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A critical look at Croatian science and higher education by a veteran

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I have been asked by the Editor-in-Chief of this journal (*Periodicum biologorum*) to comment the article SCIENCE AND HIGHER EDUCATION IN CROATIA AT THE VERGE OF ENTERING THE EU, by Ž. Jovanovic and S. Zelenika, appearing in this issue of the journal. Since I have had some historical ties with the journal, I felt obliged to accept the request and respond positively. The other reason for responding positively is my long-lasting involvement in Croatian science, and my unsuccessful attempts to introduce in the system the international standards (thus I'm a veteran!).

I have to start with a general remark. I will have to accept the statistical data as they are presented. The problem is that quite often the actual numbers were and still may be questionable, and I am far from blaming the authors for this. The numbers were questionable not because of the mathematical skills of our statisticians but because the concepts behind the numbers were often questionable. Let me use one example to make myself clear. Having followed the data on science in Croatia for several decades, I have seen such variability for the same statistical data without any rational reason. One of the examples being the number of scientists in Croatia (I will skip the fact that the usual terminology of "scientists and engineers" was never accepted and practiced in Croatia). The number of scientists in Croatia, according to the official figures varied between 7000 and 13000. At the same time, the search of the authors with Croatian addresses in relevant international data bases never provided more that 2000 registered names. As I have stated above, it is not the mistake of the two authors whose article I am commenting, but this caveat should be kept in mind when commenting on some of the figures.

Having cleared out this possible systemic mistake in some of the data, I will follow the sequence of the authors. Thus, first my comment on the "Current performances...". This will be followed by my comment on the "Measures taken...." One of the beginning sentences in the "Current performances..." is: "However, Croatian current levels in some of the key performance indicators are sill showing improvement potential". I find this sentence very diplomatic, since I believe that Croatian science needs dramatic changes as soon as possible.

But let me follow the text of the authors. Nothing could be added to the statement that the funding of Croatian science is below the average of EU member states, and that the majority of the funds come from public sources. The only additional point that could be made is that this has lasted for decades, that the sum in absolute numbers is low (low GDP!), and that a prolonged dramatic increase would be required to catch up with the rest of European countries.

Despite the fact that the innovation index shows some improvement, it remains dangerously low. I say dangerously low because it shows the inability of Croatian R&D to produce innovation, but also the lack of interest of Croatian companies for innovations as part of their competitive potential for a globalized economy. This vicious circle is extremely dangerous for the development of the Croatian economy. Of course, this fact is reflected in the extremely low rate of patents in Croatia, contradicting to some rather remarkable achievements of Croatian students and innovators performing well in international competitions, but leaving disinterested the potentials investors among Croatian companies. To this same package belongs the below average success rate of Croatian applications for the FP7. The success in obtaining more funds than Croatian contributions is a dubious consolation.

Certainly, one of the reasons for all the above facts is in below average of the population completing tertiary education in Croatia. Adding to this figure is the fact that only some parts of Croatian institutions of higher education are up to international standards. It is, therefore, not surprising that the figures for actively involved part of the working population in life-long learning is about one third of the average in EU countries.

There were and are attempts to improve the quality of the scientific and education sectors in Croatia. They always meet with a fierce opposition of those that achieved and maintain their undeserved positions in this segment of the Croatian society. The opponents often ask for democracy and consensus among all the participants for any change, forgetting (?) that excellence is the base for development and high standards of the scientific endeavor. Thus, seeking consensus and democratic voting for intended changes, in my view, is simply not reasonable.

With regard to the growing number of Croatian higher education institutions, I would say that this is more a measure of the success of local politics than the actual rational policy at the national level. This even more so since there are simply not enough competent people to make these proliferating institution to perform at international standards. A result of equally distorted reasoning, or lack of rational policy, is the proportion of students enrolling (60%) in social sciences and humanities. There are a number of reasons for this unreasonable trend adding to the numbers of unemployed among tertiary educated people in Croatia. To contribute to this unwelcome situation is the constant complaining of those working in social sciences and humanities that their fields are unfairly treated and constantly neglected. Since they often have a disproportionate and largely undeserved influence in political circles, this strange story, for example, is recently filling the pages of public media, keeping the public busy with virtual problems rather then the real ones.

Is it then unexpected that this unreasonable policy in the fields of science and higher education is having a number of foreseeable consequences. One of them being the increase in the number of students and faculty in the last 5 years. Together with dubious criteria for advancement of the faculty (40% being in the highest rank!) makes this totally unreasonable package complete. As a decorative ribbon for this package is the fact that almost 80% of all scientific and teaching staff members remains employed after the retirement age, proclaimed "indispensable" for functioning of their institutions. The question is, of course, why they were not able to prepare younger colleagues to take their place? It is all but unexpected, then, that an attempt to change the law and amend this situation has been confronted with fierce opposition, particularly by those personally interested. This leading to an unsustainable trend of keeping about 80% of funds allotted to science and higher education for covering wages alone, leaving the rest for all other needs.

