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## **Knowledge-Based Economy in the Competitiveness Equation. The Case of the Republic of Serbia<sup>1</sup>**

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*Abstract: The study presents the new approaches of the knowledge-based economies and competitiveness policy using two major indexes and methodologies developed by two prestigious world institutions, the World Bank and the World Economic Forum, as well as the practical consequences of their implementation at the level of individual economies in a dynamic globalised world. The main conclusion derived from the study is that without firm and steady measures for a comprehensive implementation of the mix of policies included in the two indexes, there are fewer chances of winning a better position of a country in the global concert of people and increasing the nation's wealth and standard of living. A particular attention is given to the case of the Republic of Serbia, candidate country to the European Union, pointing out both the achievements and the need for further action at the national level.*

*Key Words: knowledge-based economy, competitiveness, globalisation, Global Competitiveness Index, Serbia*

*Jel Classification: E42, E61, F36, F43, G15, O47*

### 1. General Aspects

The knowledge-based economy constitutes a key factor in the competitiveness equation, as competitiveness is a process resultant of a wide set of policies, which include naturally those based on knowledge, whose implementation leads to the increase of labour productivity, growth of national wealth and finally raise of the living standard of the entire population of a given country.

At this moment, there are two major indexes calculated at a world level and taken into consideration primarily by individual states, but also by international organisations, academic and business community: the Knowledge Economy Index (KEI), developed by the World Bank and the Global Competitiveness Index (GCI), established by World Economic Forum.

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The *Knowledge Economy Index* indicates to what extent a national environment favors the use of knowledge as an efficient vector of the economic development, while the *Global Competitiveness Index* indicates the capacity of a national economy to ensure higher performances with lower costs when competing on the world market.

The **Knowledge Economy Index (KEI)** uses 148 structural and qualitative variables to measure the performance of 146 countries, based on four Knowledge Economy pillars: 1. Economic Incentive and Institutional Regime (EIR), 2. Education, 3. Innovation and 4. Information and Communications Technologies (ICT), as can be seen in Figure nr. 1 below. The variables are normalized on a scale from 0 to 10 relative to other countries in the comparison group.

As working with a large set of 148 variables can be unwieldy, a simplified Basic Scorecard has been developed to capture a country's preparedness for the knowledge-based economy and calculate its overall Knowledge (KI) and Knowledge Economy (KEI) Indexes with a 14-variable scorecard.

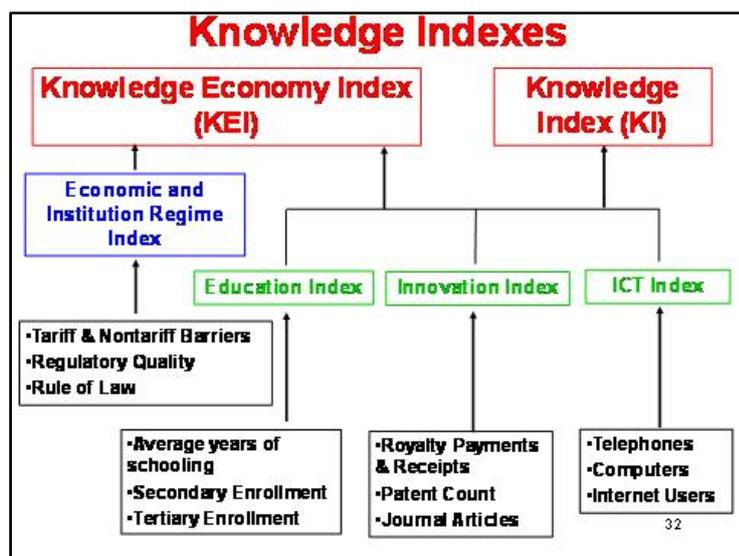


Figure nr. 1 - Knowledge Indexes  
(Source: World Bank)

KEI is utilised in the World Bank Knowledge Assessment Methodology (KAM) to help countries identify the challenges and opportunities they face in making the transition to the knowledge-based economy.

