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## INNOVATIONS AND COMPETITIVE ABILITY OF THE SLOVAK REPUBLIC

*In the article the theoretical aspects of different types of innovations are presented and were analyze their effects in different countries, particularly in Slovakia and Poland. The author emphasizes the competitive ability of Slovakia.*

*The key innovative features that distinguish strong innovative companies among weaker competitors are defined. The research using the new materials with a wide range of applications, such as nanotechnology was described. With the development of more flexible production procedures and through the branch network and knowledge. Modern technologies in new combinations, including the so-called subversive innovation are described in this article.*

*The author has investigated and gave the definition of the kind of spin-off. In the article the remarkable features of successful companies, and their ability to use intellectual property in the form of patents and licenses were analyzed. The types of innovations and their characteristics were considered.*

**Keywords:** *innovation, competitive ability, research and development*

**Problem definition.** Development of the human society was connected for the long time to successful innovations which moved forward each field of the human activity and opened new perspectives. Many of the innovations in the past arose inconspicuously and without significant publicity or financial support. They were often connected to investing of huge effort of the parties involved but they were sometimes born from coincidence or error. The scale of their successfulness was measured by the interest of customers for innovative output, profit retrieved and advantage over competition. In the last decades all the developed and also developing economies of the world urgently realise the need for systematic transfer of innovations. Simplified model pursuant to which more sources for science and research shall bring more successful innovations could not be always valid. Patents and inventions which were left in depositories of patent offices witness the useless time and financial losses. Shall we assess economies based only on the number of patent applications filed, we will reach solely distortive data without any interpretative value. It is known fact that only inventions in the form of new idea or procedure which were transformed to the material form in the innovation procedure and they were changed to the requested new product or service, were able to bring to their creators requested profit. Innovations require courage to be involved in the risk and change.

**Analysis of the latest researches and publications.** Developed market economies of the world have underpinned national innovation system which helps them to reach high international competitiveness. Many members of the European Union have however long-term problem to reach and sustain themselves among the most innovative countries of the world. According to information on politics of the innovations (information letters of the European Union), Europe spends 0.8 % less of the

GDP than the United States of America and 1.5% less than Japan. Besides of that, there is present the brain drain when the best scientists and innovators move to countries where the conditions are more favourable for them. Despite of the fact that the market of the European Union is the biggest market in the world, it is divided and insufficiently beneficial for innovations. The obstacles to innovations are also high costs connected to patentability, slow determination of norms and deficiency of the skills which are obstacles to new ideas leading to commercialisation of the science and research. When we look at the current innovative trend of the developed countries as referred to by Balog et al. (2013) we will find out that the most developed countries develop the areas which provide them with higher multiplication effect of the use of the results. In this group belong for example research of the new materials with broad scale of application, nanotechnologies, development of manufacturing procedures based on flexibility, networking and knowledge. Connecting of technologies into new combinations shall open a space in particular for so called disruptive innovations, particularly because of the reason that the competitiveness of companies which apply them increased considerably. In the mentioned countries we can see the orientation not only towards innovations which create the new knowledge but also innovations using new combinations of already existing knowledge applied by new manners.

**Formulating the goals of the article.** If the own ideas of companies are not sufficiently used in conducting of their business, it is advisable to use them as opened innovation by the means of licensing or spin-off. Sponsored, so called corporate spin-off companies can react more flexibly to the commercial call than their parent companies. In the other type of the spin-off is a scientific institution the author of the invention and it gives its share (the most often remunerated on the basis of the value of the intellectual property) into the universal spin-off company. The private investor enters into such company for a certain period by a risk capital in expectation of essential valorisation of its investment.

The company Boston Consulting Group which made research in many countries compiled after more than fifty years of experience key innovative attributes which distinguish strong innovative companies from their weaker competitors. The sign of successful companies is their ability to use intellectual property in the form of patents and licenses. Innovations are partially connected with the own ideas of the company. Protection of the intellectual property rights with the aim to remain sole owner of the product or procedure belongs to long-term defence strategies of companies. Some of the companies built their business on the basis of licenses which counts to their competitive advantages. Example of such companies is technological company IBM which pursuant to the research of BCG Perspectives (2015) belongs among stable innovators in the fifty most innovative companies of the world since 2005. Its experience demonstrates that innovations, increase and precious patents are mutually connected. The sale of licenses belongs to considerable and increasing financial source of the company. In 2012 the revenues of IBM from the sale of licenses represented USD 575 mld. and another USD 500 mld. was the income from its own development. Strong innovative companies such as IBM consider criteria as to which ideas and new products they will support twice more often than their weaker competitors.

