EDUCATION session

INNOVATIONS AS A FACTOR OF ECONOMIC DEVELOPMENT OF SOUTHEASTERN EUROPEAN COUNTRIES WITH EMPHASIS ON MONTENEGRO

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ABSTRACT
The purpose of this paper is to analyze the importance of innovation and investment in research and development (R&D) for the economic development of selected southeastern European (SEE) countries. The implicit hypothesis of this paper is therefore related to the question of sustainability of economic model of development of the SEE countries which is based on permanent investment in R&D and continuous innovation. In order to test the relationship between these two and economic prosperity measured by GDP per capita, the paper interprets results of econometric models for developed countries and explains the importance of innovation as a key to economic development of SEE countries.

In the modern business environment, the need for creative and innovative activities is permanent. Innovations significantly affect effectiveness and efficiency of a company, its capacity, as well as the quality of goods and services. If we have in mind the fact that a healthy economy is the most important factor of economic development of a country, we can see how lack of innovation could negatively affect the whole society.

The topic of innovation and its importance comes along with global recession. The policy makers did not see the crisis coming, and when it began, most governments and international institutions were taken by surprise. SEE countries were also affected and many of them did not recover up to 2012, so the main question addressed to the policy makers is how to come back to the path of economic growth. One of the most common proposed solutions are innovations that would enable the countries of SEE to exploit its full potential and in that way reduce the gap between them and developed countries.

The paper analyzes innovativeness of European countries, and we are explaining how innovations effect the economic development of these countries. Specifically, the paper addresses the question of SEE economies from the perspective of European Union integration, emphasizing the candidate countries and comparing them to the EU member countries from this region.

We give a special consideration to Montenegro, as a country where, unfortunately, importance of innovations is still not completely understood. There is no significant investment in R&D but situation is expected to improve in the future.

Key words: innovation, economic development, investment in R&D, creativity
JEL code: E2, E61, O15, O32

INTRODUCTION

There are a lot of definitions of innovation. One of them says that innovation is something new that creates value. Peter Drucker, leading management guru, defines innovation as "a change that creates a new dimension of performance". Michael Porter defines innovation as "a new way of doing things that is commercialized". Joseph Schumpeter defines innovation as "the doing of new things or the doing of things that are already being done in a new way." But, there is something that almost all definitions contain: the fact that innovation is of crucial importance for both economic growth and the growth of a firm. Moreover, modern growth theory identifies three key determinants of productivity growth: accumulation of physical capital, accumulation of human capital and a rate of innovation and technological change.

Globalization, growing international competition, the information revolution and technological changes is something that describes today's environment. In that situation, innovations became more and more important because they offer a chance for firms and countries to be different and better. Innovative firms can increase their efficiency and improve the goods and services they offer, and on the other side they can reduce the costs of production. Countries that create innovative environment are those that are experiencing high growth rates of GDP. A lot of studies prove that those variables are positively related.

Study made by Rosenberg (2004)[18] emphasizes the importance of professor Abramovitz's research (Stanford University) which was done in 1950s. This research showed that only 15% of the growth in USA from 1870-1950 was the result of increased use of labour and capital. The rest 85% of growth was unexplained by classical function of production. That leaves the possibility that technological progress and better combination of inputs can contribute to an increase in output. Later, in 1957 Robert Solow, with different methodology and the data set, got a similar result. The residual component has reached the value of 85%. That way his model has shown that the primary determinant of growth is "technical change". His contribution was in the fact that he placed innovation in the centre of a great number of future analyses. One of the significant recent papers was written by Lucas (1988) who highlights the importance of highly skilled workforce for long-term growth. New growth theories put technological progress, new knowledge and investment in R&D in the centre of analyses. These factors are important at the global level and they have a huge impact on the increase of production volume and standard in recent decades. But there is a problem if we apply those factors in the analyses of less developed countries and regions, because they do not have easy access to new technology so they cannot use benefits of new knowledge to accelerate their economic growth.

Today, innovation is regarded as one of the key factors of competitiveness, both at the level of the national economy, and that of the business system. From the standpoint of the national economy, the importance of innovation is reflected in the fact that improves the national productivity. Countries should try to improve their competiveness which means the ability to achieve success in the markets in order to increase the standard of living over time. Countries can become more competitive by improving their achievements in a wide range of factors that affect productivity growth. This applies to innovation, creating a favourable legislative environment, and transfer or adoption of a new technology, education, entrepreneurship, or new businesses.

[18] Nathan Rosenberg, Professor of Economics, Stanford University: *Innovation and Economic Growth,* OECD, 2004 (online paper)

The lack of innovation in the use of new technologies and a new product development, high costs, and a lack of information about the needs of the market affect the poor productivity and economic growth of Montenegro measured by low level of GDP per capita. Accordingly, enhancing the productivity and competitiveness of Montenegro can be achieved by strengthening the SMEs (small and medium enterprises), with the main focus on the key actors of development - innovation and technological development.

