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## GLOBAL COMPETITIVENESS OF THE REPUBLIC OF SERBIA IN TERMS OF INNOVATION PERFORMANCE

### Abstract

*Innovation is a complex phenomenon and it can be considered from various viewpoints according to affinities of the researcher and aims of observation. Since it is an essentially significant phenomenon, the abundance of literature related to the investigation of various dimensions of innovation is comprehensible. The complexity of this phenomenon often leads to basically different explications of innovation of enterprises and countries. This paper analyses innovation performance of Serbia and its position in relation to other countries of the world and Europe based on the data of The Global Innovation Index and European Innovation Scoreboard. The results of analysis of dynamics of innovation of Serbia according to the Global Innovation Index show its great innovation lagging behind European countries. Regarding the achieved innovation performance the lagging of Serbia behind European countries is also great, according to the latest data of the European Innovation Scoreboard.*

**Key words:** Innovation, Republic of Serbia, Global Innovation Index, European Innovation Scoreboard

**JEL classification:** O30

## ГЛОБАЛНА КОНКУРЕНТНОСТ СРБИЈЕ У ПОГЛЕДУ ИНОВАТИВНИХ ПЕРФОРМАНСИ

### Анстракт

*Иновативност је сложена појава и може се посматрати са различитих аспеката у складу са афинитетима истраживача и циљевима посматрања. Будући да је реч о есенцијално значајном феномену, разумљиво је постојање врло богате литературе у којој се истражују различите димензије иновативности. Сложеност појаве неретко доводи до суштински различитих објашњења иновативности предузећа и земаља. У овом раду се анализирају иновативне перформансе Републике Србије и њен положај у односу на друге земље света и Европе, на основу података Глобалног индекса иновативности (Гхе Глобал Инноватион Индекс) и Европске*

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*иновационе бодовне листе (Еуропеан Иноватион Сцоребоард). Резултати анализе кретања иновативности Србије, према Глобалном индексу иновативности показују њено велико иновативно заостајање за европским земљама. Заостајање Србије у погледу достигнутих иновационих перформанси за европским земљама је врло велико и према најновијим подацима Европске иновационе бодовне листе.*

**Кључне речи:** *Иновативност, Република Србија, Глобални индекс иновативности, Европска иновациона бодовна листа*

## Introduction

Economic analysts show great interest in the research of innovation of enterprises and countries. Innovations are the basis for economy of knowledge and play a central role in contributing to the growth and development of an enterprise today. Creation, exchange and successful commercialisation of knowledge in innovations is a source of increase of production, value added, rapid economic growth, improvement of competitiveness, creation of new labour positions and stable social welfare. The differences in innovation significantly define possibilities for growth and development of an enterprise (Cvetanović & Petrović, 2015; Moore, 2005), together with the level of development of economy and a society as a whole. Only the economies with a great number of innovation oriented enterprises that efficiently realise their innovation ideas can provide high employment rate and income of the population, thus creating conditions for future sustainable economic growth (Cvetanović, Nikolić & Pokrajac, 2016; Despotović, Cvetanović & Nedić, 2014). The absence and/or insufficient level of innovation leads to lagging in all domains of production and business of enterprises. Therefore, the motto “innovate or disappear” has become generally accepted at the levels of both an enterprise and the economy as a whole (Pokrajac, 2010).

The subject of research in this paper is the latest position of the Republic of Serbia related to the achieved level of innovation in European relations. The aim is to critically identify notified trends in the dynamics of innovations in Serbian economy, primarily related to the proclaimed European pathway of Serbia towards the full membership in the European Union. In analytical sense, the analysis of innovation of our country based on the data in *Global Innovation Index* and *European Innovation Scoreboard* will answer the question whether Serbia follows the proper direction related to the improvement of innovation and whether the process is done sufficiently fast.

The paper includes the following sections: after the introduction, the second section discusses innovation as a key characteristic of economy of knowledge. The third section reviews the innovation of Republic of Serbia based on the data obtained from *The Global Innovation Index*, while in the fourth, the innovation of Republic of Serbia is discussed according to *European Innovation Scoreboard* data. Finally, the most significant conclusions provided by the research are presented in the last section.

