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A leading light

Dragan Primorac, Minister of Science, Education and Sports, details how Croatia is developing into a knowledge-based society,...

'Croatia – small country for great holiday' was the slogan introduced more than a decade ago, and nowadays Croatia is among the top 10 tourist destinations in the world. Although tourism is one of our national economic priorities, Croatia will become more prosperous only through science and technology development. With a population of 4.5 million, we are a small market in global terms, but with great business and developing opportunities. Our biggest capital, besides natural beauty, is the people and their intellectual potential. Therefore, at the beginning of its mandate, the present Government introduced a new motto 'Croatia – country of knowledge'.

To achieve this ambitious goal and to ensure the country's development into a regional leader in this sector by 2010, the Ministry of Science, Education and Sports (MoSES) has undertaken major reforms of the Croatian education system, from primary to tertiary education, including doctoral studies and science for the past four years. The strategy for developing Croatia into a knowledge-based society is founded on two strategic documents: 'Education Sector Development Plan 2005-2010', and 'Science and Technology Policy of the Republic of Croatia 2006-2010'.

Besides clear vision and strategy, one of the most important prerequisites for such a task is funding. With the support of the entire Croatian Government and Parliament, an

increase of the Ministry's budget of 38% (€404.6m) in the period between 2003 and 2007 has already enabled us to perform and implement those essential reforms.

Increased investment in research

'Science and Technology Policy of the Republic of Croatia 2006-2010', the strategic document accepted by the National Science Council and the Croatian Government in 2006, is in full implementation. According to it, the main goals of the science and technology policy in Croatia are the sustainable growth of investment in research and development, and their greater efficiency; the reorganisation of the science system; the strengthening of co-operation between the research institutions, business sector and the Croatian Government; stimulating transfer of knowledge and developing technologies essential for the competitiveness of the Croatian economy. In all fields of research, the participation of Croatian scientists in European Union framework programmes and other aspects of international co-operation should be intensified and highly stimulated.

To achieve these goals, a number of institutions have been established, such as the Business Innovation Centre of Croatia, the Croatian Institute of Technology and Ruder Innovations Ltd.

Leading R&D and technology development support institutes in Croatia

Business Innovation Centre of Croatia – BICRO Ltd – is an innovation and investment company established by the Croatian Government in order to facilitate technology transfer and commercialisation activities primarily in the sector of small and medium sized companies; to promote the establishment and development of science and technology incubators/parks; and to contribute to the creation and development of the private equity industry.

Another leading institution in forming prerequisites for the strong growth of a knowledge-based economy is the Croatian Institute of Technology – HIT Ltd – established by the Croatian Government in March 2006. It is interesting to note that at the end of February 2006, the European Commission suggested the establishment of the European Institute of Technology, which reflects a shared understanding of the need for a comprehensive approach to the development of technology through the work of specialised establishments.

HIT's major role is to act as a bridge between academic and scientific institutions and industry. Through its core business activities like technology foresight, business intelligence and administration of the Technology Related Research and Development Programme (TEST), HIT participates on both strategic and operational levels in all technology related issues. HIT's core activities are the implementation of financial support measures for technology-based innovative entrepreneurship and setting up of co-operation on projects with EU funds. Also, it offers consulting services in the area of technology and knowledge transfer and professional assistance in setting up spin-off and start-up companies where the main criteria are innovation and development of new technologies.

The Ruder Boskovic Institute (RBI), the biggest Croatian institute in basic and biomedical sciences, undertook several important steps in 2006, fostering activities towards



Picturesque Mediterranean small town Jezera on the island of Murter

exploration of different ways of knowledge commercialisation. As the participant in the Science and Technology Project contracted by Croatia and the World Bank in March 2006, the RBI established Ruder Innovations Ltd, the agency for protection and commercialisation of RBI produced IP and expertise. In parallel, 28 RBI employees participated in the CARDS programme Intellectual Property Rights – infrastructure for R&D Community in Croatia. Although still in their initial phase, the RBI activities geared towards generation of IP increased in 2006, resulting in a total of nine inventions currently in different phases of realisation. RBI signed a contract on co-operation with one of the largest Croatian companies, Agrokor, initiating collaboration in food quality control and joint development of new products; two projects have already been realised in this year. Previous successful collaboration between the RBI and glass Producer Company Lipik Glass was formalised and a new project started in 2006. Also, short-term project collaboration with the pharmaceutical company PLIVA continued successfully in 2006.