KAM uses two indexes, KEI and KI, so it is important to note that Knowledge Index (KI) is the simple average of the normalized country scores on the key variables *in three pillars* – education, innovation and ICT, while Knowledge Economy Index (KEI) measures performance *on all four pillars*.

The EIR comprises incentives that promote the efficient use of existing and new knowledge and the flourishing of entrepreneurship. An efficient innovation system helps tapping into the growing stock of global knowledge, adapt it to local needs, and create new technological solutions. And, certainly, only an educated and appropriately trained population

is capable of creating, sharing, and using knowledge, especially if a modern and accessible ICT infrastructure serves to facilitate the effective communication, dissemination, and processing of information.

For the purposes of calculating KI and KEI, each pillar is represented by three key variables as follows.

### **The Economic Incentive and Institutional Regime**

- Tariff & Nontariff Barriers - measures the degree of economic freedom
- Regulatory Quality - measures the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development.
- Rule of Law - measures the extent to which agents have confidence in and abide by the rules of society

### **Education and Human Resources**

- Average years of schooling
- Secondary Enrollment
- Tertiary Enrollment

### **The Innovation System**

- Royalty and License Fees Payments and Receipts
- Patent Applications Granted by the US Patent and Trademark Office
- Scientific and Technical Journal Articles

### **Information and Communication Technology (ICT)**

- Telephones per 1,000 people
- Computers per 1,000 people
- Internet Users per 10,000 people

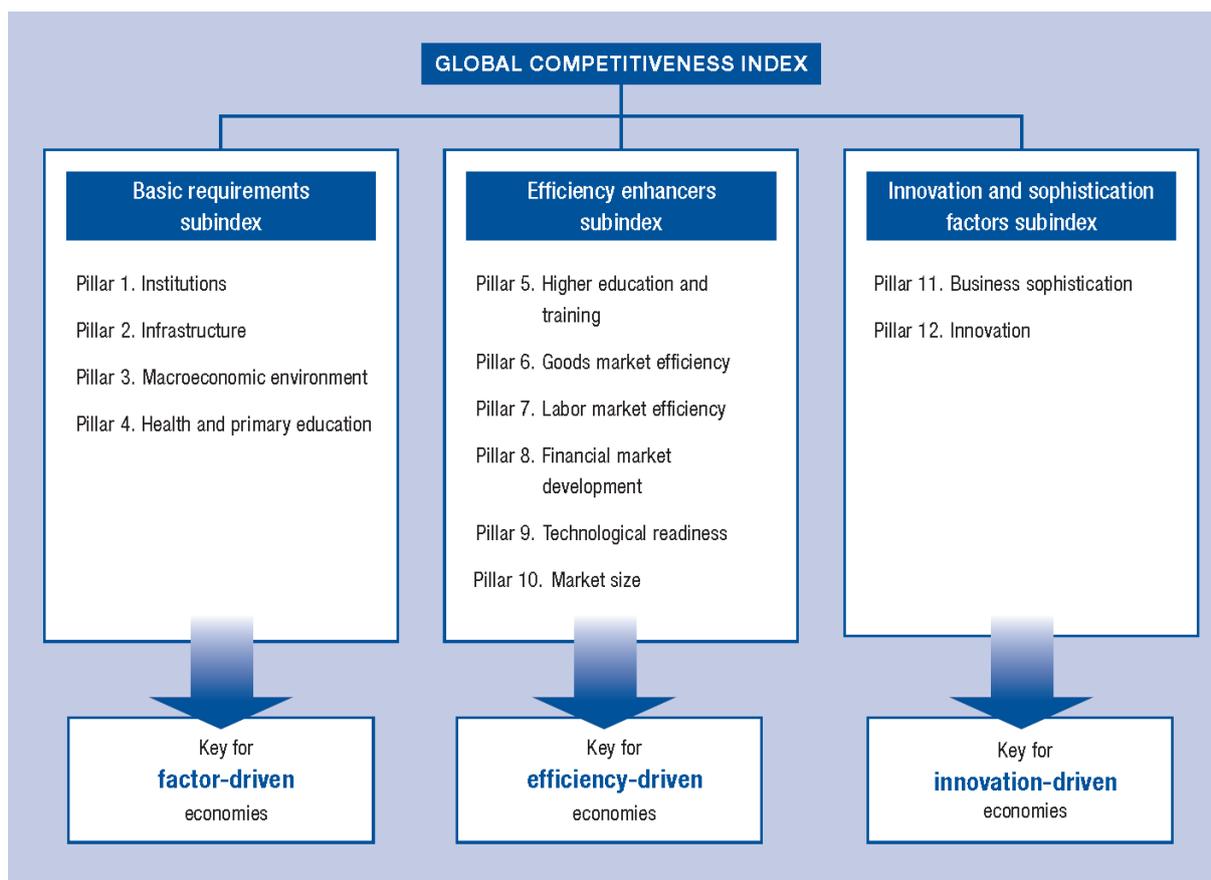
**The Global Competitiveness Index (GCI)** was introduced by the World Economic Forum in 2004 and is now one of the most used indexes to measure the competitiveness of a country. It is currently calculated for 148 countries, counting for 99% of the World GDP.