INNOVATION INDICATORS OF EUROPEAN COUNTRIES

There are a lot of ways of measuring how innovations contribute to the economic growth and development. Before we move on to the Global Innovation Index, which is the central section of our paper, we will try to display the innovativeness of European countries using some separate indicators, in order to get general overview which countries are leaders in this area.

Firstly, we will talk about most frequently used measure of innovativeness- **Gross domestic expenditure on R&D**, also known as **GERD**. We define GERD as current and capital expenditures on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture and society, and the use of knowledge for new applications.[19] Main advantage of this indicator is its universality, which originates from the fact that GERD is the sum of the R&D expenditures of the four economic sectors- business enterprises, government, private non-profit organizations and higher education industries.[20] In the chart 1, we are displaying GERD as a percentage of GDP for 28 European countries in the 2010.

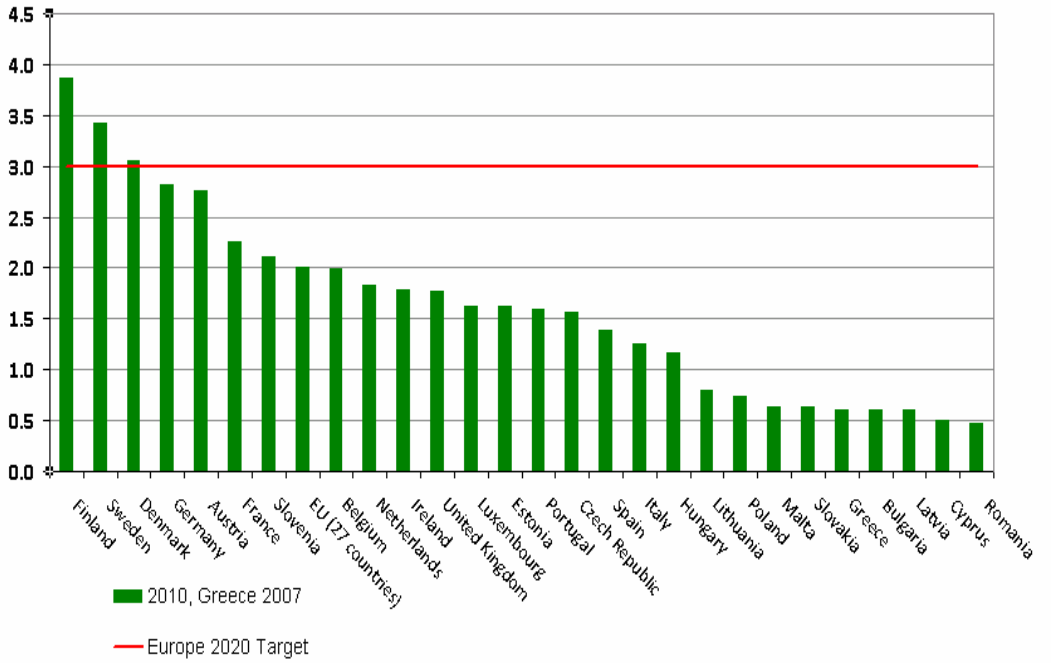

Chart 1: GERD as a percentage of GDP for 28 European countries, 2010[21]

[19] http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS (accessed on March 12, 2014)

[20] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Gross_domestic_expenditure_on_R_%26_D_(GERD) (accessed on March 12, 2014)

[21] http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/introduction (accessed on March 12, 2014)

As we can see from the chart above, the leading countries according to this indicator are Scandinavian countries- Finland, Sweden and Denmark (above 3%), followed by Germany, Austria and France, which belong to the group of most developed European countries. It is interesting to note that Slovenia (former Yugoslav republic) is above average of European Union, while the United Kingdom is below average. This data, in general confirms the hypothesis that countries with high investments in R&D are at the same time the most developed countries, with few exceptions mentioned above. Another data marked on the chart 1 is the Europe 2020 target. As we have already mentioned, Europe 2020 is the EU's growth strategy for the coming decade in order for EU to become a smart, sustainable and inclusive economy. One of the five objectives of this program is the innovation, which includes objective mentioned above- EU countries should achieve GERD at the level of 3% of the GDP. This shows the importance of investments in R&D for the whole community.

Another interesting indicator is **the number of patent applications** submitted by the countries in one year. Data refers to the applications filed directly under the European Patent Convention or applications filed under the Patent Co-operation Treaty and designated to the EPO (Euro-PCT). In the chart number 2, we can see the number of patent applications per country submitted in 2010.

