

## **STRENGTHENING THE TECHNOLOGICAL CAPACITIES OF SMEs IN BOSNIA AND HERZEGOVINA THROUGH PROGRAMS OF COOPERATION WITH UNIVERSITIES AND RESEARCH CENTRES**

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### **1. INTRODUCTION**

Lack of skills, financial funds and possibilities to collect and analyze technical and market information causes that SMEs face greater obstacles than large enterprises regarding development and absorption of new technologies. However, changes in pattern of technological development and greater availability of information through improvements of communication and information technologies allow to SMEs in developed countries to get closer to technological frontier and in number of cases even to develop radical innovations. It is well-known fact that country that invests in education, research and innovations ensures higher rate of economic development and greater productivity, especially in long-term period. However, not all countries have the capacities for conducting the researches and innovations, and in that way to contribute to its long-term development and prosperity. One of objectives of renewed Lisbon strategy is to turn Europe into a modern, dynamic and open knowledge economy. It should be mentioned that Lisbon strategy is relevant for Bosnia and Herzegovina, from which is expected to incorporate it into its reform plans. Innovation system in Bosnia and Herzegovina is undeveloped and poorly fragmented. Characteristic of this area is poor effort of SMEs aimed at improvement of their innovativeness. At the same time, governments in Bosnia and Herzegovina also do not recognize importance of innovativeness, and support activities are directed towards development of inter-firm clusters and networks.

This paper begins with presentation of state regarding development of SMEs' technological capacities and knowledge transfer structure. Then, certain examples of good practices of European countries in field of cooperation between SMEs, universities and research institutions are presented. Final part of the paper propose new model of cooperation between universities and SMEs which will enable strengthening the technological capacities of SMEs in Bosnia and Herzegovina.

### **2. STATE OF DEVELOPMENT OF TECHNOLOGICAL CAPACITIES OF SMEs IN BOSNIA AND HERZEGOVINA**

Market globalization is spreading very fast which causes that all enterprises, and mostly SMEs face greater competition, not only in terms of sales but technological know how and skills. In order to ensure long term profitability and sustainability at the market, enterprises must be capable to create and offer new, more sophisticated and more individualized products and services, and strengthen their technological capacities. However, in Bosnia and Herzegovina, there are no many enterprises with innovative products and services, and strong technological capacities.

Results of the Global Entrepreneurship Monitor research 2009 in Bosnia and Herzegovina support previous sentence. Global Entrepreneurship Monitor (GEM) is the world's largest single study of entrepreneurial activity in the world, and 2010 is third year as Bosnia and Herzegovina participates in this important research. According to this research, only 1,38% early stage entrepreneurs in Bosnia and Herzegovina in 2009 were operating in high or medium technology sectors, and this percentage for established businesses is 4,22. Out of total number of early stage entrepreneurs in Bosnia and

Herzegovina in 2009, 47,16 % does not use any new technology. Worst situation is with established businesses. Out of total number of established businesses, 68,30% uses no new technology. New technology relates to technology 1 to 5 years old. If these results are compared with results for Slovenia, or any other European Union country, participant in GEM 2009 research, it can be concluded that Bosnia and Herzegovina lags significantly behind these countries regarding this issue. Cooperation between universities and enterprises in Bosnia and Herzegovina, as one of basic preconditions for improvement and sustainability of the process of strengthening the technological capacities of SMEs is very poor. Evident is certain progress in adoption and implementation of technology and innovation policy, but these actions are taken at entity level, and there is no significant effort at the state level. Good examples are technological parks opened in Tuzla and Zenica, and Business and Information Technology Centre (BIT Centre) established in Tuzla. In Republic of Srpska, University in Banja Luka established agreement of cooperation with Agency for development of small and medium-sized enterprises. Clusters in tourism, wood processing and automotive components are operating in Bosnia and Herzegovina. One of restrictive factors for development of SMEs in Bosnia and Herzegovina, and factor which, among others, contributes to lack of government support to strengthening technological capacities and innovativeness of SMEs is that in Bosnia and Herzegovina still prevails opinion that large enterprises are the ones which contributes the most to economic development of the country, so policy makers also act like that, and do not consider SMEs as important factor of economic development.

### **3. ESTIMATION OF STATE OF DEVELOPMENT OF KNOWLEDGE TRANSFER STRUCTURE IN BOSNIA AND HERZEGOVINA**

Bosnia and Herzegovina is worst developed country among Southeast Europe countries regarding the area of science and technology. In purpose of estimation, number of parameters were taken into consideration such as level of availability of information, innovativeness, development of science and technology, liberalization, industry connections, entrepreneurship, sustainable development etc. However, in the last few years certain improvements are evident, especially regarding creation of framework for more active role of science. What certainly complicates situation in Bosnia and Herzegovina is multi-divided state structure and great number of governments level (state, entity, cantonal, and local). Authority for the field of education belongs to different bodies in different entities. What contributes to more complicated situation in this area is that there is no Ministry of education, and for this field authorized is Ministry of Civil Affairs of Bosnia and Herzegovina within which exists Department for science and culture. Ministry of Civil Affairs of Bosnia and Herzegovina adopted Strategic directions for development of education in Bosnia and Herzegovina with the plan of implementation for period 2008-2015, Strategy for development of science in Bosnia and Herzegovina 2010-2015 and Action plan for implementation of Strategy for development of science in Bosnia and Herzegovina 2010-2015. Adopted strategic documents includes estimation of situation, provide strategic directions and action plan for development of scientific and research activity in Bosnia and Herzegovina for five-years period, with aim of prosperous development of science and research, industry and education in accordance with recommendations for development of science in Europe and world. Regarding its objectives, Strategy for development of science in Bosnia and Herzegovina identifies nine objectives, among which sixth and ninth objective are especially relevant for our further consideration. Sixth objective relates to need for making structural changes in scientific and research systems with emphasis on cooperative and joint researches of universities, scientific and research institutes and industry. Focus of the ninth objective is reinvestment in industrial research in certain number of sectors.