Defining competitiveness as a "set of institutions, policies and factors that determine the level of productivity of a country", GCI scores are calculated by drawing together country-level data covering 12 categories – the so-called "pillars of competitiveness" – that together make up a comprehensive picture of a country's competitiveness.

The twelve pillars are further divided into 115 indicators, altogether helping to build up a real image of the competitiveness level of the analysed countries.

The CGI structure is presented in Figure nr. 2 below:

Figure nr. 2 - Global Competitiveness Index



Source: Global Competitiveness Report 2013–2014, World Economic Forum, 2013, page 9

The twelve pillars are grouped in three *categories* or *subindexes*: *basic requirements*, *efficiency enhancers* and *innovation and sophistication factors*, each of them defining a stage of development: *factor-driven economies*, *efficiency-driven economies* and *innovation-driven economies*. The main criterion used to allocate countries into the different stages of development is constituted by the level of GDP per capita. Any countries falling in between two of the three stages are considered to be “in transition”. The three categories of development and their respective weights are shown in Table nr.1.

**Table 1: Subindex weights and income thresholds for stages of development**

	STAGES OF DEVELOPMENT				
	Stage 1: Factor-driven	Transition from stage 1 to stage 2	Stage 2: Efficiency-driven	Transition from stage 2 to stage 3	Stage 3: Innovation-driven
GDP per capita (US\$) thresholds*	<2,000	2,000–2,999	3,000–8,999	9,000–17,000	>17,000
Weight for basic requirements subindex	60%	40–60%	40%	20–40%	20%
Weight for efficiency enhancers subindex	35%	35–50%	50%	50%	50%
Weight for innovation and sophistication factors	5%	5–10%	10%	10–30%	30%

Note: See individual country/economy profiles for the exact applied weights.  
\* For economies with a high dependency on mineral resources, GDP per capita is not the sole criterion for the determination of the stage of development. See text for details.

Source: Global Competitiveness Report 2013–2014, World Economic Forum, 2013, page 10

As a country is moving from the first stage of development to the third one, its economy becomes more sophisticated, its productivity is rising and its competitive capacity strengthens significantly.

To illustrate how the GCI is functioning, we shall use the example of the German economy that, we consider, provides a good example of how a policy focused on fostering the scientific research and technological development influences its level of competitiveness on a world-wide scale. Germany is on the fourth position in GCI top 2013-2014, with a score of 5.51 points out of 7, and in the third stage of development ("innovation-driven"), that means it is considered "a highly competitive economy". Below we present German performance in terms of GCI data:

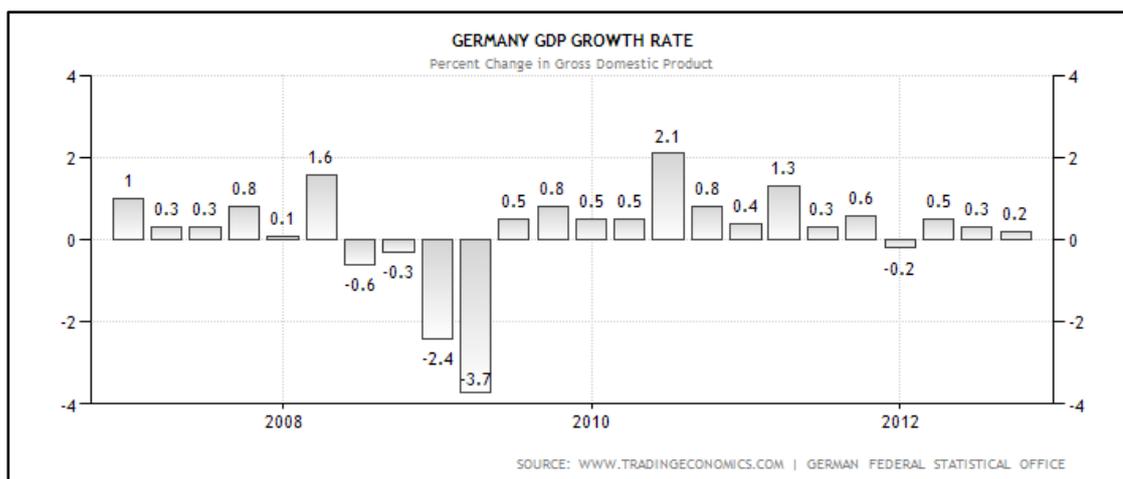
Table 2 - Germany in GCI 2013-2014

	overall index		basic requirements		efficiency enhancers		innovation and sophistication factors	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Germany	4	5.51	9	5.90	8	5.31	4	5.59

Source: WEF Global Competitiveness Report 2013-2014

The recent international financial and economic crisis was the litmus test for the German economy, as it revealed its strengths compared with other economies in EU and outside EU. If we look how the German GDP changed in the first years of the crisis (Figure nr. 3), we can see that Germany witnessed, with one notable exception - the first year of the crisis in Europe - , a favorable evolution, explainable by a multitude of factors but where the high level of competitiveness counted primarily.

Figure nr. 3 - Germany GDP Growth Rate



According to the Federal Statistical Office, GDP Annual Growth Rate in Germany averaged 1.30 Percent from 1992 until 2014, reaching an all time high of 5.20 Percent in the first quarter of 2011 and a record low of -6.80 Percent in the second quarter of 2009.

The fact that the German government, together with its social partners, focused primarily on the main factors of increasing country's competitiveness, first of all by strengthening the role of factors pertaining to the third stage of development - "innovation driven", allowed it to fully benefit from EU and eurozone membership to extend its exports of goods and services all over EU, without meeting any custom, monetary or other types of barriers. At the same time, a quiet but strong process of dislocations from the partner-countries took place in the favor of German market as well, so illustrating Hecksler-Ohlin-Samuelson model of factors distribution.

Germany recorded also important financial inputs, having a stronger possibility to assist financially the countries in need, like, among others, Portugal, Spain, Italy or Greece and even strengthen its negotiating position inside EU.

An interesting analysis is made by Michel Didier and Gilles Koleda in the book "Competitiveness France-Germany. The Huge Gap"<sup>2</sup>, which summarises the study they conducted for the French Ministry of Economy, Finance and Industry in order to measure and explain the deepening gap of competitiveness between France and Germany in the first decade after euro introduction (2001-2010). The main conclusion was that the difference between the economic and social policies, the little attention devoted in France to the R&D activities as compared to Germany, determined, inter allias, a serious reduction of the quota of

<sup>2</sup> The book was published in French, under the title "Compétitivité France Allemagne. Le grand écart", by Economica Publishing House and Coe-Rexecode 2011

French exports in the overall German export, from 55% to 40%, which meant about 10% of the French GDP (200 billion euro).