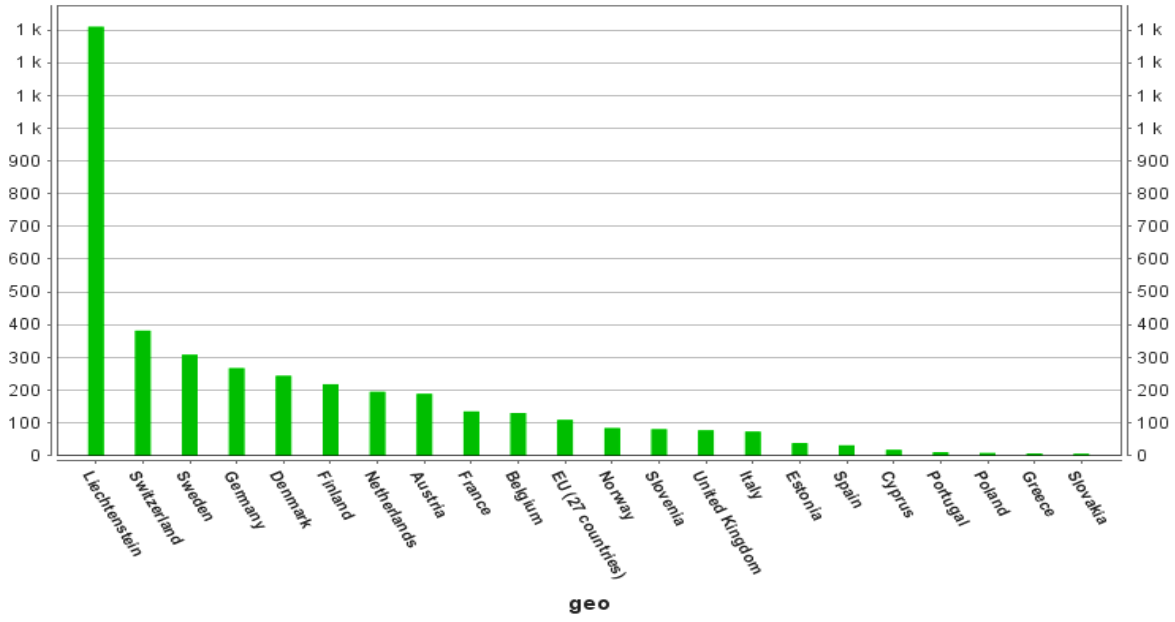

Chart 2: Number of patent applications per country submitted in 2010[22]

This data also confirms the fact that countries which are investing a lot in R&D are the ones which are the leaders in economic development in Europe. Again, at the top of the ladder are Scandinavian countries as well as some of the most developed countries from the West and Central Europe. However, elusive leader is Lichtenstein, country from the Central Europe.

[22] http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TSC00032 (accessed on March 12, 2014)

If we analyze previous the previous two charts, we can see that countries from Southeastern Europe (with exception of Slovenia) are lagging behind most developed countries in terms of innovations and R&D. Their GERD is lower than the same indicator in the most developed countries and below Europe 2020's objective. Also, SEE countries had smaller number of patent applications submitted in the observed period. In addition, we analyze **the number of researchers per million inhabitants** in SEE, as another indicator of innovativeness. These data are displayed in the chart 3.

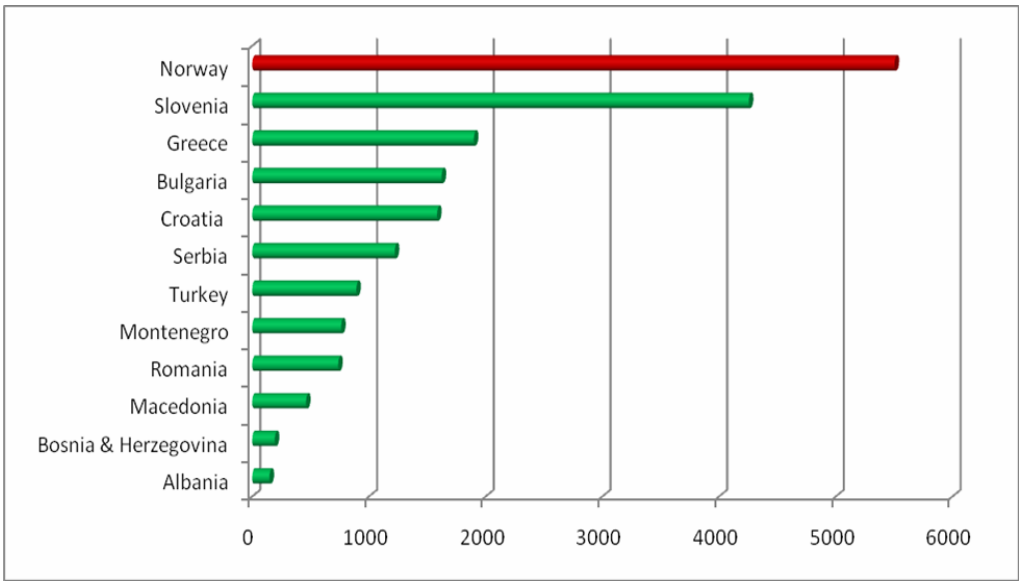

Chart 3: Number of researchers per million inhabitants (last available data for each country) [23]

It is obvious how much these countries are behind the most developed ones (in this case represented by Norway, country with highest level of indicators related to innovations). Half of these countries (including Montenegro), have less than 1000 researchers, which is potentially cause for concern in these countries. Slovenia is the only exception, with 4.255 researchers in 2011, which is the closest to 5.504 researchers in Norway.