**Setting forth the research basic material.**

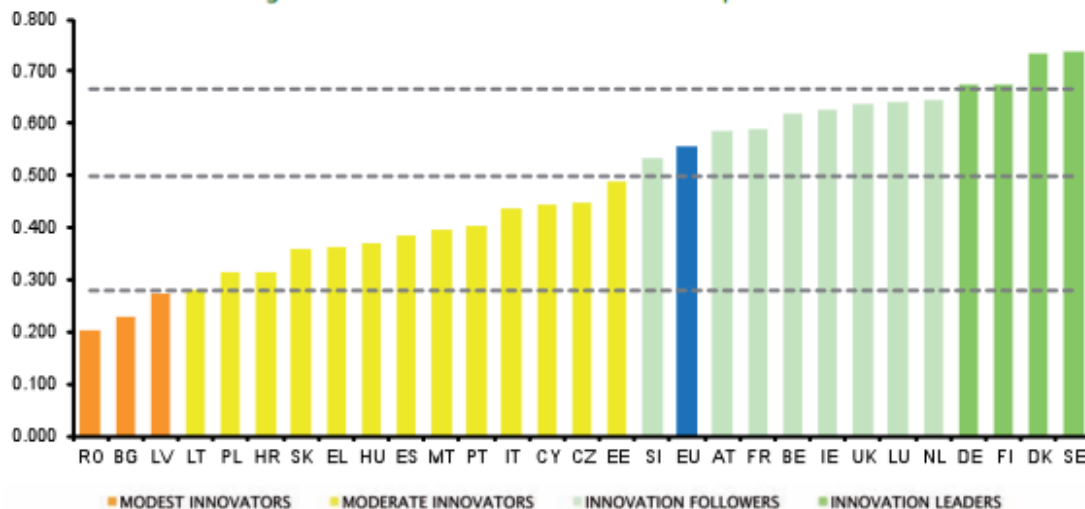
Historical, economic and political development of V4 countries as well as their joint entry into the European Union offers after some time space for comparing of

their position to innovations. Direction of these countries should not represent only catching up with technology leaders by improving of technological and knowledge actives but also creation of own strategies which enables them to become leaders in certain segments should the radical changes be used. One of the seven main initiatives of the Europe 2020 strategies is the Innovation Union. There is used comprehensive innovation index for measuring, which involves performance of many different indicators. It divides the European countries pursuant to results of innovations into four groups. The first group of countries is called the leaders of innovations, then there are the followers of innovation, the third group represents slightly innovative countries and in the last fourth group there are countries marked as modest innovators. Index differentiates between three main types of indicators such as the activation, business events and outputs and subsequently eight innovation dimensions covering 25 indexes.

Although the V4 countries were in 2015 listed in the third category among moderate innovators, pursuant to the rate they reached it is possible to see outstanding difference among them.

Hungary, the Slovak Republic and the Republic of Poland are in the first half of the countries marked as the moderate innovators. As it is evident from the Figure 1, the Czech Republic grows in the group of moderate innovators the fastest and it is approaching the group of countries marked as the followers of innovation and to the average of the European Union.

**Figure 1: EU Member states' innovation performance**



Source: Innovation Union Scoreboard 2015

The Slovak Republic differs in many ways from the leaders of innovation. It is, therefore, convenient to compare it with similarly developed countries. The specifics of new member states, as stated by Balog et al (2013), is non-development of formal systems of innovations management. Although the less developed countries establish their own national boards, respectively committees for innovations, they

are mostly used as discussion forums and not as real authorities for coordination. The problem is their instability and non-functional competences. On the other hand, developed countries have stable national innovation agencies with high autonomy. In the Slovak Republic there absent the top level institutions in the field of governing and coordination of innovation politics. The powers in the innovation politics are

divided between the Ministry of Economy of the Slovak Republic and the Ministry of Education, Science, Research and Sport of the Slovak Republic. Up until now there absent regional bodies of innovation management. The Slovak Republic has several agencies which implement innovation politics but their insufficient coordination of activities seems to be a negative. For example, the programme for support of applied research is implemented by the Slovak Innovation and Energy Agency (SIEA), the Slovak Research and Development Agency (APVV) and the Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic for the Structural Funds of the European Union (ASFEU). The majority of innovation politics are financed from structural funds of the European Union and the rate of national financing constantly decreases. In 2011 the government of the Slovak Republic approved bylaws

of the Government Council for Science, Technology and Innovation, which however started to operate only in 2013.

