

Croatian Science at a Crossroads

Decision-makers responsible for the work of the scientific community in Croatia will soon be obliged to decide: are Croatian scientists able to assist in resolving the Croatian structural crisis or politicians will continue to listen to Croatian scientific opinion-makers who argue in favour of Croatian scientists serving other people.

The term 'Croatian scientists' should be specified. There are two principal categories: professional scientists and members of the academic community. Members of the academic community have other obligations apart from research. Croatian science comprises 6 groups. These are: biotechnical, social, humanistic, medical, natural and technical science.

Croatian scientific opinion-makers have been extremely successful in imposing their view that science constitutes only natural science, accompanied by tacit tolerance of the social sciences. They were given licence to do this with catastrophic consequences.

Two more terms should be mentioned. Pioneering research and productive research. Croatian science favours pioneering research and underrates those who are involved in concrete, productive research.

One often hears the refrain that more money should be allocated to science. For which research? Pioneering or perhaps after all for productive.

Why has Croatian science managed to get itself into such a situation? First of all, the opinion-makers have constantly been imposing their views that we should make knowledge-based data available free-of-charge, mainly in one country. These data bases were created using Croatian taxpayers' money or, to make matters worse, through borrowed capital. All criteria in the pursuit of advancement or recognition were subordinate to this and so moving up the ladder depends on articles published in journals in certain data bases. Given these facts, what has never been articulated is why, for instance, publishing an article in the journal of *WoS's* choice is more important than that in *Scopus*. There is no analysis which bases are best for certain areas. For example, the best base for one area simultaneously covers roughly 67 % of journals from CC, 87% from *WoS* and circe 95 % from *Scopus*. However, this is not a reliable guide for those pursuing advancement or recognition. The lack of such analyses has given rise to some interesting developments. Recently, a journal was included in *WoS*. The result of this was that the number of articles multiplied fivefold with a charge for printing. And what does Croatia get out of this? The answer – not very much. This, in fact, is the first step in servility and many such journals exist.

Croatia has several journals in the area of mechanical engineering. All are held in high repute but all are similar. Original scientific papers in English predominate. The scientific area, in a very successful manner, is covered by private journals from Croatia and Slovenia.

Now Croatian scientists are involved in various European projects. As a rule, this is as junior partners. Excellent. But the day is made up of 24 hours and where is the judicious evaluation of Croatian national interests in certain areas.

A conclusion should be drawn. According preferential treatment to writing for foreign data bases which, to a great degree, foist trends advantageous to their interest, accompanied by questionable reviews which hinder competitors, does not serve the needs of Croatia. This is not always even European partnership. We need change; a complete reengineering of Croatian science must be carried out.

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Croatia has a certain number of scientists comparable to basketball players in the NBA league who should be provided with the opportunity of working at home or abroad. However, that number is nevertheless very small. We have to think about CNSL i.e. the Croatian National Scientific League which must, given the number of available scientists the majority of whom belong to the academic community, provide for science based on development of the country.

Some attempts were made but they were nipped in the bud. Here we are mainly thinking about the Technological Council's successful work which has practically been suspended, while an exchange with some high-sounding organisations gave no results.

What should be done? Croatia cannot operate in all areas. A niche should be found. One of these could be microtechnology and nanotechnology. It would be interesting to see an analysis of the time and money expended by Croatian scientists on these areas, especially in the nanotechnology field. Twelve years were spent, enormous effort was invested in nano natural science. And then the statement: Croatia does not have one company dealing in nanotechnology. Over the past couple of years our own strategy for reexamining ways of seeking a niche has been put forward. However, there has been no response.

The second step should involve a complete change of criteria for advancement and the pursuit of recognition. Dignity should be restored to commissions who ought to recognise the contribution of the applicant and not that clerks count the number of papers. The question is not rhetorical. Why is the one who knows how to calculate the vibrations on some potential export equipment inferior to the one who is constantly simulating something on a computer in the same field? He has articles published in journals which someone from Croatia will read. Will this newly-developed science be applied in Croatian practice – that's a different story.

Given that the Croatian scientific community is small, scientists have to operate in central institute bodies, scientific and professional associations and as editors in the work of standardization bodies (e.g. physicists, biotechnologists and technologists). Book writing, so indispensable for this environment, is less and less appreciated. Due to the small number of top-class experts, it is the members of the academic community especially who have to provide for the transfer of the most recent knowledge (99.9 % of world knowledge) in the country.

Members of the academic community are very often obliged to participate in amending the Constitution and laws, leading or coordinating projects of particular national interest etc.

It is clear that all scientific branches are not the same. Top-class natural scientists should be left to carry out pioneering research. However, all natural scientists, not to mention biotechnologists and technologists, cannot be involved only in this.

An overall world trend is biotechnology. We should see what Croatia could actually gain from this. Development of molecules from which foreigners will make medicine or material is not in the national interest of Croatia. But biotechnology also contains a powerful component of artificial engineering, in plain language, engineering. Where are our possibilities here? It would be worth discussing.

And where are the social and humanistic sciences? Without them there is no biotechnology nor engineering and least of all appropriate technology. If technology is an all-encompassing science on the interlocking of engineering, economy (social science) and society (social and humanistic science), then there is a need for these sciences. Biotechnologists and technologists are capable of inventing many things. However, someone needs to check the economic justification and contribution to the prosperity of the country, the risks, protection of health and the environment, ethics etc. A debate should be opened on the contribution of Croatian scientists in resolving the structural crisis. Croatia requires, above all, scientists who are dedicated to that goal. A number of scientists should be allowed to represent Croatia in the NBA league.

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