Results of relevant former researches among which are my own, implicitly prove that scientific and research activity in Bosnia and Herzegovina today is characterized by: (1) lack of qualified and accredited institutions for scientific and research work and small number of researchers; (2) low level and unfavorable structure of funding sources – total funds aimed for financing the science are below 0,1% of GDP, where state contributes more than 80%, business sector approximately 10% and education institutions and other subjects less than 10%; (3) poor mobility of researchers and their large concentration in entity centers; (4) poor competitiveness of scientific papers regarding their number and quality (5) low level of scientific researches' transformation into innovation and products with high added value; and (6) poor statistical data. Financing the scientific and research work and

technological development in Bosnia and Herzegovina is a process conducted in multiple levels. For development of science and technology both entities in Bosnia and Herzegovina provide around 0,07% -0, 1% of GDP, while one of objectives set for European Union member states is that to provide 3,00 % of GDP for scientific and research work until 2010.

In order to become part of European higher education community, all universities in Bosnia and Herzegovina started the reform process. There are 8 public and 9 private universities, several autonomous faculties and colleges in Bosnia and Herzegovina. All public universities in Bosnia and Herzegovina participate in projects within EU funds through Tempus, Erasmus Mundus and Framework Program for Research and Development (FP6 and FP7).

#### **4. EXPERIENCES OF EUROPEAN COUNTRIES AS BASIS FOR CREATION OF NEW MODEL OF COOPERATION BETWEEN UNIVERSITIES AND SMES IN B&H**

There is a number of good practice examples, that is examples of universities in Europe which have established good and productive cooperation with SMEs. Here, we present examples of Rheinische Fachhochschule Köln - University of Applied Sciences, Graz University of Technology, University of Edinburgh, University of Maribor and University of Novi Sad and introduce certain characteristics that make them good practice examples regarding mentioned issue. Rheinische Fachhochschule Köln (RFH) – University of Applied Sciences has clearly defined university procedures regarding cooperation with enterprises and public institutions. This university owns centers and offers services that support promotion, implementation and consultations related to cooperation between universities and SMEs. Graz University of Technology is also one of examples of good practice in this field. Most of the Graz University of Technology Council members hold executive positions in industry. University in Edinburgh adopted and currently implements Strategic plan for period 2008- 2012 with following strategic goal: „Excellence in commercialization and knowledge exchange“. University of Maribor adopted clear procedures related to intellectual property management and founding of spin-off companies. University of Novi Sad is the center of higher education and research in Vojvodina. Statute of the University of Novi Sad includes clearly defined procedure regarding cooperation between university and enterprises, which is implemented in practice. All mentioned universities have different mechanisms and structure that support promotion and implementation of cooperation between university and enterprise. These universities provide support to business start-ups and development of entrepreneurship through improvement and modernization of curriculum. Mentioned institutions impact the local and regional development through cooperation with different institutions and implementation of projects that contribute to development.

#### **5. PROPOSED MODEL OF COOPERATION BETWEEN UNIVERSITIES AND SMES IN BOSNIA AND HERZEGOVINA**

In order to ensure competitiveness and follow contemporary trends, Bosnia and Herzegovina needs to establish new model of cooperation between universities and enterprises. Key role in transition from economic development based on existing industry into knowledge based economic development have entrepreneurial universities. Proposed model suggests regionalization of Bosnia and Herzegovina, which must be achieved in process of association with European Union. Universities in Bosnia and Herzegovina should be more flexible and able to adapt to changes in knowledge and technologies, in order to educate staff with contemporary knowledge and skills demanded at the labor market. Taking into consideration specific characteristics of Bosnia and Herzegovina, new model of cooperation between universities and enterprises should be combination of following activities:

- Establishment of science and technology parks in university centers, which can be generators of new entrepreneurial ventures or spin-off companies
- Organization of regional industrial clusters in Bosnia and Herzegovina, depending on field of research and business
- Establishment of consortium „university-enterprise“ with purpose of joint application for programs like FP7, EUREKA, TEMPUS and other EU programs
- Establishment of regional collaborative training centers or life-long learning centers
- Establishment of Open Innovation Networks with SMEs
- Enabling practice for students
- Industrial fellowship programs for graduate students and/or employees from enterprises.

## 6. CONCLUSION

Contemporary society based on knowledge demands new models of cooperation between universities and SMEs. Interaction between universities and enterprises must be strong and must provide mutual benefits. Through this kind of cooperation, universities will supplement own academic researches and commercialize research results. Enterprises will achieve faster, simpler and cheaper access to new research results and scientific discoveries.

Proposed model is not traditional linear model based on transfer of research results to SMEs. This model includes different inter-connected organizational mechanisms such as research centers of excellence, transfer technology centers and incubators that move research with long-term commercial potential into use, as well as clusters, life-long learning centers and joint consortiums.

Universities in Bosnia and Herzegovina have potential to become the leading force of knowledge, technological improvement and economy, and in order to achieve this, these institutions need to strengthen their position, especially regarding their connections with SMEs, which includes: adjustments of curriculum to demands of labor market, providing industry oriented research for local economy, and defining ways of cooperation in order to find private partners as alternatives sources of founding.

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