## Improvement of innovations in the economy of knowledge

Innovation is a phenomenon that significantly determines the development of knowledge based economy. The improvement of innovation is the most important factor of

survival and development of an enterprise and is the best response to global challenges of contemporary society (Cvetanović, 2017). The growth of innovations of an enterprise and a country is in the function of continuous adaptation of market subjects to dynamic changes in the environment and is a basic assumption of more complete satisfaction of the existing and new needs of people (Cvetanović, 2011). Innovation is often defined as the capability of an economy, an enterprise or an individual to transform new business ideas into new products, services, technologies and markets. Its basic concept is designing new and more efficient products and services (Dess, Lumpkin & Eisner, 2007; Crespell & Hansen, 2008). Commercialisation of innovation is a risky activity for an enterprise, since it does not always lead to success on the market. To succeed in the market it is not enough to introduce innovation only, but it should provide improvement of business performance (Amidon, 2003; Likar, et al., 2006; Yoo, et al., 2012; Cvetanovic, Nedic & Eric, 2014)

In order to manage innovation activities more efficiently and effectively, the basic principles of innovations are defined as follows

- Innovation has to take place basically into the enterprise.
- The existence of economic freedom that is formed in the market surroundings is necessary as a result of competition which forces economic subjects to improve and advance business factors.
- Innovation is an obligation for all employees, not for certain parts of the enterprise or part of employees.
- Innovation integrates several aims such as developmental, unilateral, aesthetic, ecological etc.
- Innovation need not necessarily be absolutely original, since there is a so-called ‘creative imitation’, which may also be a significant step in the innovation behaviour of a single company.
- Innovation behaviour includes taking risks.
- An innovator is more concentrated on the possibility than on a risk
- Efficient innovation has to be simple and well promoted on the market.
- Aspiration towards leadership in this domain is a decisive assumption of a successful innovation and its sustainability in the market (Pokrajac, 2001).

Measuring innovativeness is significant since the obtained results create a basis for defining developmental policy and are a necessary element of its practical realisation. Numerous investigations, studies and analyses of innovations are conducted and published at international and national levels. The contribution of innovations in the improvement of business performance of an enterprise is most often quantified, as well as economy as a whole. The traditional approach is increasingly abandoned, based on a small number of individual indicators (e.g. number of patents) in favour of contemporary approach, based on the use of the so-called composite indicators which include a greater number of single parameters of innovation (Cvetanović & Novaković, 2014; Grupp & Schubert, 2010). The development of composite indicators significantly improved follow-up of innovations. A composite indicator is an aggregate index of single indicators as well as pondered coefficients which represent the relative significance of each separate indicator. Best-known indicators that measure innovations include *The Global Innovation Index*, *The Global Innovation Policy Index*, *European Innovation Scoreboard*, *The Global Cleantech Innovation Index*, *The Atlantic Century Benchmarking EU and US Innovation and competitiveness*, *The BCG Report - The Innovation Imperative in Manufacturing* and many others.

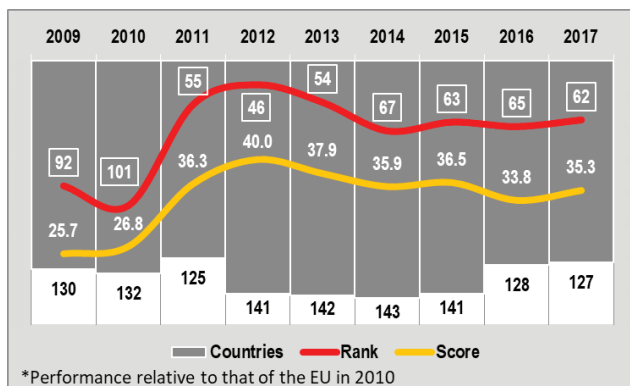
In continuation, innovation performance of Serbia together with its position in relation to other countries of the world and Europe is analysed by using *Global Innovation Index* and *European Innovation Scoreboard*.

