knowledge and exploitation of knowledge by business organizations.

It is also necessary to develop advanced educational systems, allocating significant funds for innovation, implementing rules for the liberalization of economic competition between local companies and foreign companies.

For Romania it is necessary to strengthen the position held by KIS sector, education sector support, research and innovation, ICT, infrastructure development and business support services exports.

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