When we analyze the stage of development in SEE countries, we can get the broader image of innovativeness of these countries. As we can see from the table 1, seven SEE countries are in the efficiency driven stage- stage where countries develop more efficient production processes and increase product quality in comparison to factor driven stage. However, only two of these countries are in the innovation driven stage where companies from these countries compete by producing new and different goods using the most sophisticated production processes.

[23] http://stats.uis.unesco.org/unesco/tableviewer/document.aspx?ReportId=143 (accessed on March 12,2014)

Table 1: The stage of development of SEE couties[24]

Stage of development				
Factor driven stage (FD)	Transition from FD to ED stage	Efficiency driven stage (ED)	Transition from ED to ID stage	Innovation driven stage
		Albania	Croatia	Greece
		Bosnia & Herzegovina	Turkey	Slovenia
		Bulgaria		
		Macedonia		
		Montenegro		
		Romania		
		Serbia		

All in all, every indicator that is related to innovations points, more or less, at the same conclusion- the more countries invest in R&D, the more they are developed. Finally, we can move on to the analysis of the Global Innovation Index, which is the overall indicator of the country's innovativeness.

In order to explain the estimated effect of GERD (research and development expenditure (% of GDP)) on GDPPC (GDP per capita, PPP (current international $)) we use the Fixed Effect Estimator for panel data. Our data set contains information on 6 countries (Austria, France, Germany, Slovenia, Sweden, United Kingdom) for the time period 1998-2010.[25] The estimator eliminates the individual country effect and it is correcting for standard errors. The coefficient of logged value of GERD on logged value of GDPPC is significant at 2% level. Surprisingly, coefficients on EDU (Public spending on education, total (% of GDP)) and CPI (inflation, consumer prices (annual %)) are not statistically significant. It is possible that there is an omitted variable bias, but even when including other relevant variables for explaining GDPPC the coefficient remains significant. The results show the significance of investing in R&D as they seem to be one of the driving forces of economic growth. Many researches on this topic prove the positive and significant relationship between the two, and there are arguments in the literature that there is bidirectional causality. All in all, the importance of investing in R&D is undoubting, because it creates a background for innovation and invention which promote growth.

The result of our analysis is given in the table below:

[24] http://www.weforum.org/reports/global-competitiveness-report-2013-2014 (accessed on March 12, 2014)
[25] Data source: The World Bank: World Development Indicators

Table 2: Fixed-Effect Estimator

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Fixed-effects (within) regression               Number of obs      =        64
Group variable: countryname                     Number of groups   =         6

R-sq:  within  = 0.2681                         Obs per group: min =         6
       between = 0.4142                                        avg =      10.7
       overall = 0.2512                                        max =        13

                                                F(3,5)             =      5.87
corr(u_i, Xb)  = -0.7990                        Prob > F           =    0.0430

                                (Std. Err. adjusted for 6 clusters in countryname)
------------------------------------------------------------------------------
             |               Robust
      lpcgdp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        ledu |    .377866   .6891599     0.55   0.607    -1.393676    2.149408
       lgerd |   .7872087   .2276382     3.46   0.018     .2020461    1.372371
        lcpi |   .0424002   .0278344     1.52   0.188    -.0291504    .1139509
       _cons |   9.025282   1.287522     7.01   0.001       5.7156    12.33496
-------------+----------------------------------------------------------------
     sigma_u |  .19350638
     sigma_e |  .13232701
         rho |  .68136862   (fraction of variance due to u_i)
------------------------------------------------------------------------------
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INNOVATION AS DETERMINANT OF ECONOMIC DEVELOPMENT

The Global Innovation Index (GII) is the result of cooperation between one of the world's leading and largest graduate business schools, INSEAD and World Intellectual Property Organization (WIPO), a specialized agency of the United Nations. Economic growth is determined by a lot of factors, and one of them is innovation, which has become very important in the period of globalization and growing international competition. Importance of the Global Innovation Index is in the fact that it helps creating an environment in which innovation factors are under continual evaluation and provides a key tool for refining innovation policies. The report pays attention to what companies and countries are doing and what they should be doing in order to stimulate and support innovation. This Index is one of the many research studies that build a ranking of countries related to innovation. The top three countries among all different indexes are Switzerland, Sweden and Singapore. The last Global Innovation Index Report was published for the year 2012 and our analyses are based on this Report.

