

## Support to the establishment of effective cooperation between metal processing companies and R&D institutions

According to project activities in CREDO II, activity 2.1.1.9 *Supporting the establishment of effective cooperation between companies in metal-processing sector and R&D institutions* a general overview of the current state in cooperation between SME metal processing companies and existing institutions that are more or less engaged in research and development activities in economic region northeast of Bosnia and Herzegovina is given.

Phrase itself Research and Development - R&D, in accordance with the definition of the Organization for Economic Cooperation and Development (OECD Factbook 2008: Economic, Environmental and Social Statistics) is a "*creative work systematically taken in order to enlarge their knowledge and its implementation in the design of new applications*". In terms of the global business environment constant innovation, development of new and improvement of existing products is a critical factor in the survival of companies. The above statement is particularly comes to the fore if we take into account the fact about constant development of techniques and technologies, and changes in customer preferences. Generally speaking R&D can be presented as the willingness of companies, government organizations or other entities for the waiver of certain amount of financial funds – earnings with the aim to improve future performance through research and development. Principally R&D activities are conducted in specialized organizational units belonging to companies, universities or other institutions. To obtain a sense of investments size in R&D around the world, see following table, which refers to 2006 year:

Investments in R&D (billions USA \$)		
1	USA	343
2	EU	231
3	China	136
4	Japan	130

Investments in R&D in %GDP		
1	China	4,3
2	Japan	3,2
3	USA	2,6
4	EU	1,8

Countries that invest the most in R&D in relation to the GDP are: China, Sweden, Finland, Japan, South Korea, Switzerland, Iceland, USA, nine other countries, and then the EU.

Assessment of the amount of many that Bosnia and Herzegovina, at all levels, invest in scientific research is 0.05% of resulting GDP (ANUBiH, 2006 "*Strategy for scientific and technological development of Bosnia and Herzegovina*"). At the level of Bosnia and Herzegovina, including the economic region of north-eastern Bosnia and Herzegovina, as a result of inherited relations under the institutions dealing with some form of scientific and research work can be classified universities, institutes and the certain segments of the production companies (very rare, almost negligible). Some of the institutions that can consider as scientific-research institutions, whose activities may affect the regional metal processing sector, and whose headquarters are in the area of economic region of north-eastern Bosnia and Herzegovina are: University of Tuzla (Faculty of Mechanical Engineering, Faculty of Electrical Engineering, Faculty of Technology, etc), Mining Institute Tuzla, Welding Institute Tuzla, Institute for testing materials and structures Banja Luka, Institute for the Protection and Education Tuzla, Aeronautical Institute "Orao" Bijeljina. Detailed analysis of scientific-research activities in these institutions would require significantly greater commitment and resources, and as such is not the subject of this document.

In general, except daily problems that faced by all economic entities in Bosnia and Herzegovina, all scientific-researchers institutions that do operate in the territory of Bosnia and Herzegovina have more or less similar problems:

- Lack of professional, motivated, scientific and research staff - Generally known fact that in Bosnia and Herzegovina, the share of population that can in active and in a systematic way to deal with scientific-research work (highly educated working force) makes only 4.3% of the active working population (Council of Ministers of Bosnia and Herzegovina, "*Strategic directions in development of education in Bosnia and Herzegovina with the implementation plan, 2008<sup>th</sup>-2015<sup>th</sup>*"). With the specified percentage B&H was the penultimate country in Europe, ahead of Moldova (B&H Open Society Fund, Program of research support in the area of public policy, "*Human Resource Development in Bosnia and Herzegovina: how to run a stagnant development*"), for instance the Republic of Croatia has a share of 11.9 % of highly educated population in the working population. The above data clearly indicate the status of staff in institutions who dealing with scientific-research work. Analyzed from the aspect of staffing only thanks to his "position" University institutions are in somewhat more favourable situation than other institutions that often with the tacit consent of the competent state bodies carry a prefix which indicate the scientific research activities and work. Stated situation is additionally exacerbated by the fact that the interest of young people for technical occupations (university degree and above) in generally, including interest associated with work in metal processing sector, decreasing from year to year. Taking into account the increasing of speed in technology obsolescence and reducing of interest for the education of young people in technical occupations current situation is further complicated. Result of that trend is multiple reducing in number of competent personnel capable to carry out seriously scientific research work. Lack of interest of young people to work in scientific research institutions and in projects associated with them is mostly connected to weak material and all other forms of institutional support to staff who dealing with scientific-research work. One of the results of the lack of appropriate support is called "brain drain" or departure of the best experts in foreign countries where they contribute to scientific and research activities of the host country, not here in Bosnia and Herzegovina where they are educated.
- Outdated and/or inadequate scientific research equipment - Most scientific research institutions that exist in the economic region of north-eastern Bosnia and Herzegovina has more or less long tradition and they are established the socialist era - the contracted economy. Equipping of scientific research institutions by equipment is carried out with for the time modern scientific research equipment in accordance with the planning objectives and the needs of large SOEs that were able to financially facilitate scientific research work (equipment, professional development, space, etc.). However, with changes and events that followed at the end of the 20th century, scientific research institutions have found themselves in an unenviable situation. Specifically, the existing equipment is or has become useless outdated for some serious scientific research work, and the R&D institutions were not able to substitute it with a new modern equipment. The reason for the inability to replacement of outdated R&D equipment lies in the fact that it is very expensive and sophisticated and it requires significant financial resources, which scientific research institutions can not in reality provide themselves. There are individual cases - step out into this field, however weak synchronization of activities and plans between scientific research institutions and commercial entities often caused insufficient usage of existing very expensive scientific research equipment.

- Lack of adequate space capacity - All scientific research institutions have a constant problem connected with the appropriate (quantitative and qualitative) space that provides the best possible conditions for work. Given that this is a business activities that requires significant financial investments in other capacities (personnel, equipment, ...), as well as current economic situation in the region, many scientific research institutions deliberately ignore investment in space capabilities, which often results in more than inadequate conditions for carrying out scientific-research work.
- Visa regime with the most technologically highly developed countries - One of significant aggravating factors for a scientific research institution is in the visa regime with the most technologically highly developed Western countries. It is well known fact that knowledge (the result of scientific research work) refines and expands only if it is shared and has the ability to smooth transfers. It is also the fact that in a global world, knowledge is the "goods" that can be transmitted from one place to another and by that significantly shortening the time of adoption and implementation of new knowledge in order to increase the competitiveness of the economy. Imposed visa regime significantly impedes the exchange and training of scientific research workers and ideas. Therefore further progress and work of scientific research institutions is additionally complicated.
- Insufficient support of governmental institutions and commercial entities to scientific research work - As has been repeatedly mentioned scientific-research work is a business activity that requires significant investments, without guarantee for achieving the planned results. Performing of these activities requires involvement of all entities (government, economy) that directly or indirectly benefit from the results that would eventually be achieve by successful implementation of scientific research results. The current state in the area of support and co-financing of scientific-research activities is more than unsatisfactory. The government sector, thanks to the existing state order, the legal framework, bad economic situation, etc. doesn't have planned activities which aimed to significantly support scientific research activities in order to raise competitive ability of the domestic economy. Amounts that are directed to scientific research activities by the government sector are also negligible (0.05% of BDP in 2006<sup>th</sup>, before 1992<sup>nd</sup> 1,5% of BDP, the request from the new EU member states is minimum of 3% of BDP). As far as business entities, taking into account the existing situation - global economic crisis, a very small number of them is able to set aside certain funds for serious scientific research activities. In fact, currently only large companies from the domain of power and mining industry, and a certain number of medium-sized companies from the domain of the implementation of IT technology, and the automotive industry, take a part of the funding for internal research projects, while small enterprises in most cases don't have potential to support any scientific research activities.
- The lack of active cooperation on joint projects between R&D institutions and SMEs - Lack of communication, trust, financial support to scientific research activities, all kinds of incentives by the government sector, mutual understanding, etc. are directly affected that scientific research institutions and SMEs from the metal processing sector almost haven't joint scientific research projects aimed to increase competitiveness and intellectual capital through two-way transfer of knowledge and solving practical problems in the industry. Indicated lack of cooperation has additional weight when one takes into account the constant highlighting and declarative support of all actors (government sector, NGOs,

R&D institutions, SMEs) to cooperation between scientific research institutions and small and medium enterprises.