Evaluation of scientific projects

Croatia is aware that it is only leading research institutions and high quality research that can be competitive globally and gain new value for our country. Evaluation of scientific organisations has been introduced in order to achieve a high level of quality and efficiency. The National Science Council carries out the evaluation.

As a part of ongoing science sector reform, in January 2006, new criteria harmonised with the EU standards were introduced for the selection of scientific projects and programmes funded by the Ministry. These criteria encourage concentration of research, stimulate and reward excellence and introduce a significantly higher participation of foreign reviewers. For the first time in Croatia the evaluation process was carried out by independent evaluation experts appointed by the National Science Council. Thus, it has completely removed the influence of the administration from the review process. Furthermore, the Ministry has introduced a completely computerised system, which prevents access to unauthorised individuals. The Ministry only offered logistic support to reviewers who manage the entire evaluation procedure. For example, in 2006, after the completed evaluation procedure, the acceptance rate was 72%. For the sake of comparison, the acceptance rate in 2002 was 88%. This project acceptance rate and the stricter evaluation criteria bring us closer to EU standards.

A very sharp and competitive evaluation of technology projects was already being carried out in the last six years by the Technology Council, with the acceptance rate below 40%. The Technology Council permanently monitors project development for its entire period of duration. The important fact is that a number of projects are successfully completed and results are already in the phase of commercialisation. The recent innovation is that the



Second Congress of Croatian Scientists from Homeland and Abroad

Ministry financially supports the employment of the best junior researchers, working on technology projects of different companies. Until recently this was the practice only for junior researchers from academia involved in scientific projects

In considering science and research financing, let me mention, as an example, that our Ministry has allocated €22m for projects in 2007. This figure shows an increase of over €6.7m compared with 2002.

Apart from the Ministry, which is the main source of financing research activities in Croatia, the Croatian National Foundation for Science, Higher Education and Technological Development was established as an independent foundation. It finances research projects by its own criteria and evaluation procedure.

The gigabyte infrastructure in the service of education and science

Croatia leads the world in e-Education as the result of its thorough informatics service infrastructure that has been established for a globally competitive higher education and science system. The Government recognises new technologies as an imperative for the further development of Croatia as a nation based on knowledge, and it is important to note that a majority of technology-based services have been established by Croatian experts. A complementary system of services and infrastructure opens the way for improved scientific work and study conditions, equal to those enjoyed by researchers in developed European nations. An important part of e-Education in Croatia is CARNet, with its purpose to develop an advanced information and communication infrastructure for the academic and scientific communities. It is a fast and secure network with a 1.2 gigabyte speed and a number of contents and services to which all scientific institutes, higher education institutions and student dormitories are connected. Giga CARNet has been the largest CARNet infrastructure project in the past few years. Through this

project, CARNet and the University of Zagreb Computing Centre SRCE have been promoting the gigabyte infrastructure, which is currently the most advanced technology available in the world. Mobile CARNet is a service of the mobile wireless connection to the CARNet network offered to all of its users. The Online Database Centre contains data and a collection of foreign scientific journals for the research and academic community. It provides access to all Croatian scientists, researchers and students, unrestricted access to key world online databases and full texts of 24,000 scientific journals, along with a simple authentication system, regardless of whether the system is being accessed from work or home. Furthermore, the Croatian Science Portal was established in April 2006 to consolidate information useful to the scientific community, enable better linkages between scientists and encourage their co-operation.

Croatian 'Brain Gain'