In the picture below is presented the structure of Global Innovation Index:

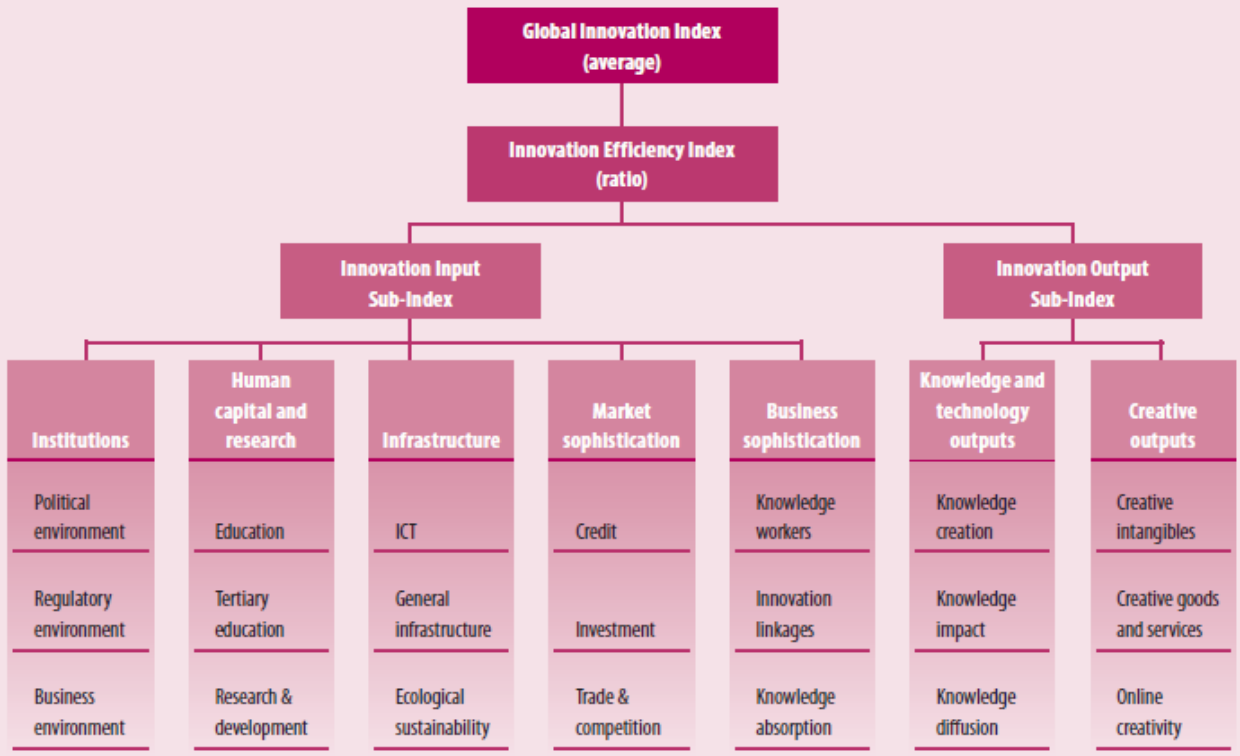

Figure 1: The structure of Global Innovation Index[26]

The Global Innovation Index is a simple average of two sub-indexes: Innovation Input Sub-Index and Innovation Output Sub-Index. Both of them consist of several pillars. Innovation Input Sub-Index is a simple average of five pillars which presents enablers of innovative activities in one national economy: Institutions, Human capital and research, Infrastructure, Market sophistication and Business sophistication. Innovation Output Sub-Index measures results of innovative activities and it is also a simple average of two pillars: Knowledge and technology outputs and Creative outputs. Although the Output Sub-Index includes only two pillars, it has the same weight in calculating the overall GII scores as the Input Sub-Index.

Whereas the aim of this analysis is to indicate the connection between innovation and economic growth (measured by GDP/pc) in this chapter will be given the comparative review of the GII level in several European countries. Analysis is based primarily on comparison between Montenegro and countries of the region (Serbia and Croatia), Estonia (which is often used as a benchmark when we talk about economic development of Montenegro)[27], Switzerland (as the country with the highest level of GII), the most developed countries of the EU (Germany, France and the United Kingdom) and countries with lowest GDP/pc in the EU (Bulgaria and Romania).

[26] http://www.globalinnovationindex.org (accessed on March 12, 2014)

[27] Montenegro and Estonia are both former socialist, small and open economies. They both have intensive cooperation with countries in the region. Difference is in the fact that Estonia had revolutionary transformation to the market economy, but Montenegro had evolutionary approach to market economy and the result of that process is different.

In table 2 is given the review of GDP/pc in 2012 as the measure of economic development of above mentioned countries and the score and rank on the Global Innovative Index list for the 2012:

Table 3: Comparative review of 10 selected countries

	GDP per capita (US$)	Global Innovative Index	
		Rank	Score
Montenegro	7,317	45	40.1
Serbia	6,081	46	40.0
Croatia	14,457	42	40.7
Estonia	16,583	19	55.3
Switzerland	81,161	1	68.2
France	44,008	24	51.8
Germany	43,742	15	56.2
United Kingdom	38,592	5	61.2
Bulgaria	7,202	43	40.7
Romania	8,863	52	37.8

Analysis shows high degree of correlation between GDP/pc (which represents the level of economic growth) and the score of Global Innovative Index (which represents the level of innovation in one country). The correlation coefficient between the GDP/pc and the score of GII is 0.89, which means that there is a very strong linear relationship between these two economic indicators, as can be seen from the graph below.

