ANALYSES OF SELECTED RESEARCH AND DEVELOPMENT INDICATORS IN SLOVAKIA AND SPAIN

E. Sira., Ing., PhD
Faculty of Management, University of Presov in PreSov, Slovakia

Abstract. This article deals with comparison of Slovakia, Spain and EU 27 according to selected research and development indicators. Indicators were choosing according to Regional Innovation Scoreboard 2012 indicators. We compare the years 2008 - 2012 according to Eurostat data.

Introduction. OECD defines knowledge economy as „those that are based on the production, *distribution and use of knowledge and information'"* **[3].** Another definition says, that in knowledge economy **„***the creation and use of knowledge has dominant share in the creation of wealth. This is not only to expand existing knowledge, but also the use of all types of knowledge in all economic activities."*" **[2],** [1]

The characteristics of knowledge-based economies summarized [3] as follows:

- The focus of both people and organizations become learning.
- Knowledge economy consists of a network of innovative organizations.
- In the knowledge economy, there is a very influential technological force causing high and growing intensity of the use of information and communication technologies (ICT) by educated knowledge workers.
- For the knowledge economy is significant scientific cooperation.
- There is a growing share of GDP devoted to knowledge assets compared to physical capital.
- The knowledge economy is also characterized by the absence of firmly defined borders. Knowledge exceeds corporate, industry and country borders.
- Computers and the internet have brought to individual organizations and institutions interconnectivity, cooperation and partnership.
- The knowledge economy also brings collaboration, merging and integration of formerly separate sectors.

Methodology. The aim of the article is to compare the situation in two selected EU members' countries according to chosen research and development indicators.

According to differences between the amounts of population in selected countries, we mostly compare the values of indicators accounting per inhabitant. So we can better compare the economic value of different countries. We choose Slovakia and Spain for comparison. We compare analysed values with the value of EU 27 countries to get more complete view.

European Regional Innovation Scoreboard (RIS) provides a comparative

assessment of innovation performance across NUTS 1 and NUTS 2 regions of the European Union, Croatia, Norway and Switzerland. RIS in the year 2012 evaluate the countries according to 12 indicators, which are given in Table 1.

We were inspired by RIS indicators, so we choose these selected indicators to analyse the countries:

- GDP per inhabitant,
- Total intramural R&D expenditure per inhabitant,
- Intensity of R&D in %,
- Total R&D personnel and researchers as % of total labour force in percentage of active population,
- Researchers in higher-education and government sectors.

We obtain the data from Eurostat and from the publication Regional Innovation Scoreboard 2012 and from further publications given in list of literature.

Table 1 - Regional Innovation Scoreboard 2012 indicators

Group	Indicator
The Enablers	Population with tertiary education per 100 population aged 25-64
	R&D expenditure in the public sector as % of GDP
Firm activities	R&D expenditure in the business sector as % of GDP
	Non-R&D innovation expenditures as **%** of turnover in SMEs
	SMEs innovating in-house as **%** of SMEs
	Innovative SMEs collaborating with others as % of SMEs
	Public-private co-publications per million population
	EPO patent applications per billion regional GDP
Outputs	Technological (product or process) innovators (% of all SMEs)
	Non-technological (marketing or organisational) innovators (% of all SMEs)
	Employment in knowledge-intensive services + Employment in edium-high/high-tech manufacturing as % of total workforce
	Sales of new to market and new to firm innovations as % of turnover in SMEs

Source: RIS 2012, p. 40

Discussion. We compare the values of GDP per inhabitant. We can explain this indicator as an efficiency of economics, which contains the amount of all produced products and services, which were done on the given territory during the year by 1 inhabitant. The highest value from the analysed countries was in EU 27. In the year 2012, there was GDP per inhabitant in Spain in the amount of 22 300 € and in Slovakia 13 200 €. But, when we compare the development of this indicator, we can see, that in Slovakia, the value was increased and in Spain decreased through whole period 2008 - 2012. The amount of GDP per inhabitant in Slovakia achieved the half from the indicator's amount in EU 27.

Table 2 - GDP in current prices in euro per inhabitant

	2008	2009	2010	2011	2012
EU 27	25 100	23 500	24 500	25 200	25 600
Spain	23 900	22 800	22 700	22 700	22 300
Slovakia	11 900	11 600	12 100	12 800	13 200

Source: Eurostat

The development of indicator research and development's expenditure in Slovakia has increased through whole analysed period. In the last year, there was the value of 108,3 € per inhabitant. According to value in the year 2008, there was more than 50 % growth. Opposite situation was in Spain, where the values of this indicator felled. This decreasing reflects the situation in whole economy in Spain.

Table 3 - Total intramural R&D expenditure in Euro per inhabitant

	2008	2009	2010	2011	2012
EU 27	481,5	474,7	492,8	516,2	531,4
Spain	321,9	315,4	313,8	303,9	283,7
Slovakia	56,7	56,3	77,2	86,9	108,3

Source: Eurostat

We can see the calculated values of indicator intensity of R&D in the table 4. This indicator represents the ratio between expenditures on R&D and GDP. Countries in EU 27 obtain the intensity 2,07 % in the year 2012. In Spain, there was the value 1,29 % and in Slovakia 0,82 % in the same year. Research and development (R&D) is one of the main prerequisites for the creation and development of innovation. This indicator was chosen because the premise of creating innovations is one of the signals of growth of innovation performance across the country.