**Situation of the Slovak Republic in the area of innovations.** The Slovak Republic belongs to small and open economics and is more and more dependent on export, which is generated by high rate of production, additional value and employment. The structure of the Slovak economics which is characterised by high proportion of production of personal automobiles for international companies underlies also the higher rate of the economics openness indicator, e.g. compared to the Republic of Poland. Development of the economy is directly supported and influenced also by the amount of financial expenses on science and research for individual scientific areas, as it is documented by the Table 1 below:

**Table 1**  
**Gross domestic expenditures on R&D (GERD) by field of science (in thousands of € (EUR), in current prices)**

Indicator	2010	2011	2012	2013	2014
Natural sciences	82 938	97 060	119 837	108 163	119 006
Technological science	223 112	223 349	274 571	311 613	326 552
Medical and pharmaceutical sciences	29 549	37 292	49 506	54 694	66 823
Agricultural sciences	34 125	35 443	39 454	19 428	46 477
Social sciences	29 112	39 618	43 569	45 825	69 218
Humanities	17 533	35 677	58 288	71 154	41 556

Source: Yearbook of Science and Technology in the Slovak Republic 2015

Well-adjusted structure and innovation politics can contribute to development of perspective fields of business and, therefore, also to the development of the whole national economy. Only few selected areas with significant increase of industrial production belong among the most successful ones. These fields create the supporting part of the export. We amount here

production of computer, electronic and optical products, further the fields of automotive, electro technologic industry and production and processing of iron and steel.

Important is also the quality of human resources connected to the science and research, allocation of which in the Slovak Republic is documented by the Table 2.

**Table 2**  
**R&D personnel in head counts as of December 31 by occupation and field of science**

Field of science	2010	2011	2012	2013	2014
Natural sciences	5 046	4 873	5 178	4 896	5 048
Technological science	9 807	10 166	10 081	9 790	10 042
Medical and pharmaceutical sciences	3 590	3 544	3 641	3 280	3 259
Agricultural sciences	1 888	1 856	1 723	1 125	1 599
Social sciences	4 802	4 896	4 814	5 175	4 836
Humanities	2 995	3 261	3 443	3 557	4 041

Source: Yearbook of Science and Technology in the Slovak Republic 2015

**Marginal regions of the Slovak Republic and the Republic of Poland in the field of innovations.** There are strong differences between regions in the Slovak Republic which are caused by several factors, such as the historic background, geographic location, availability of educated human resources or technological difficulty of production. The region of Prešov tries already for several years to leave the position of the least developed region with high level

of unemployment and few job opportunities, poor efficiency and low level of produced value. It is a region with low level of sectoral specialization. The area of construction, tourism and industrial production with low technology offers potential for development.

While comparing medium-sized enterprises in the region of Prešov in the eastern Slovakia and in the sub-region of Krosno – Przemysl in Podkarpatsko, the attention was concentrated on the potential of export as

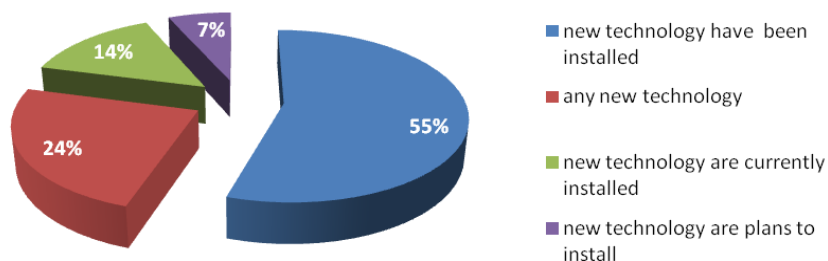
well as on innovations. Active use of innovations might significantly strengthen the competitiveness of region, which can be for example demonstrated also in the volume of the export.

The part of the export potential of medium-sized enterprises in two neighbouring regions of the Republic of Poland and the Slovak Republic, as stated by authors Kaszuba, Madzinová, Sedláková a Cierpal-Wolan (2014) were besides of the other activities also opinion pools in the sub-region of Krosno – Przemysl in Podkarpacko and in the region of Prešov. Both regions are situated in eastern, less developed part of the Poland and Slovakia. They represent borders of the European Union and also of the Schengen Area in the east of the union. The Podkarpackie Voivodeship is one of the sixteen Polish regions and represents the Nomenclature of Territorial Units for Statistics No. 2 (NUTS 2). Also, the region of Prešov together with the region of Košice in Slovakia, which together form Eastern Slovakia are in size of NUTS 2.