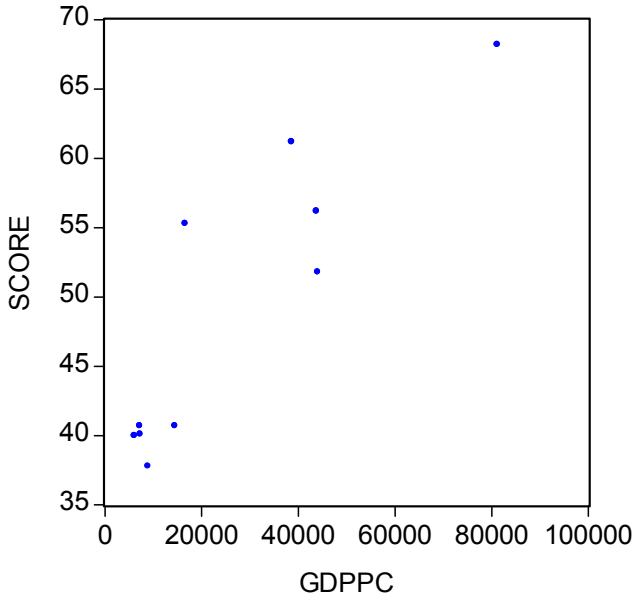

Figure 2: Relationship between the GDP/pc and the score of the GII

It means that those countries which recognize the importance of and invest in innovation benefit from this activity in form of economic growth. But, it is understandable that situation with less developed countries is different. Those countries are faced with a lot of obstacles and they often do not have enough resources to innovate. They can benefit from innovation only after they reach certain level of development. So, in those early phases of economic development it is very important for them to be able to understand importance and to be open for innovations. For those countries is very important the support of government in the field of innovation.

Switzerland has the highest level of GII in the world which makes it the most innovative country. In almost every pillar it has one of the top 10 positions. Its only weakness is the Institutions pillar rank (13th), because of poor showing in the ease of starting a business and of resolving insolvency. But, the fact that its economy is based on knowledge and that Switzerland has one of the highest GDP/pc makes it a friendly environment for innovation and makes easy transformation of innovation-input to innovation-output.

THE IMPORTANCE OF INNOVATION FOR EU INTEGRATION

Almost all countries in transition in Central and East Europe choose the EU membership as their strategic goal. Due the fact that development of the EU in this decade is based on Europe's growth strategy Europe 2020, those countries which want to became the part of EU need to follow that development framework. One of the priorities of the strategy is "smart growth" which includes development of an economy based on knowledge and innovation. This shows how importance of innovation is highly ranked in EU.

We already showed how far countries in transition are behind development countries. The best way for bridging the gap is innovation which can be the faster way too. Innovation gives the chance for those countries that thanks to small efforts make giant leaps. Information technologies have changed many aspects of modern life. Implementation and development of information technology is precondition and determinant of success, not only for companies and industries, also for whole regions and countries. Digital economy brings a lot of opportunities but at the same time it brings new rules of game. How countries will place themselves on the global market depends on their ability to learn fast new rules of market game. Important question is if new possibility can improve the position of developing country or they only make the gap between developing and developed countries deeper.

Dominant opinion is that globalization and all its consequences will help to decrease the differences between rich and poor nations, where innovations and technologies play the main role. They offer a wide range of opportunities for developing countries to transform their economies into digital economies which can compete with developed countries. Simply, developing countries cannot afford that "luxury" to dismiss the possibilities that those technologies and innovations offer.

One of the main determinants of innovation in those countries is public policy. Although governments in SEE countries made a lot of efforts to improve innovativeness, the result is still unsatisfactory. There is still a huge bureaucracy that makes obstacles for future development of SME, inefficiency of public companies, monopolies encouraged by government, problem with corruption, nepotism and unemployment that causes brain drain (or human capital flight), low computer literacy, and often the fear of people to accept innovation because of creative destruction: they first need to destroy all established templates if they want to create something new. That is especially problem in countries with cultures that do not accept the changes easily. Every government needs to find their own way to solve those problems, because they are specific for every country.

On the other hand, integrations are followed by the "brain drain", characteristic indicator especially for SEE countries. The next table shows the country capacity to retain and attract talent, two separate indicators related to brain drain.

