

Systemic change in Polish science

# Science, Stupid!



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### If we do not eliminate the barriers impeding Polish research, Poland's economy will also lag behind

Poland's population represents 8.5% of the EU's inhabitants, Polish scientists comprise 4.6% of the European research community, the Polish GDP is 2.5% of Europe's, and our country's research spending accounts for some 0.7% of all EU spending on science. These figures suffice to illustrate that we live in a relatively poor EU country that has for years been allocating less money to R&D than might be expected even considering our modest wealth. This state of affairs not only affects the caliber of Polish research but also undermines the attractiveness of our country's economy in the wider world.

Polish research teams win the lowest amounts of EU funding when considered as a ratio of our country's GDP. Under the competitive 6th EU Framework Programme (2002–2006), researchers from Poland recovered only 53.6% of our country's contribution to the funding pool (which is based on the member states' GDPs), as compared to 75% for the Czech Republic, 96% for Hungary, and 155% for Slovenia. Moreover, our achievements to date under the 7th FP, now underway, do not seem to indicate that much headway is being made in this regard.

One way of gauging the level of scientific research in a given country is the overall number of research publications. By this standard we are ranked 19th in the world, with much less populous countries like the Netherlands, Switzerland, and Sweden far ahead of us. When the overall number of publications is viewed in per capita terms, we rank last in the EU. The position of Polish universities is also weak: even the very best

are only rated in the 300–400 range in the Shanghai ranking of world universities.

### Next to last

The weak stature of science in Poland necessarily entails a less innovative economy, since these two fields are integrally linked. Each year Poland registers with the European Patent Office only four inventions per 1 million inhabitants, the poorest rate in the EU save for Romania. High-technology exports represent a very small share of our country's exports overall, at 3%, compared to 22% for Hungary, 14% for the Czech Republic, and the EU average of 18%. Poland's share of high technology exports worldwide stands at just 0.15%, three times less than the Czech Republic and four times less than Hungary.

For several years now, Poland's standing has been dropping on list of 55 countries ranked in terms of their ability to cultivate and maintain a business-friendly environment. In 2007 we came in 52nd, far behind countries like Estonia, Lithuania, the Czech Republic, Slovakia, Hungary, Bulgaria, and Romania.

We make a similarly poor showing in a ranking prepared by the World Economic

### One of the factors impeding Polish research is the low level of funding

Forum. Of the 131 countries it compares, Poland now occupies the 51st place, clearly outstripped by our EU partners Estonia, the Czech Republic, Lithuania, Slovenia, and Slovakia. While it is clear that this state of affairs cannot be changed in just a few years, countries like Spain have shown it is possible to turn from stragglers into world leaders in less than two decades.

### Ten barriers

Among the various factors inhibiting the development of research in our country, several should be first in line for elimination. One of the most unfavorable is that Polish



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researchers all too frequently publish their work in journals of only national scope. As many as 80% of Polish scientists' papers appear in publications that frequently have little impact on world science. The Polish Ministry of Science and Higher Education currently subsidizes several hundred of them, a situation urgently in need of change. Such extensive support for lower-standard research journals harms both Polish science and the scholars themselves, who doom their own work to marginalization by publishing it in such titles. Of course, some of these journals fully deserve support, for instance those that provide a venue for ambitious papers investigating Polish literature or describing the local natural or cultural milieu. All the rest, however, need to be closely scrutinized, especially since this is not just about poorly-harnessed funding but also about the promotion of relatively poor research work. One of the forms of such harmful promotion involves points being awarded to articles published in such weak journals, which are then cited as an argument to boost the evaluation of specific research institutions or the achievements of their individual researchers or laboratories.

Another phenomenon that greatly impairs the advancement of research is the level of funding – extremely low for years, the lowest among EU member states. Now, for the first time in a long time, there is a chance this situation will change. Poland's 2009 budget act calls for significantly increased state budget spending on science. While the global crisis may hamper these ambitious plans somewhat, the Polish research sector

will also be receiving money in the coming years from EU cohesion funds, significantly boosting research budgets.

The next factor that impairs science in Poland is the fact that the salaries earned by many scientists are insufficiently linked to their level of achievement. The most productive scholars earn the same kind of pay from their institutions as their average or even mediocre fellows. That renders it extremely difficult to attract top scientists from developed countries to come to Poland.

### Spread too thin

Another impediment taking its toll on Polish science which we must mention is the plague of research staff working multiple jobs. Although the phenomenon is relatively new, its scope and multifaceted impact already verge on the absurd: some academics simultaneously employed at multiple research institutions officially hold full-time posts at every one of them, and 100% of the research staff at certain research institutions hold positions elsewhere. The true extent of this phenomenon among the Polish research community is unknown, but it is estimated to involve one in every five individuals holding the post of professor. We have grounds to fear that such fields will soon experience complete degradation.

Also unfavorable is the absence of mechanisms stimulating healthy competition. Science cannot develop properly in a country where a vast majority of researchers work at higher-education schools whose budgets are not contingent upon research achievements.