## The innovation of Republic of Serbia considered according to Global innovation index

*Global Innovation Index* (GII), as a complex indicator of innovation that includes a great number of single indicators of innovation surpasses traditional methods of measuring of innovation based on single indicators of innovation (e.g. development of research and growth, number of patents, number of new products etc.). This index provides clear, comparable and comprehensive method for identification of the position of Serbia in relation to other European and world countries. In addition, GII enables the identification of domains which have to be significantly upgraded in order to improve innovation of the observed countries (especially Serbia) to a great extent, together with the domains that are already developed and should be further developed, in order to decrease the lagging of Serbia in innovation development in relation to other EU countries, especially the surrounding countries. The methodology of obtaining GII enables comparison and ranking of various countries by their innovation development, i.e. innovation capacity. This indicator is designed to measure innovation in the countries of various economic and innovation levels, which is especially beneficial for the developing countries that want to rapidly improve their innovation and total development.

In 2017, according to GII, five most developed countries in the world were Switzerland, Sweden, Holland, the USA and Great Britain. With the value of *Global Innovation Index* amounting 35.3 points (on the scale from 1 to 100), Serbia took 62<sup>nd</sup> position out of 127 observed countries related to innovation (Figure 1), i.e. the very bottom of Europe, significantly lagging behind the most developed European countries, as well as after the neighbouring countries of South East Europe (Table 1, Figure 2).

Figure 1: Innovation values and ranking of Serbia according to Global Innovation Index by years



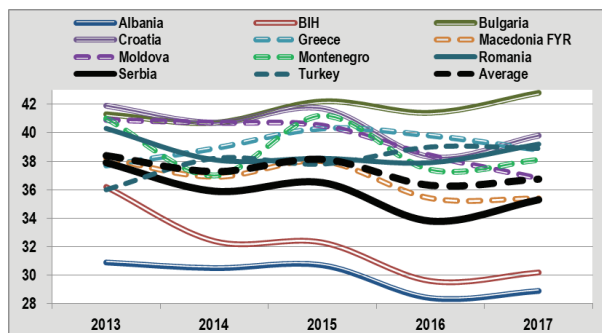
Source: Authors according to data from *The Global Innovation Index 2017: Innovation Feeding the World, 2017*

Although the ranking of Serbia improved by three places in 2017 in comparison to the previous year, the ranking of Serbia in the global innovation map was significantly under the level achieved in 2012, when Serbia was at the 46<sup>th</sup> position out of 141 observed countries. Low ranking of Serbia during the whole observed period points to great innovation lagging and low level of competitiveness of the Serbian economy.

Table 1: Score of South East European countries according to Global Innovation Index by years

Score (0-100)	2013	2014	2015	2016	2017
Albania	30.9	30.5	30.7	28.4	28.9
BIH	36.2	32.4	32.3	29.6	30.2
Bulgaria	41.3	40.7	42.2	41.4	42.8
Croatia	41.9	40.7	41.7	38.3	39.8
Greece	37.7	38.9	40.3	39.8	38.8
Macedonia FYR	38.2	36.9	38	35.4	35.4
Moldova	40.9	40.7	40.5	38.4	36.8
Montenegro	41	37	41.2	37.4	38.1
Romania	40.3	38.1	38.2	37.9	39.2
Serbia	37.9	35.9	36.5	33.8	35.3
Turkey	36	38.2	37.8	39	38.9

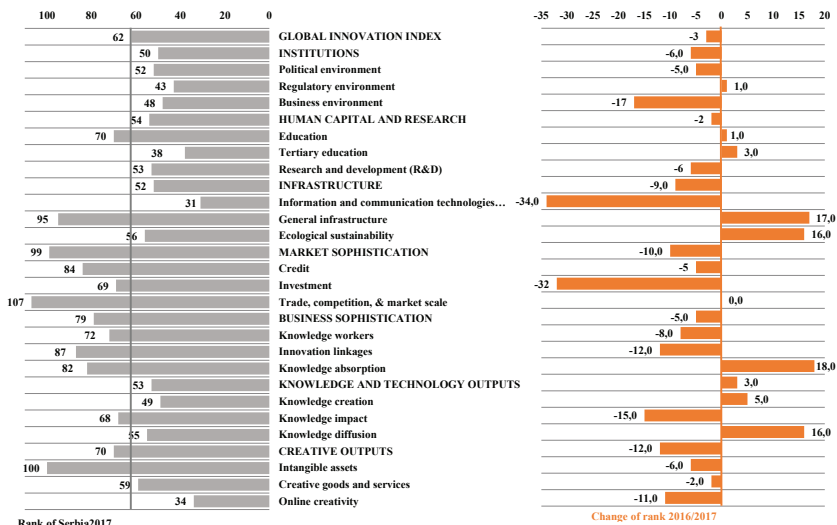
Figure 2: Dynamics of values of Global Innovation Index of Serbia and other South East European countries during the period 2013-2017