Table 4: SEE countries capacity to retain and attract talent in 2013 [28]

Country	Country capacity to retain talent		Country capacity to attract talent	
	Score	Rank	Score	Rank
Albania	3,6	63	3,6	63
Bosnia & Herzegovina	1,9	143	1,9	140
Bulgaria	1,9	142	1,9	144
Croatia	2,3	134	1,9	143
Greece	3,1	86	2,3	127
Macedonia	2,6	123	2,1	134
Montenegro	3,1	92	3,1	92
Romania	2,1	138	2,2	132
Serbia	1,8	146	1,6	147
Slovenia	2,9	107	2,5	120
Turkey	3,3	78	3,2	89

All these SEE countries are faced with severe problem- most talented and educated individuals are leaving country, while countries are not capable to attract other perspective individuals from around the world. As it is presented in the previous table, SEE countries are placed in the bottom half of the list of world countries ranked by country capacity to retain and attract talent in research conducted by World Economic Forum in 2013 (even seven of them are placed among last twenty in terms of attracting talents). This leads to the conclusion that SEE must improve their working environment in order to prevent additional brain drain.

[28] Country capacity to retain talent takes value from 1 to 7, where 1 = the best and brightest leave to pursue opportunities in other countries, 7 = the best and brightest stay and pursue opportunities in the country; while in case of country capacity to attract talent values: 1 = not at all; 7 = attracts the best and brightest from around the world, source: http://www.weforum.org/reports/global-competitiveness-report-2013-2014 (accessed on March 12, 2014)

The topic of innovation and its importance comes along with global recession. The policy makers did not see the crisis coming, and when it began, most governments and international institutions were taken by surprise. SEE countries were also affected and many of them did not recover up to 2012, so the main question addressed to the policy makers is how to come back to the path of economic growth. There is evidence that the crisis hitting less innovative countries, especially ex-Socialist economies.[29]One of the most common proposed solutions are innovations that would enable the countries of SEE to exploit its full potential and in that way reduce the gap between them and developed countries.

THE IMPORTANCE OF INNOVATION FOR MONTENEGRO

According to the same index, Montenegro is the 45th most innovative country in the world. Being a country in transition, Montenegro has had various challenges in improving its economy. Unlike many other developed countries of the world, there is no significant investment in R&D by the government, or by the private sector. But still, Montenegro shows openness to innovations and changes which has been recognized by the EU and Montenegro has often been praised for being an open economy and for its willingness to make changes. Montenegro is the EU candidate country and has a lot to work on prior to becoming a member country. One of the things that are preventing the growth and development of Montenegrin economy is the lack of support for R&D activities. Studies show that private sector in developed countries is the main generator of innovation. In Montenegro there is no much expenditure on R&D in the business sector, due to global financial crisis, but also poor economic conditions in the country. In accordance with this is figure 3, which shows that almost half of R&D activities are carried out by the government sector, while 30% of researchers are also employed in the government sector. In 2011, the GERD in Montenegro was 13.2 million EUR, which makes 0.41% of GDP.[30]

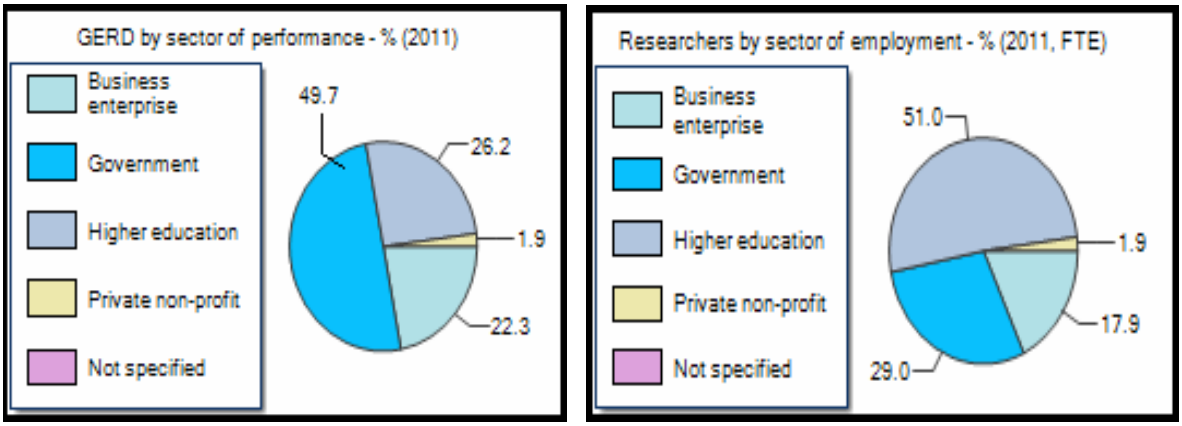

Figure 3: GERD and researcher by sector of employment in Montenegro in 2011[31]

[29] More detailed: Andrea Filippetti, Daniele Archibugi, Innovation in times of crisis: *National Sistem of Innovation, Strucutre and Demand*, Elsevier B. V. 2010 (online paper)
[30] http://www.worldbank.org/content/dam/Worldbank/document/eca/Western-Balkans- R&D-Montenegro.pdf (accessed on March 12, 2014)
[31]http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=198&IF_Language=eng (accessed on March 12,2014)