**One of the ways to help young, up-and-coming researchers embark upon their own research careers is to establish a special pool of grants for them**

## Systemic change in Polish science

University budgets in Poland are supplemented by a state subsidy that is calculated mainly based on the numbers of students and teaching staff. Poland needs to identify and promote a handful of top-league research institutions, flagship higher-education schools, and large national research infrastructures to act as rapid-reaction forces in the battle for European and international funding. That does not mean that the rest of the higher-education and research establishments will fall into disfavor – their task will be to serve as platforms for talented individuals, to promote innovation in the regions, and to broadly educate Poland's young people on the highest possible level. Independent experts should set the criteria based on which certain research institutions and academic circles will be chosen to become flagship institutions, while others will remain on the regional level.

### Transparent procedures

One heated and quite awkward topic of discussion about reform in Polish science is the lack of clear competitive procedures for filling research positions, and also the unclear criteria for charting out career paths. It is not customary for the outcome of such competitive procedures to be made public. We joined the EU nearly 5 years ago, yet it remains a rhetorical question how that momentous occasion has changed our procedures for the promotion and recruitment of research staff, for how grants are awarded, and for how funding gets allotted to specific research groups at a given institution. The pace of development is also affected by the lack of mechanisms enabling young, up-and-coming researchers to quickly embark upon an independent research career. One way to improve the current state of affairs could involve creating a pool of grants reserved for such individuals and facilitating their return to Poland after they finish internships or doctorate study abroad. Lab units with retiring staff should be closed down, to be replaced by new labs established based on open competitions.

### Good practices

One topic that is rarely addressed, yet crucial for the development of every field of life, is ethics. Our country lacks a transparent system overseeing the observance of good

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ethical practices in science. Each research institution in Poland needs to have an ethics mediator, with a second-instance mediator on the national level acting as a body of appeals on ethical issues.

The hurdles faced by Polish science also include the poor availability of modern, relatively objective scientometric tools (e.g. Scopus and Thompson/Reuters) and Polish researchers' lack of a need to use them. These are large databases reflecting not just original research articles but also their subsequent citations – without such tools and data, objectively identifying the caliber of a specific researcher or institution essentially becomes impossible and it is hard to pursue any rational advancement or investment policies. Another factor important here is the absence of an independent agency tasked with evaluating the research conducted at various institutions in Poland. Lastly, this long list of problems also has to include the low level of mobility among research staff. It remains standard in our country for scientists to plan and conduct their entire career at a single institution. Like in biology, where it is a basic truth that inbreeding leads to the accumulation of congenital defects and pathologies, the proper development of a researcher's career requires professional experience obtained at a number of institutions. Only greater mobility can help both Polish scientists and the institutions they work for to develop.

Before I answer the question that now presents itself – which of the above barriers

**The funding granted to research projects and institutions has to be contingent upon their performance**

I consider most detrimental to Polish science – I will cite a bit of my own personal experience. I am a biochemist, and years ago I was working on the theory of metabolic control. One of the tenets of that theory maintains that most metabolic processes are limited on many levels, each of them with its own controlling mechanism. Even if the inhibiting factors are removed on most levels, that will still not greatly affect the system as a whole. The few remaining limitations will simply increase their inhibiting strength and the initial balance will be retained. By analogy, truly altering the condition of science in Poland will require comprehensive solutions on many levels.

### Roads to reform

In December 2008, the Polish government put forward a package of five science-related bills: on research funding, on establishing a National R&D Center and a National Science Center, on the Polish Academy of Sciences, and on research institutes. The main objective of all these new regulations is to boost the competitiveness, quality, and innovation of science in Poland. The proposed package of five laws should significantly transform how science functions in our country, and their enactment will reduce the inhibiting impact of many of the barriers I mentioned – those barriers are by no means just rhetorical figures for describing a fictional reality, but hurdles that actually exist at each of the country's several hundred higher-education schools, R&D institutes, and Polish Academy of Sciences units.

### Smart funding

The bill addressing the rules for research funding contains regulations that will render the money obtained by research establishments and individual leaders of science contingent upon their performance. Moreover, research work will be funded from multiple sources.

The National Science Center, in turn, will implement an idea that has long been promoted by the scientific community: establishing a specialist-managed and publicly-funded institution, independent of politicians, tasked with awarding research grants in all fields of science under competitive principles. Next, the National R&D Center will promote state

policy by financing research of strategic importance for the country's development.

The bill on research funding calls for increasing funding to be channeled through these two centers each year, reaching 50% of all budgetary spending on science in 2015. These monies will be fully allocated to specific projects identified via competitive procedures. The same bill also calls for a new advisory body to be set up under the minister responsible for science, called the Committee for Evaluating Research Institutions. This body will evaluate Polish research units according to the standards and principles followed in the world at large, classifying them into one of three categories: A (top institutions on the national level), B (an acceptable level, improvement recommended) and C (an unsatisfactory level). The overarching objective of all these bills is to comprehensively address many of the

### Truly altering the condition of science in Poland will require comprehensive solutions

barriers impeding the development of science in our country. Plans also notably call for the laws regulating higher education and academic degrees and titles to be amended in the near future as well.

### Final clash

However, the real battle against barriers impeding Polish science will be fought at each of the higher-education schools, research centers, and Polish Academy of Sciences institutes. The research establishments that emerge from this battle victorious will guarantee a lasting place for themselves and even be forces to reckon with outside Poland's borders. They will lead our country's development, based on transparent principles and on what is most precious in today's world: creativity, original solutions, and impressive knowledge. It should be clear to all that prioritizing the development of science, and thereby an innovative economy, is crucial for us. One might sum that up by simply saying: "Science, stupid!" ■

#### Further reading:

<http://www.nauka.gov.pl>