Source: Authors according to data from *The Global Innovation Index 2017: Innovation Feeding the World, 2017*

In comparison to 2016, Serbia improved its global position in 2017 related to innovation performance in six out of seven pillars included in *Global Innovation Index* (Figure 3). The greatest rise of 12 places in the list of global invention was recorded in the pillar which measured *Creative outputs* (rise from 82<sup>th</sup> in 2016 to 70<sup>th</sup> ranking in 2017). Significant improvement of Serbian innovation position was also noted in the pillar *Market sophistication* (rise from 109<sup>th</sup> to 99<sup>th</sup> ranking), together with the pillars which measured development: *Infrastructure* (rise from 61<sup>th</sup> to 52<sup>nd</sup>), *Institutions* (rise from 56<sup>th</sup> to 50<sup>th</sup> ranking), *Business sophistication* (rise from 84<sup>th</sup> to 79<sup>th</sup> ranking) and *Human capital and research* (rise from 56<sup>th</sup> to 54<sup>th</sup> ranking). The decline of position of Serbia in the promotion of innovation was noted only in the pillar which measured *Knowledge and technology outputs* (fall from 50<sup>th</sup> to 53<sup>rd</sup> ranking)

Figure 3: Innovation ranking of Serbia according to Global Innovation Index in 2017 and change of innovation in relation to 2016



Source: Authors according to data from *The Global Innovation Index 2017: Innovation Feeding the World, 2017*

Out of 21 domains on the global innovation scale in 2017, Serbia showed the best achievements in the domain of *ICTs* (with 41<sup>st</sup> ranking out of 128 countries), *Online creativity* (34<sup>th</sup> ranking) and *Tertiary education* (38<sup>th</sup> ranking), while out of 81 single indicators of innovation, Serbia was best ranked in four indicators of invention: *Cost of redundancy dismissal* (Ranking 1), *Wikipedia yearly edits* (with maximum 100 points Serbia was ranked among leading countries – Rank 1) *ISO 14001 environmental certificates* (4<sup>th</sup> ranking) and *Scientific and technical publications* (8<sup>th</sup> ranking).

The greatest lag in innovation development of Serbia was in the pillar which measured *Market sophistication*, and in the domains *General infrastructure* (95<sup>th</sup> ranking), *Trade, competition, & market scale* (107<sup>th</sup> ranking) and *Intangible assets* (100<sup>th</sup> ranking). In relation to single indicators, the worst position of Serbia was in the indicators which measured *GDP per unit of energy use* (119<sup>th</sup> ranking), *Intensity of local competition* (118<sup>th</sup> ranking), *Total computer software spending* (103<sup>rd</sup> ranking), *ICTs and organizational model creation* (103<sup>rd</sup> ranking), *State of cluster development* (102<sup>nd</sup> ranking) and *ICTs and business model creation* (101<sup>st</sup> ranking).

The basic conclusion of the analysis of Serbian innovation development according to the *Global Innovation Index*, in comparison to other countries in the world, and primarily to other countries of South East Europe, is that innovation development of Serbia is at European bottom and among the lowest ranked countries of South East Europe.

Comparison and dynamics of single indicators of innovation in the recent years point to presence of innovation potential in Serbia, but it is insufficiently utilised, and the innovation factors of development are inefficiently managed (Kutlača & Semenčenko, 2015). Therefore, it is necessary to change the former policy of total and innovation development and take more effort and provide means (primarily human and financial) in order to improve

the innovation of the economy as a base of future dynamic and sustainable development, increase of employment, and the rise of life standard and quality in Serbia (Despotovic, Cvetanović & Nedic, 2016).