We continue analysis with review of factors of demand and supply for R&D in Montenegro, which are presented in the Table 4. Montenegro is faced with the common problem of SEE countries- R&D demand gap. As we can see from the table, scores for supply factors are relatively better then demand factor for R&D. This means that Montenegro is not successful in employing its R&D capacities effectively. For example, this could be caused by the fact that high share of business processes do not use new technologies.[32]

Table 5: Scores for factors of demand and supply for R&D in Montenegro [33]

Montenegro							
Factors of supply for R&D							
Quality of the educational system	Quality of primary education	Quality of math and science education	Availability of research and training services	Quality of scientific research institutions	Availability of scientists and engineers		
4,4	5,0	4,9	3,8	4,0	4,0		
Factors of demand for R&D							
Extent of staff training	Firm-level technology absorption	Production process sophistication	Buyer sophistication	Degree of customer orientation	Company spending on R&D	Government procurement of advanced tech products	Capacity for innovation
4,1	4,5	3,5	2,9	4,5	3,3	3,9	3,6

One of the main factors of innovation is expenditure on R&D and on education. In Montenegro, most of expenditure on R&D goes to basic research, which is theoretical work undertaken primarily to acquire new knowledge of the underlying foundations and phenomena and observable facts, without any particular application or use in view. Montenegro is also limited by the country size, but as we have seen in the previous chapter, Switzerland is the most innovative country in the world, regardless its size.

Innovation outputs are the results of innovative activities within the economy. There are two output pillars: Knowledge and technology outputs (this pillar was labelled 'Scientific outputs' in the 2011 GII) and Creative outputs.

The pillars of GII show that Montenegro is among the top countries in the world when it comes to Knowledge Impacts and Creative outputs, which are the most relevant for measuring innovation output. Montenegro has the score of 71.3 in Online Creativity, which makes it the 10th best country by this criterion. Montenegro is ranked as the 1st country in sub-pillars *Generic top-level domains (TLDs)/th. pop. 15-69* and *Country-code TLDs/th. pop. 15-69*. These two sub-pillars focus on creation of internet sites. That is really important for generating innovations, since the Internet itself has been a great innovation, and it is a place where many innovations take place nowadays.

[32] Radosevic Slavo, Research and Development, Competitiveness and European Integration of South Eastern Europe, Europe-Asia Studies, vol 61, 2009, page 634.

[33] http://www.weforum.org/reports/global-competitiveness-report-2013-2014 (accessed on March 12, 2014)

Montenegro has a good score in *Human Capital & Research* pillar, being ranked 29th in the world. It has a really good score in Tertiary education, which is mostly because of increased number of college graduates in recent years. But still, even though education is the most important input for R&D, Montenegro does not have a good score in *R&D* sub-pillar; it is ranked as a 45th country in the world. Problems that Montenegro has are visible from the GII's sub-pillar on *Knowledge diffusion*, which reveals how good country is in diffusing knowledge. On the other hand, the country is ranked as 32nd in the world in knowledge absorption.

It has already been said that investing in education is the input for R&D activities, and therefore the input for innovation. Table 5 shows the number of finished scientific papers in Montenegro for the period from 2000 to 2010.

Table 5: Number of scientific papers (2000-2010)[34]

Year	Number of Scientific papers
2000	60
2001	70
2002	84
2003	192
2004	216
2005	47
2006	62
2007	44
2008	59
2009	72
2010	87

The table shows that there are very few scientific papers in Montenegro per year, but in the last 5 years, the number of published scientific papers has increased and there is a positive trend.

WIPO ranks Montenegro as the 161st country by Intellectual Property activity for 2011. Data shows that there have been 1,179 patent applications in Montenegro since 2008.[35] That is a small number, but that has been a significant growth in patent applications when compared to the period prior to 2008.

Overall, there is little R&D activity in Montenegro which is due to many factors. But in the coming period, period of Montenegro's integration to the EU, there will be more expenditure on education, R&D and support towards creating an innovation friendly environment. In the last few years, even though by a small percentage change, there has been an increase in R&D as percentage of GDP. As it has been presented before, it is not easy for a less developed country to invest in R&D, and therefore generate innovations, so that becomes a *circulus vitiosus.* But Montenegro should put emphasis on supporting the small and medium enterprises (SME) in order to encourage the SMEs to make small

[34] http://www.monstat.org/cg/page.php?id=77&pageid=77 (accessed on March 12, 2014)
[35] http://www.wipo.int/ipstats/en/statistics/country_profile/ (accessed on March 12, 2014)

innovations since that it also really important for one country's innovativeness, and therefore economic growth.

SUMMARY

Innovation is often defined as "new ideas that add value", so this automatically means that innovation is a driving force behind growth. There are various ways to measure innovation and innovativeness, and this paper presented the methodology of the Global Innovation Index, which was used to explain Montenegro's position compared to countries in the Balkans and in the EU. One way to measure how innovation affects the economic growth and development is by presenting the Gross Expenditure on Research and Development as a percentage of GDP. Studies have shown that the more countries invest in R&D, the more innovations there are, and higher the economic growth.

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