The success rate of 85% of the proposed scientific projects would have us believe that Croatian scientists are extremely creative and deserve financing of their proposals far above any percentages known in the scientifically developed countries. Needless to say, that is highly unlikely. Rather, there is a lack of proper criteria for acceptance, as well as improper peer review supposedly involved in the awarding process. Let me just say here that I firmly believe that a competent and impartial peer review within Croatia is simply not possible. It is true that these projects are financed with minimal sum, but it is also true that even the totally low amount of money given for them is actually a waste of taxpayers' money.

What is coming out of these projects? It is about 0.8 publications per scientists (full time equivalent). The figure itself is not so low, particularly if one takes into account the amount of money spent (see above). However, the quality of the production is rather low; only about 3% of the papers are published within the 10% most prestigious scientific publications in the world. In the EU countries the figure is 11%. Other figures for the published papers (citation, h-index, impact factors of journals) testify to the conclusion of the average low quality of papers by Croatian scientists. It is also not surprising that few of these papers are written in collaboration with international scientists.

As if all the above is not a cause for grave concern, (im)moral issues within the community of scientists, high education teachers and the students are coming into the open. About 60% of students cheat during the exams, up to 60% of the faculty members are aware of undeserved authorship of scientific publications. Up to 90% percent of the faculty members turn the blind eye on such misconduct. Possibly some of the recently more frequent legal procedures against the persons involved in some form of corruption or misconduct may present a light at the end of the tunnel.

Concluding this part of my comment, I should be quite clear that nothing of the described failures of the system of R&D and higher education can be ascribed to the two authors, presently in position of trying to amend what they can. The system has functioned with wrong practices over the past decades, not at all free of detrimental political influences. In my view, we are in the present

situation because of the accumulated lack of quality control and assurance within the system, that would be in accord with the practices in the most scientifically advanced countries and valid international standards. Croatian science and higher education have championed a strange and autistic way of setting the rules and regulations, and changing them relative to the interests of influential power groups, often closely collaborating with the political establishment of the moment.

Let me cite the opening paragraph of this part of the article I am referring to: "In order to address the above situation, since the beginning of the current legislation started at the very end of the year 2011, in the past 15 month MSES (i.e. Ministry of science, education and sports) has carried a number concrete steps aimed at aligning and harmonizing the Croatian scientific and higher education system with the best practices of the most developed EU member states and other western democracies. In line with Albert Einstein's statement that "We can't solve problems by using the same kind of thinking we used when we created them", these measures include but are not limited to (5)." Clearly the goals of the MSES are properly set.

I firmly believe that the MSES has an enormous task, trying to regulate science, whole education (from the kindergarten up) and sports. All these have a lot of accumulated problems to which the cited Albert Einstein's statement can be well applied. All of these societal subsystems are quite important, but also equally burdened with inappropriate functioning. This remark serves only to describe the immense tasks for the MSES.

Reading through the intended steps described in the article I am commenting on, one can see a clear intention to organize and regulate the scientific and higher education system (parallel with other tasks given to the Ministry). All the listed measures are steps in the right direction as set in the cited paragraph (see above). I for one am convinced, however, that a set of proper values for the functioning of the system has to be imposed, not negotiated through democratic procedures. Science is democratic in its methods, but definitely not in its achievements. Only internationally renowned persons should be able to set the rules and practices. They should be assigned the task to set the practices that have been functioning for long time in scientifically developed communities. One cannot participate at the international level unless accepting the rules and practices that exist in the field. We can have at our disposal a sufficient population of successful Croatian scientists working and obtaining fame throughout the world. Of course, other colleagues, as it is customary in the system, I am sure, would be willing to help us.

We should start by admitting the grave situation in which we find ourselves, through fault of our own for a number of decades, and starting from scratch to apply proper ways and means to make our system of science and higher education function in line with the most successful ones in Europe and the rest of the world. In time we should try to deal with the remnants of the past by putting the wrong things into the right place, including people who undeservedly occupy places of distinction and power in our system. For this we need a clear political backing of politicians, but only to the extent that they are ready to take the risk of such dramatic changes and their consequences. Once this is set in motion, the academic community is able to autonomously regulate itself, properly supervised by the relevant political representatives. I see no other indispensable quick and proper change in our system of science and high education.

An often used saying in Croatia is: "Changes cannot be done overnight". True for all changes to be completed, but some could be installed exactly overnight. For example, the decision that there will be no financing of scientific projects in Croatia unless there are judged by competent and impartial experts wherever they come from. Or, that there will be no advancement of scientists unless they have passed though a proper evaluation by competent colleagues. And alike. Can it be done? I am sure that it can. Will it be done? I am hopeful, but not sure, since I have seen, in my life, to many failures.