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## INNOVATION IN HIGHER EDUCATION IN SLOVAKIA

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**Key words:** *innovation, higher education, transport, security*

**Abstract:** *Innovations in higher education in Slovakia are closely linked to the sustainable development of society. A modern European country has no choice but through innovations to build prosperity and the future. Education, science and research are essential attributes of innovation processes at all levels.*

*The upcoming year 2020 will be a breakthrough in both the global, European and national environment. The accelerating processes of informatisation, globalization and internationalization bring us everyday challenges and tasks. The challenge of keeping pace with the world in science, research and innovation is crucial. Thanks to the structural funds, the countries of Central and Eastern Europe had the opportunity to build a high-quality scientific research base. In 2007-2013, 20 research centres and science parks were built in the Slovak Republic. The University of Žilina built a total of three new buildings filled with state-of-the-art technologies with a budget of 60 million euros. The aim of the paper is to present possibilities of cooperation in science, research and innovation at the international level.*

*The University of Žilina has a long-term cooperation in the corporate environment. We are regularly evaluated as the university with the best cooperation in practice. Thanks to the close links between state institutions, private companies and academic environments, we are dealing with dozens of projects that a modern society needs. Our latest activities are in favor of Zilina SMART CITY and Zilina SMART REGION.*

### INTRODUCTION

The year 2019 is the penultimate year of the Operational Program Research and Innovation (hereinafter OP RaI). The OP RaI is based on the priorities of the Europe 2020 strategy as well as the main recommendations of the Small Business Act and the Action Plan for Entrepreneurship 2020. The OP RaI is a key implementation tool of the Strategy "Knowledge for prosperity- Research and Innovation Strategy for the Smart Specialization of the Slovak Republic" (hereinafter RIS3 SK). The Operational Program Research and Innovation (OP RaI) is a joint programming document of the Ministry of Education, Science, Research and Sport of the Slovak Republic (hereinafter MESRS SK) and the Ministry of Economy of the Slovak Republic (hereinafter ME SR).

The Slovak national innovation system, supported by policies of education, research, development, innovation and support for SMEs, is one of the least developed in the European Union (EU) in terms of its performance, management and synergistic implementation, what implies the need for changes. In assessing the country's innovation performance, Slovakia ranked 21st among mild innovators. In terms of global excellence and taking into account local relevance to the needs of smart specialization, the following domains of smart specialization RIS3 SK have been identified:

1. Means of transport for the 21st century
2. Industry for the 21st century
3. Digital Slovakia and creative industry
4. Population health and health technologies
5. Healthy food and environment

In addition to the overall low expenditures, the low rate of private investment is a hallmark of R&D funding in Slovakia. In 2012, the share of RaI expenditure was 0.82% of GDP. For comparison, the EU average was 2.06%.

The total value of corporate RaI investment in 2012 was only 0.34% of GDP. Investments from the state account present 41.6% and from foreign sources 18.7%.

By 2020, also in terms of the Europe 2020 strategy, Slovakia wants to increase the share of RaI expenditures to at least 1.2% of GDP so that the share of public and private resources is in the ratio of 1: 2. To achieve this aim, it will be necessary to support the structural changes in RaI through the activities of the OP RaI by strengthening the cooperation of research centers with business entities as well as to consolidate and expand the RaI infrastructure through smart specialization, to use motivational indirect tools of support for the business sphere and to support more significant appreciation of work in the area of RaI in the SR [1].

Due to the long-term focus of the University of Žilina, a very important part for changes in the processes of innovation and modernization of society is the Office of the Deputy Prime Minister for Investment and Information Technology. The Office coordinates activities in the areas of informatisation of public administration, smart city and investment. It has been successful in linking national funds with EU funds [2].

Universities and research institutes have a key role to play in innovation processes in most European countries. If the country has a historical foundation in some field, then innovation is the most natural way of developing the economy.

## **INNOVATION IN THE HIGHER EDUCATION SYSTEM**

The higher education system has been continuously transformed since the change of the political system in 1989. According to OECD assessments, higher education in Czechoslovakia in 1990 was among the best in Europe. During the transformation process, we gradually left the 5-year study and created a three-stage education. The fundamental change is establishment of the Slovak Accreditation Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic in November 1, 2018. Its task is to change the system of national accreditation to institutional accreditation. Gradually, universities will establish their internal accreditation bodies and the accreditation agency will only check the compliance of the qualitative and quantitative assessments set [3].

Other changes in the system of higher education bring daily life; they are mainly related to the financing of universities. At present, the amendments to the Higher Education Act have retained the degrees of associate professor and professor which will be awarded according to traditional procedures. A major problem of higher education is nowadays the natural decline of students; the average year-on-year decline is 4%. The aim of universities is

to use marketing tools to attract students from abroad. The big challenge is the admission of students from third countries (India, China and African countries).

## **EXAMPLES OF UNIVERSITY AND PRACTICE COOPERATION**

For a long time, the University of Žilina has been one of the most successful scientific research universities within the Slovak Republic with the strongest connection of applied research and innovation into practice. As an example from a distant past, we can mention the project of a 5FP within the framework of which the Center for Transport Research (CETRA) was built at the University of Žilina. This center has become a seed for a number of successful international scientific research projects. Among the most important is to mention - SurfTran, ETRA.CC, EURNEX, EURO\_Trans-Days, U-STIR, STAR-Net Transport [4].