## **The innovation of Republic of Serbia considered according to European innovation scoreboard**

*European Innovation Scoreboard* is a system for follow-up of results of the innovation process and provides data on innovation of European Union enterprises and countries. It is an instrument used by the European Commission for the follow-up and comparative analysis of innovation performance, key strength and weakness of EU countries and other joined countries (Serbia, Macedonia, Croatia, Iceland, Turkey, Norway and Switzerland). The report also includes comparisons based on the selected set of indicators between EU28 and 10 globally competitive countries: the USA, Japan, Australia, Canada, South Korea and BRICS countries (Brazil, Russia, India, China and South Africa).

Innovation scoreboard includes *three basic groups of indicators* of innovation classified in eight dimensions with the total of 25 different indicators. It is a set of connected indicators of innovation performance that are grouped in three blocks of pondered composite indices.

*The first group of indicators* includes input factors which enable innovations but are not related to any enterprise and cover three dimensions of innovation:

- 1) *Human resources* (three indicators that measure availability of highly qualified and educated labour)
- 2) *Research systems* (three indicators that measure openness, quality and attractiveness of research system, i.e. international competitiveness of scientific base of a country) and,
- 3) *Finance and support* (two indicators that measure availability of finances of innovation projects and support of a state for performance of innovation activity).

*The second group of indicators* serves for evaluation of innovation at the level of an enterprise and includes three dimensions of innovation:

- 1) *Firm investments* (two indicators that follow the investments of an enterprise in IR and other investments which enterprises undertake to achieve innovation)
- 2) *Linkages & entrepreneurship* (three indicators that follow the innovation activity within an enterprise and capability and readiness of an enterprise to be connected to other organisations and institutions) and
- 3) *Intellectual assets* (three indicators that show a degree of intellectual copyright protection and possibilities of financing the activities in research and development)

*The third group of indicators* includes results of innovation activities of an enterprise through two dimensions:

- 1) *Innovators* (three indicators that follow small and medium enterprises which introduce innovations to the market or within an enterprise, either related to a product or a process and fast-developing innovation enterprises)
- 2) *Economic effects* (five indicators by which it is possible to evaluate the effects of innovations on employment, as well as export and sale that are a result of innovation activities (Mroczkowski, 2012).



According to the information obtained in the scoreboard it is possible to determine *Summary Innovation Index* aimed to help countries to improve their innovation performance and successfully realise Europe 2020 Strategy. The *Summary Innovation Index* is a complex indicator of innovation which is calculated by using aggregate indices of national innovation performance, as a composite index that contains 25 single indicators, thus providing consideration of an overall pattern of innovation performance of countries.

According to the data of the *Summary Innovation Index* the lagging of Serbia in terms of innovation is very pronounced. The fact that innovation gap is getting closer is an encouraging fact, although not sufficiently fast. For example, in 2009, general level of innovation in Serbian economy was 41.8 % of EU innovation, while that percentage was 63.2% in 2016 (Table 2). In relation to the neighbouring countries, Slovenia and Hungary had better innovation performance in 2016, while Serbia was better than Croatia, Bulgaria, Romania and Macedonia.

With regard to single domains *Firm investments* and *Employment impacts* (Table 2) made the greatest contribution to the innovation growth of Serbia during the observed period of time.

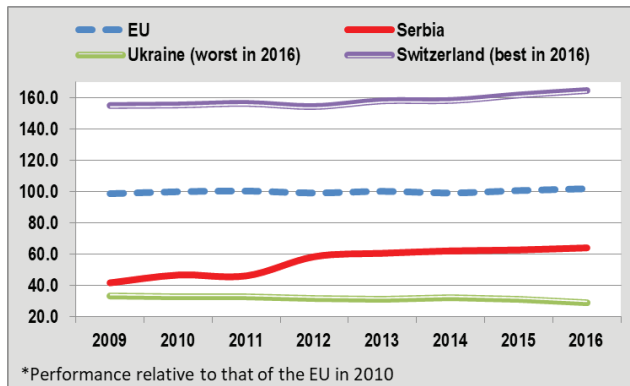
Table 2: Dynamics of innovation of Republic of Serbia in single domains during the period 2009-2016.