The Slovak definition of contractual administrative unit “region” meets the Polish “voivodeship” from the functional-administrative viewpoint. Sub-region of Krosno-Przemysl has acreage of 9,830 km<sup>2</sup> and the region of Prešov 8,974 km<sup>2</sup>. Population density at the time of the survey was in the sub-region of Krosno – Przemysl 881.1 and in the region of Prešov 817.4 (thousand inhabitants per km<sup>2</sup>). The survey in both countries was performed in 2013, while in the region of Prešov it was realised in July and August 2013 and

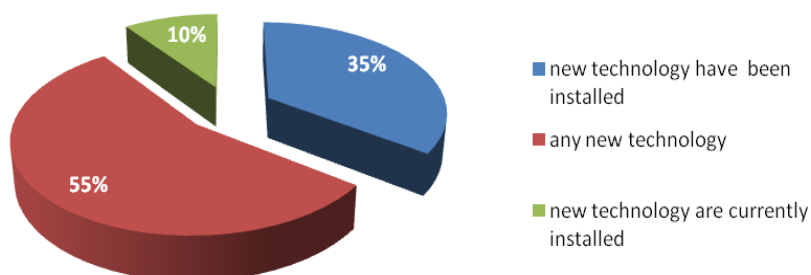
in the sub-region of Krosno – Przemysl between August and October 2013. There were overall 266 medium-sized enterprises in the region of Prešov at that time. From the individual districts of the region of Prešov there were randomly selected 115 middle-sized enterprises, 102 of which returned the questionnaires. After excluding 12 questionnaires which did not meet the definition conditions of the middle-sized enterprises, the resulting survey sample was created by 90 questionnaires. In the sub-region of Krosno – Przemysl there were 269 middle-sized enterprises and the survey itself included 100 companies which met the set conditions of the middle-sized enterprise. The high number of returned questionnaires was secured by interviewers who personally visited the individual companies. Medium-sized enterprises in both regions answered the same 22 survey questions which were dealing with the support and barriers in expert of commodities and services. In order for the company to succeed in international competition, not only on home but also on foreign market, it is necessary to introduce innovations into production, without which the companies would not be able to operate. One of the questions was determining whether the company in the last three years introduced new technologies in the area of its basic activities. Figure 2 documents differences between the medium-sized enterprises in the area of innovations in the region of Prešov in the Slovak Republic.

**Figure 2** New technologies in medium-sized enterprises in the region of Prešov



Source: Own processing based on survey.

**Figure 3** New technologies in medium-sized enterprises in the sub-region of Krosno - Przemysl



Source: Own processing based on survey.

A different situation arose on the Polish side (see the Figure 3) in the area of installing of new technologies in the middle-sized enterprises. The lower percentage was represented by enterprises which innovated technologies in the area of its basic activities. Should a company succeed mainly in foreign markets, it pays more attention exactly to innovations. Different approach between the two regions of the Poland and Slovakia may be connected with the fact that among the Polish surveyed companies 48 % was export-orientated, while in the region of Prešov it was 58 % of middle-sized enterprises which were export-orientated, which only confirms the openness of small Slovak economy to export. Other explanation might be the possibility that the Polish middle-sized enterprises innovated in the past and, therefore, they responded negatively in the questionnaire. There was also missing the statement of the Polish business owners regarding eventual planned installation of new technologies, which was, however, discussed with the entrepreneurs in the region of Prešov.

Another question was detection of which activities were carried out by the enterprises between 2010 and 2012 in order to increase the export potential. As it was opened question, enterprises in the Slovak Republic replied that it was modernisation of already existing technologies and introduction of new technologies, as well as searching for possibilities of lowering the costs. Companies on the Polish side replied, that besides of

implementation of new technologies, the increase of the export potential was caused by the offer of new products, improving of quality, searching for new suppliers and buyers. On the other hand, the lack of qualified labour power was marked as an obstacle, which was mentioned by both sides.

**Conclusions drawn from the research and prospects for further investigation.** Usually the companies, products of which are strong within the competition, enter the foreign markets, eventually they produce totally new original products. Innovations, however, help to succeed in competitive pressure not only in foreign markets but also in the home market. Sectors with higher technological difficulties in production can succeed on the foreign markets by higher quality and they create higher potential of added value and lead to technologic development of the particular country. In order to have higher success and stability of development of economy in the region of Prešov in the future, it is necessary to support integration of home companies into global value chains and engagement of services into the production of final products of consumer industry. It is also necessary to connect high schools and university education with entrepreneur sector so that the schools prepare educated specialists interesting for the particular market. Therefore, there is needed to increase the level of openness for cooperation and paying attention to protection of the intellectual property.

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