As I have already mentioned, the greatest Croatian capital is its people and their intellectual potential. However, it may not be known that the number of Croats living out of Croatia almost equals the number of Croats living in the country. We simply cannot neglect this immense intellectual power of the Croats living and working abroad. Based on Israeli and Indian experiences, the Ministry created a permanent networking system for all Croatian scientists working in Croatia and abroad in order to mobilise all of them. In line with this strategy, The First Congress of Croatian Scientists from the Homeland and Abroad, held in November 2004, gathered over a thousand scientists and guests and was a major milestone for Croatian science. The Congress objective was to critically analyse the current situation in the Croatian scientific community and to propose measures for the establishment of a permanent networking system for all Croatian scientists working in Croatia and abroad. This resulted in the establishment of the Unity through Knowledge Fund, which is intended for the networking and return of Croatian scientists and is funded by €3.9m. The Ministry's Project for the Return of Croatian Scientists from Abroad has encouraged the return of 44 Croatian scientists from abroad since 2004, and efforts are underway for the return of dozens of others. The vision presented in the S&T Policy was supported by the World Bank, which approved a loan in the amount of €31m for the Policy's realisation. The Croatian National Foundation for Science, Higher Education and Technological Development also started its 'Brain Gain' programme in 2005. The programme has four sub-programmes: Guest, Senior, PostDoc and Returnee. The Returnee programme finances the establishment of a research infrastructure in the amount of over €100,000.

On the issue of international co-operation in S&T, one has to leave the traditional confines of thinking only in terms of bilateral and multilateral co-operation. Bilateral, multilateral and regional activities will affect each other in today's global village and cause synergetic effects in S&T policy and co-operation within the country.

Multilateral S&T projects

Each of the 118 bilateral S&T agreements/treaties/protocols to which Ministry is a party refer not only to countries with which Croatia has traditionally enjoyed good S&T co-operation – eg. Germany, France and Great Britain – but also to stakeholders who will represent tomorrow's cutting edge of S&T, or those who are already there, such as the United States, Japan, Israel and India, and China as emerging S&T powers. The result of such bilateral activities is some 222 bilateral projects that have crossed the boundaries of traditional two-way co-operation and have found their way into 170 multilateral S&T projects, including the most developed countries in the area of S&T: US-Croatia research projects co-financed by the US Government, technical agencies and the Ministry; the €1m Croatia-India Fund co-financed by the respective national authorities for science; scientific co-operation with Israel. The Joint Declaration was signed in Jerusalem on 15th June 2007.

Multilaterally, Croatia's main partner in S&T co-operation is the EU. The first two chapters that were closed in the negotiation process for Croatian accession to the EU were science and education. The participation of Croatia in the EU Sixth Framework Programme (2002-2006) started the process of Croatian integration into the European Research Area. The overall participation as a third country (2002-2005) and as a country associated to FP6 (2006) resulted in more than 100 projects and a favourable ratio of invested national contribution versus approved funding. It has confirmed the excellence and competitiveness of Croatian scientists on the European level and prompted the association of Croatia into the Seventh Framework Programme. In the process of accession negotiations, the EU noted that Croatia is already well placed to address the targets of the European Research Area.

It is worth mentioning that Croatia is a member of numerous multilateral organisations such as EMBO, COST, CERN, ESF and ICGEB, and that it participates as a NATO candidate country in the Science for Peace Programme. Since it is our ambition to become one of the region's leading S&T countries, and all we have done so far in this regard indicates that we are well on this course, we must not forget the opportunities provided by regional organisations such as the Central European Initiative, the Alps-Adria Community, the Stability Pact Organisation and many others.

Care for employees in science and education sectors

To stimulate all active participants in the above mentioned activities, we have introduced several additional financial measures, such as the subsidised housing loans. The Ministry has made it possible for the employees of higher



Plitvice Lakes – Breathtaking National Park that UNESCO has declared the World's natural inheritance

education institutes and public institutes to use subsidised housing loans. A loan user pays around 1.67% interest, and the Ministry subsidises 3.23%. So far, 1,903 subsidised housing loans have been approved, and the Ministry has supplied the funds to subsidise another 740 loans in 2007.

All of these reforms would not be possible without employing additional people in the science and education sectors. Therefore, during 2004 and 2005 we have created almost 5,500 newly opened jobs in the entire sector, which is the biggest increase in job openings recorded so far. Additionally, 1,643 jobs have been opened for new junior researchers alone. The Agreement on Salaries signed by the Croatian Government and the three major unions in the science and education sector in 2006 guarantees a significant increase in salary for those employed in the science and education system. This document of major significance projects salary increases of about 61% in the next six years.

According to the latest EU Report, Croatian education, science and technology development is on a respectable level. Croatia is considered to be the leading country in the region, and even better positioned in comparison to some newly accessed EU countries. This testifies to the fact that Croatia is even now recognised as the competent partner in science and technology on the world market.



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