Serbia	2009	2010	2011	2012	2013	2014	2015	2016
<b>Summary Innovation Index</b>	41.8	46.8	46.3	58.5	60.7	62.2	62.8	64.2
<b>Human resources</b>	25.6	28.1	31.4	37.2	48.7	53.7	77.7	76.8
<b>Research systems</b>	30.3	30.5	32.8	39.9	36.0	34.4	36.1	44.1
<b>Innovation-friendly environment</b>	34.8	39.2	37.0	37.0	37.0	37.0	37.0	37.0
<b>Finance and support</b>	25.5	66.9	58.5	56.2	58.6	46.9	37.9	43.9
<b>Firm investments</b>	76.1	78.5	77.3	58.4	63.4	124.4	128.6	130.2
<b>Innovators</b>	46.8	46.8	46.8	109.0	109.0	84.0	84.0	81.2
<b>Linkages</b>	30.5	31.0	34.2	52.1	48.4	43.4	43.4	42.6
<b>Intellectual assets</b>	25.2	24.1	17.8	13.0	14.2	16.6	19.5	22.7
<b>Employment impacts</b>	62.9	71.6	77.3	94.0	94.0	94.0	94.0	94.0
<b>Sales impacts</b>	46.7	45.4	45.9	56.0	66.1	66.6	65.3	65.3

Source: European Innovation Scoreboard 2017, 2017.

The innovation growth of Serbia by the average rate of 22.3% during the period 2009-2016 enabled partial closing of the innovation gap between Serbia and EU, which can be seen in Figure 4. However, this gap was even deeper in comparison to Switzerland, as the leading innovation country. Figure 4 also reveals the innovation fall in Ukraine, as the lowest ranked country in this list.

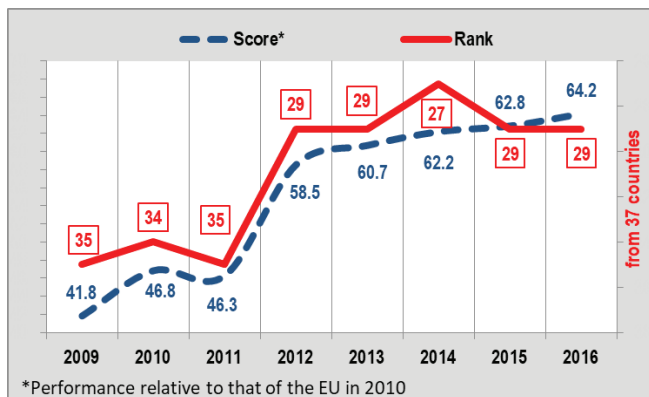
Figure 4: Dynamics of innovation of EU, Serbia, Ukraine and Switzerland in the period 2009-2016



Source: Authors according to data from European Innovation Scoreboard 2017, 2017.

Thanks to the continuous increase of the innovation level in the period 2009-2016, Serbia managed to increase its ranking in the observed group of 37 European countries (from nearly lowest position in 2009 to 29<sup>th</sup> ranking in 2016 (Figure 5).

Figure 5: Ranking and score: Summary Innovation Index for the period 2009-2016.



Source: Authors according to data from European Innovation Scoreboard 2017, 2017.

The improvement of ranking position for 6 places is not a spectacular result, but it can be positively assessed on the whole, especially bearing in mind that improvement of innovation is basically a slow and long-term process.

## Conclusion

In 2017, with its value of global innovation index of 35.3 points (on the scale from 1 to 100) Serbia was at 62<sup>nd</sup> position out of 127 observed countries with respect to innovation, i.e. it was at the very bottom of Europe, significantly lagging behind the most developed

European countries, as well as the neighbouring countries of South East Europe. The lagging of Serbia regarding innovation was also highly pronounced according to the data of the *Summary Innovation Index*. However, the positive trend of values in the *Summary Innovation Index* since 2012 is encouraging. As an example, in 2009, global level of innovation in Serbian economy was 41.8% of EU innovation, while in 2016 it was 64.2%. Due to its permanent improvement in the level of innovation in the observed period (2009-2016), Serbia upgraded its position within the group of 37 European countries for 6 places, thus rising from nearly lowest to the 29<sup>th</sup> ranking in 2016. This ranking position is not a breathtaking result, but it reveals the tendency of improvement of innovation, especially bearing in mind that it is a slow and long-term process.

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