In recent years, the project ERA DIATE has been very successful. The most important aims were:

- ◆ unlock and strengthen UNIZA's research potential in Intelligent Transport Systems,
- ◆ promote the excellence of the University of Zilina (UNIZA) as well as the Zilina convergence region in the field of ITS,
- ◆ enhance transnational cooperation in research thus increasing international competitiveness of UNIZA,
- ◆ intensify national and international cooperation with stakeholders and contribute to growth and jobs in line with regional innovation strategies [5].

In addition to the most important international scientific research projects, the UNIZA information system currently has a total of 4435 registered projects of all levels, from faculty to university, national to international. As a novelty in the area of project support, we mention the creation of a grant competition for young researchers, PhD students and students of the 2nd degree at UNIZA level. The university thus continued the many years of experience of the faculties, which for more than 15 years supported the PhD students and the beginning scientific pedagogical staff.

Under the Operational Program Research and Innovation, UNIZA has submitted many innovative projects in recent years:

- ◆ Research and development of autonomous flying devices useful in life-threatening situations.
- ◆ Research and development in the field of "smart systems" and "smart engineering" for industrial development 4.0 (DESTINY).
- ◆ The new generation of goods wagons.

The long-term strategic research projects present the highest level. The University of Zilina has prepared a project proposal - Innovative solutions of propulsion, energy and safety components of vehicles. Planned project activities are focused on Innovative Hybridization of Drive Systems for Road Vehicles (DRIVELINE), Perspective Systems for Storage and Distribution of Electricity of Vehicles (STORAGE and CHARGING), Safety and thermal management of propulsion and energy systems of vehicles (SAFETY) and Assessment of economic and social aspects of modern materials and technologies in industrial production, statistical forecasting (IMPACT). The results of the project are aimed at reducing the negative environmental impact of the carbon footprint of vehicles and increasing the efficiency and safety of new technologies and components within vehicles. The project innovativeness is expected in industrial research of the life of automotive components, in research and development of hydrodynamic converters, in theory and electric machines and in autotronics, and in the application of ICT in enhancing operational safety.

As part of the internationalization of long-term strategic research projects, experts from China, Croatia, Italy, Portugal and Switzerland were selected for the project team. The advantage of the project is the construction of the Research Center and the University Science Park, where the necessary instrumentation has been installed from the previous period. Another advantage is UNIZA's close cooperation in the field of project solutions with Slovak commercial companies.

Researchers of the University of Zilina are currently involved in the solution of dozens of research projects of an innovative nature. We thus fulfill the long-term strategic goal of UNIZA and at the same time support projects in the city, Žilina region and the whole of Slovakia. The most upcoming project plan is the project Zilina - SMART CITY / Zilina Region - SMART REGION

## **CONCLUSION**

The aim of the paper was to present Slovak experience in the field of science, research and innovation. The authors have long been involved in research and innovation in the field of security and transport. Both areas are multi-level and multi-sector. Therefore, in addressing the challenges of the present day, it is crucial for individual projects to create ad hoc teams that represent both - academia, commercial research, private companies and state institutions. For example, in developing a smart city strategy, the public sector must necessarily be associated with the private and, in some activities, academic environments.

The University of Žilina is one of the leading research institutes in Slovakia in the field of applied research and innovation. Thanks to its successful work with young people talented graduates stay at the university either in the positions of full-time PhD students or young scientific pedagogical staff.

The Slovak Republic wants to be a modern and successful country. One important condition is to capture global trends in research and innovation and gain and maintain positions in the global market. In some areas it is doing well, in others there are reserves.

## **ACKNOWLEDGEMENTS**

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## ИНОВАЦИИ ПРИ ВИСШЕТО ОБРАЗОВАНИЕ В СЛОВАКИЯ

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**Ключови думи:** иновации, висше образование, транспорт, сигурност.

**Резюме:** Иновациите във висшето образование в Словакия са тясно свързани с устойчивото развитие на обществото. Съвременните Европейски държави нямат друг избор освен чрез иновациите да постигнат развитие в бъдеще. Образованието, науката и изследванията са основни елементи на иновационния процес на всеки негов етап.

Наближаващата 2020 г. ще бъде преломен момент, както за глобалната, така и за Европейската и национални икономики. Ускоряващите се процеси на цифровизация, глобализация и интернационализация са свързани с много предизвикателства и задачи. Предизвикателството науката и изследванията да бъдат “в крак” с времето, е от съществена важност. Благодарение на структурните фондове, държавите от Централна и Източна Европа имат възможност да създадат висококачествена научно-изследователска основа. За периода 2007-2013 г., 20 изследователски центрове и научни паркове са изградени в Словакия. Жилинският Университет създаде 3 нови сгради, оборудвани с нови технологии за бюджет от 60 млн. евро. Основната цел на доклада е да се представят възможности за сътрудничество в областта на науката, изследванията и иновациите на международно ниво.

Жилинският Университет има дългогодишен опит и сътрудничество с бизнес корпорациите. Той е оценен като университета с най-голям практически опит в сферата на сътрудничество с бизнеса. Благодарение на своите дългогодишни връзки с държавните институции, частни компании и академични среди, университетът изпълнява редица проекти, отговарящи на обществените нужди. Актуалните проекти, в които Жилинският Университет има принос са Жилина Смарт Сити и Жилина Смарт Регион.