Table 4 - Intensity of R&D in %

	2008	2009	2010	2011	2012
EU 27	1,91	2,01	2,01	2,05	2,07
Spain	1,35	1,39	1,40	1,36	1,29
Slovakia	0,47	0,48	0,63	0,68	0,82

Source: own calculation according to Eurostat data

Next table shows the values in % of total R&D persons compared to total labour force. In this indicator, Slovakia has researchers more than 1 % of total labour force. The values obtained in Spain were similar to values in EU 27. In the year 2010, the Spain obtained the level 1,56 % and EU 27 obtained 1,58 %. In the next year, this indicator in Spain decreased and in EU 27 increased.

Table 5 - Total R&D personnel and researchers as % of total labour force in percentage of active population

	2008	2009	2010	2011	2012
EU 27	.	1,53	1,58	1,66	.
Spain	1,54	1,56	1,56	1,53	.
Slovakia	0,88	0,94	1,04	1,07	-

Source: Eurostat

Notice: - means not available

Next tables 6 and 7 show the number of researcher in higher education and government sectors. For better interpretation of obtained values, we make the graph, which include the values in %, researchers in government to researchers in higher education sector in each country.

Table 6 - Researchers in higher education sector in Head Count

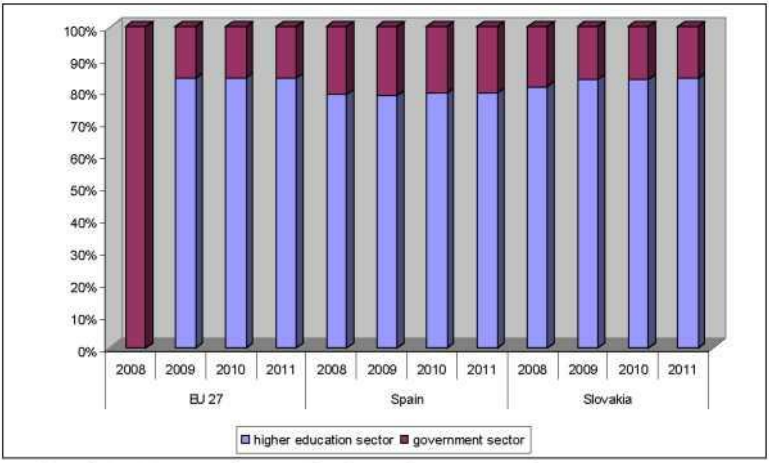
	2008	2009	2010	2011	2012
EU 27	.	1 248 124	1 293 881	1 325 631	.
Spain	122 167	125 130	129 696	127 085	.
Slovakia	14 383	16 485	17 826	18 363	-

Source: Eurostat

Table 7 - Researchers in government sector in Head Count

	2008	2009	2010	2011	2012
EU 27	231 745	239 322	244 460	251 982	.
Spain	32 653	34 277	33 884	33 278	-
Slovakia	3 274	3 275	3 484	3 519	-

Source: Eurostat



Graph 1 - Researchers in higher education and government sector
Source: own calculation according to Eurostat data

We can see from the graph, that situation in both countries and EU 27 is similar. The highest number of researchers belongs to higher education sector. More than 80 % of all researchers in Slovakia and EU 27 belong to higher education sector.

Conclusion. From the analysed indicators we can see that Slovakia became the lowest values in indicators. But the trend in all mentioned indicators was

increased. So we can say that this tendency is correctly set. In this country, there are needed to increase the expenditures on R&D.

The situation in Spain is different. Spain obtains the values similar to values in EU 27 countries, but the problem is the decreased trend in indicators. It is clear, that Spanish economy has problems. Solving the problems in economy can change setting trends.

LIST OF LITERATURE

[1] ALI TAHA, Viktoria - TEJ, Juraj. *Potreba univerzti vznalostnej spolocnosti pri rozvoji regionov* [online]. In Uloha univerzit v regionalnom rozvoji. Kosice: Univerzita P. J. Safarika
v Kosiciach - Fakulta verejnej spravy, 2009, s. 9 - 20. ISBN 978-807097-791-0. [online], [cited 2013-11-11]. Available at: <http://www.uniregio.fvs.upjs.sk/pdf/zbornik/AliTaha_Tej.pdf>.

[2] BURES, V: Znalostni management a proces jeho zavadern. Praha: Grada, 2007, 212 p. ISBN 978-80-247-1978-8

[3] OECD. *The knowledge-based economy*, 1996 [online], [cit. 2013-11-20]. Available at: <http:// www. oecd. org/ dataoecd/51/8/1913021 .pdf>.

[4] *Regional Innovation Scoreboard 2012*. European Union, 2012. ISBN 978-92-79-263088 [online], [cited 2013-11-19]. Available at: <http://ec.europa.eu/enterprise/policies/innovation/index_en.htm>

Екзистенційні та комунікативні питання управління: матеріали Міжнародної науково-теоретичної конференції, м. Суми, 23-25 січня 2014 р. - Суми: Сумський державний університет, 2014. - Ч.2. - С. 20-24.