Worth mentioning in this context that the situation is similar at the level of the European Union as a whole, where the Lisbon Strategy had to change its ambitious objectives at mid-term review and the new strategy, Europe 2020, with less ambitious objectives, does not seem now to be successfully implemented. We think that the EU member-states are not yet prepared to make a better mix a policies and attain also a better coordination of such policies within EU.

## 2. The Case of the Republic of Serbia

With a population of 7.3 million inhabitants and a GDP of 37.4 billion USD<sup>3</sup> (that means 0.10 of the World GDP and 4,943 USD/inhabitant), Serbia occupies the position 49 from 146 countries included in the *World Bank Knowledge Economy Index*, scoring 6.02 points (Romania is situated on place 44 with 6.82 points) and the position 101 from 148 countries included in the *Global Competitiveness Index* calculated by World Economic Forum, with 3.77 points from 7 (Romania is on 76 position with 4.13 points).

Table nr.3 - Comparative KEI data for Balkan countries, Sweden and Romania (2012)

Rank	Country	KEI	KI	Economic and Institution Regime	Innovation	Innovation	ICT
1	Sweden	9.43	9.38	9.58	9.74	8.92	9.49
28	Slovenia	8.01	7.91	8.31	8.50	7.42	7.80
39	Croatia	7.29	7.27	7.35	7.66	6.15	8.00
44	Romania	6.82	6.63	7.39	6.14	7.55	6.19
49	Serbia	6.02	6.61	4.23	6.47	5.98	7.39
57	Macedonia, FYR	5.65	5.63	5.73	4.99	5.15	6.74
70	Bosnia-Herzegovina	5.12	4.97	5.55	4.38	5.77	4.77
82	Albania	4.53	4.48	4.69	3.37	4.81	5.26

Source: World Bank, KAM

Analysis of the data from Table nr. 3 indicates that Serbia succeeded to pass, slightly, in terms of performances, to the second part of the scoreboard for both KEI and KI, witnessing a substantial progress throughout the last decade. But it remains in a median position as compared to the other Western Balkan countries, the performances in Economic and Institution Regime are still under the average figure, it has best achievement in ICT, but in the field of education it marked a move back of 1.33% compared to the reference year (2000). That means, Serbia must further dedicate substantial efforts to increase the

<sup>3</sup> The Global Competitiveness Report 2013–2014, World Economic Forum, 2013, page 334

performance in the education field, strengthen the economic freedom, improve the regulatory framework and abide more determined to the rules of the society.

In the Table nr. 4 below, we present, for the same countries, the KEI changes (in %) in 2012 as against 2000, noting the high rate of growth recorded by Serbia within this interval of time.

Table nr. 4 - KEI changes 20012/2000 (%)

Rank 2012	Country	KEI		Change in KEI (%)
		2000	2012	
1	Sweden	9.65	9.43	-9
28	Slovenia	7.90	8.01	+1.39
39	Croatia	6.59	7.29	+10.62
44	Romania	5.66	6.82	+20.49
49	Serbia	4.80	6.02	+25.42
57	Macedonia, FYR	4.76	5.65	+18.70
70	Bosnia & Herzegovina	4.37	5.12	+17.16
82	Albania	3.52	4.53	+28.69

Source: World Bank KEI

As to the Global Competitiveness Index, alike Romania and other 29 countries, Republic of Serbia is an "efficiency-driven economy", according to the classification made by World Economic Forum.

The following table presents the situation of Serbia and Romania's individual performances as regards the three stages of development considered in the GCI construction:

Table nr. 5 - Romania and Serbia in GCI Top 2013-2014

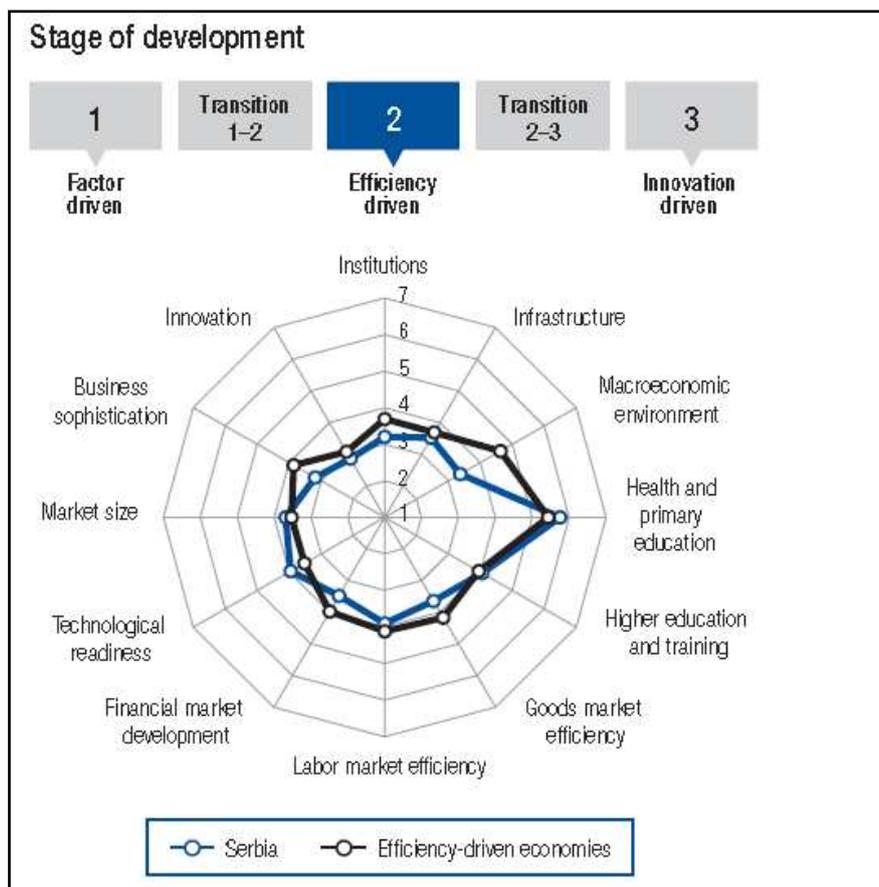
	overall index		basic requirements		efficiency enhancers		innovation and sophistication factors	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Serbia	101	3.77	106	3.96	92	3.78	125	3.01
Romania	76	4.13	87	4.32	63	4.13	103	3.32

Source: WEF Global Competitiveness Report 2013-2014

In the figure below, there is a suggestive presentation of how Serbia implements the twelve pillars of the WEF Global Competitiveness Index, compared with the overall performances of the countries belonging to the "efficiency-driven stage". It is obvious that

Serbian economy's performance is, with a few exception, underneath the overall performance of the "efficiency-driven economies", with a slight better performance for "technological readiness" and "health and primary education". To some extent, we see that the assessment made in the GCI analysis confirms the corresponding results provided by the World Bank Knowledge Economy Index presented above.

Figure nr. 4 - Serbia's performance of the 12 pillars



Source: The Global Competitiveness Report 2013–2014, World Economic Forum, 2013

Unfortunately, according to the available data, Republic of Serbia did not attain a proper level and orientation of its investment policy in towards R&D domains, which constitute an essential prerequisite for the implementation of a knowledge-based economy. After the official available data, the public funds allotted to R&D activities stagnated at 0.3% of GDP, most of the funds being used to pay researchers wages, while the projects devoted to basic scientific research received maximum 6 million Euro per project and those money concerned only the applicative research, to which there were given a maximum 4 million Euro amount per project.

In the following period of time, the Serbian government intends to invest more in science and technology development as the only one possibility to create a sustainable

economy and society. According to IMF prognosis, in order to catch up with the EU countries by 2020 Serbia would need to grow at an additional 2% yearly from 2011 to 2020. But the creation of competitive advantages would lead toward a knowledge-based economy and to sustainable growth, which is of utmost importance, especially now, when Republic of Serbia started the EU accession negotiations.

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