Due to the above-mentioned problems existing R&D institutions their everyday activities mostly reduced to pure survival, while in the few institutions which in their work practice scientific research activities, R&D work is mainly down to applied research till base research activities appear in a very small quantity.

General assessment of cooperation between SMEs and metal processing companies in economic regions of north-eastern Bosnia and Herzegovina and the existing scientific research institutions indicate that it is on the more than unsatisfactory level. The reasons for this situation can be seen from two directions.

From the aspect of scientific research institutions, SMEs haven't the potential to self-finance some serious activities in this area and therefore R&D institutions often not looking at SMEs as serious partners in R&D field. In order to make profit and ensure the existence, scientific research institutions are turning to "great" players and so unjustly neglected SMEs by which automatically ignore the real needs of this part of the economy. It is important to note that neither the government sector significantly helps cooperation between R&D institutions and SMEs. Namely, by not supporting to listed cooperation on implementation of specific R&D projects related to business activities to SMEs is denied ability to turn from "lego" producer into development-suppliers manufacturers and by that significantly raise their level of competitiveness and competence. What is interesting is the fact that all R&D institutions underline: the importance of cooperation with economic subjects-SMEs, lists a series of successful cooperation examples and achieved results, and they are very pleased with cooperation so far. On the other hand, SMEs stand out absence or even lack of any cooperation with R&D institutions, which clearly indicates to a lack of communication.

When considered cooperation is perceive from the aspect of SMEs there is an impression that they doesn't need any kind of R&D activities or at least they doesn't see any benefit form R&D activities. The reason for this can be found in the fact that the profit in the regional metal processing SMEs is largely realized through lower cost of human labour in relation to competition, not through their own innovative product - the production process in which is counted price of intellectual capital. In addition, aware of the fact that they are not ready to start serious scientific research activities, and seeing no possibility of any support (primarily thinking to the government sector: co-funding, tax breaks ...), SMEs adapt their overall business activities to specified situation and consciously remain at the level of "lego" producers. Another important aspect that needs to be included in consideration of cooperation between R&D institutions and regional metal processing SMEs is mutual feeling of distrust, which additionally complicates attempts to establish any kind of quality cooperation.

Taking into account all above facts, in order to increase competitiveness of metal processing SMEs in economic region through the improvement of cooperation with R&D institutions the following activities is suggest:

- Establishment of certain aspects of coordinating body that would have the task to articulate the needs of regional metal processing SMEs and capabilities of R&D institutions in realization of specific problems, at all levels of professional and scientific-research activities;
- Start activities on unifying of financial resources that are provided at various government levels in single scientific research fund (in cooperation and assistance of interested business entities) that would be used for co-financing of scientific research activities, in order to raise competitive ability of SMEs in regional metal processing sector;
- Arrange and organise open WEB database with detailed competences of potential scientific and research workers (including scientific research institutions and metal

processing companies) in order to facilitate finding of persons-researchers with the necessary competence in solving of specific practice problems and to establish real market of knowledge;

- Arrange and organise open WEB database with detailed review of available equipment and software that can be used for scientific research purposes in order to better utilization of those resources and to “prevent” duplication of existing scientific-research equipment and software capacities. This is particularly important when considering the extremely high prices, maintenance costs, and the amortization degree of scientific and research equipment and software;
- Support the certification and accreditation of existing laboratory resources in order to ensure optimal quality of services to regional metal processing sector;
- Organize periodic meetings between the scientific-research institutions/workers and representatives from regional metal processing companies in order to exchange experiences, presentations of results, considering possibilities of joint action, etc., by the principles of meetings organization and visits each time at different place;
- Find an adequate way for the promotion of scientific research and activities, and promotion of best practices of cooperation between economic subjects and scientific research institutions.