

Tough times for Greek science

The recent economic crisis has drastically affected research and development in Greece, but competitive research goes on, says Eleftherios Economou, a founder of the Foundation of Research and Technology Hellas (FORTH) research centre in Greece, and former General Secretary for research and technology.

■ Why did you decide to study physics?

During my undergraduate years at the Technical University of Athens I was very lucky to have had inspiring mathematics professors. In particular, one of them recommended some English textbooks on advanced electromagnetism and introductory books on quantum mechanics. I was thrilled to discover intellectual treasures in them. Then, in the early 1960s, the newly established research centre 'Demokritos' organized unofficial courses on modern physics, taught by researchers who had just returned after completing their PhD in the US or UK. Several colleagues of mine followed these courses and, as a result, they were set on a path to study physics abroad, in the USA, UK, France and so on.

■ You started your career in the US in the early 1970s. What made you decide to go overseas, and how did you select your topic of research?

The events I mentioned before oriented me towards studying theoretical physics abroad, because the opportunities in Greece were essentially non-existent. A few of my friends were already studying physics or chemistry at the University of Chicago. So, I included this university in my applications. The University of Chicago was flexible enough to accept me in the middle of the spring quarter of 1966, just after I had finished my military obligations in the Greek Air Force. I had already decided to study theoretical physics; the dilemma for me at that time was choosing between high-energy theory (very popular among Greek students back then) and solid-state physics (almost unknown in Greece in the 1960s). The attraction of the unknown and the then top-ranking solid-state theory group at the University of Chicago led me to choose solid-state theory. My PhD thesis on surface plasmons in multilayered metal/dielectric structures was completed in 1968. Surface plasmons were thought at that time as alternative means to mediate superconductivity. Of course, I could not guess then the future of this field — nowadays known as the vibrant field of plasmonics.



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■ What was the research landscape in Greece and the US like back then?

In the 1960s, modern physics in Greece had just been introduced with an emphasis on high-energy theory through the initiatives of Demokritos. But, in general, research opportunities in Greek universities and higher institutions were very few. In contrast, the University of Chicago, being one of the top US universities, offered excellent research opportunities in almost all branches of modern physics. In particular, in the late 1960s, it was among the centres worldwide where the novel topic of disordered systems was being developed. During the 1970s, as a faculty member of the Physics Department at the University of Virginia, my research interests were on disordered systems, amorphous semiconductors, the Hubbard model and superconductivity.

■ What are FORTH's research activities? Can you tell us more about this institution?

At present, FORTH consists of six institutes that focus on applied mathematics, computer science, materials and lasers, molecular biology, chemical engineering and Mediterranean studies. The first four institutes are located in Heraklion next to the University of Crete campus, the Institute of Chemical Engineering Sciences is located in Patras next to the University of Patras campus, and the Institute for Mediterranean

Studies is located in the town of Rethymnon in Crete. However, the part of the Institute of Molecular Biology & Biotechnology that focuses on medical applications is located at the campus of the University of Ioannina in northern Greece.

FORTH is administratively independent of the universities, but is able to offer joint faculty appointments and allows graduate students to conduct their research in its facilities. This type of cooperation, which by the way is available to all research centres in Greece, has proved very beneficial to both the University of Crete and FORTH.

FORTH has been quite successful in competing within the Framework Programme of the European Union (EU). (In the latest report from the EU covering the period 2007–2010, FORTH was ranked number 1 among all Greek research centres and universities as far as competitive funding from the Framework Programme was concerned, number 12 among all European research centres, and number 28 among all universities and research centres in the EU.) Over the 29 years of its operation up until 2012, 41% of its expenditure came from organizations outside of Greece, 18% from the private sector, 23% from structural, infrastructural and matching funds, and 18% from the state budget; the latter was supposed to cover salaries of tenure and tenure-track personnel, and other inelastic expenses. In reality, all other sources of income contributed to these expenses. FORTH gives about 250 fellowships per year to young researchers and among other activities has created and operates the Crete University Press with more than 400 titles and about 100,000 book sales per year.

■ What has the research environment in Greece been like more recently and how does it compare with that across Europe?

Since the early 1980s, Greek research has improved mainly, in my opinion, because researchers can compete for funds from the European Framework Programme. Very competitive research groups, on a par with those across Europe, now exist although they are the exception among the less competitive or inactive units. One of the

problems of research in Greece is the rare national evaluation of performance, and mainly, its almost complete disconnection from national funding. A second is the inadequate overall expenditure for research and development, which was (before the crisis) only 0.57% of the gross domestic product (of that, 0.28% was from the Government, 0.12% from the private sector, 0.14% from sources outside of Greece and 0.03% from various other sources). A third problem is the relatively minute contribution from the private sector, which consists mainly of small enterprises that are unable to appreciably invest in research. It should be noted that in advanced countries the share of the private sector exceeds the sum of all other sources combined. Finally, the Greek government (and the public) do not really believe that research and technology is needed in Greece; thus whatever measures that are taken or announced in support of research lack consistency, and are usually limited to rhetoric statements and window-dressing actions. Therefore, in spite of the substantial improvement achieved during the period 1980–2010, Greek research has not realized its potential.

■ **How much has the recent economic situation affected academic institutions and research in Greece?**

The severe financial crisis of the past three years has negatively and profoundly affected research. Budgets have been cut by about 35% and salaries of research personnel cut by almost 50%. Tenure or tenure-track appointments almost disappeared. An already huge bureaucracy has grown tremendously as a result of a plethora of new laws imposing more and more restrictions. Almost all of the cuts

were applied across the board without any consideration of performance. Recruitment for tenure-track positions is next to impossible and the brain drain is steadily increasing. Nevertheless, there are some recent signs that things may be improving: a new law for the universities, passed a year and a half ago, eliminated the politicized student bodies from the university administrations and brought some new blood to their top level by introducing a kind of overseeing board consisting typically of senior professors. National research grants and matching funds (financed by the structural funds) have started reappearing.

■ **Are any reforms currently being implemented in Greece's universities and higher institutions?**

I already mentioned the new law, which is clearly beneficial, although some aspects of it require revision; moreover, its implementation has not been without obstacles. The Greek government should immediately take some measures of no cost that will reduce the bureaucracy and make the operation of the research centres more efficient. Any restrictions on salaries of research personnel paid from sources other than those of the Government must be lifted. This would allow the best research groups to offer competitive salaries and thus hire, on 'soft money', high-quality young researchers, Greek or foreign; it would also allow the slowdown of brain drain of both young and senior personnel. Recently, the idea of mergers has been proposed or implemented (possibly under the pressure of the 'troika', which represents the interests of the lenders) as a panacea for "cutting cost, promoting excellence, and strengthening cooperation." This is a dangerous idea

because, if it is implemented without a serious and comparative evaluation, it may reduce the quality of the existing centres of excellence; such a development would be extremely difficult to reverse. Actually, the small number of 'window dressing' mergers implemented up to now have produced no savings worth mentioning, have had no effects on scientific excellence, and have not produced cooperation between universities; instead, they gave rise to some temporal upheaval, and added further uncertainty to the competitive components of the Greek research system.

■ **Are you optimistic about the future? What do you see is the way forward?**

I think the foremost concern is how to keep the various competitive groups within the universities and the research centres alive during the financial crisis. I retain a glimmer of hope that this task can be achieved provided that the structural funds continue to supply money through competitive national grants, unnecessary restrictions are removed, and no quick 'fixes' such as window-dressing mergers that have not been seriously evaluated will be implemented.

■ **What are your personal plans for the future? Do you intend to continue doing research?**

My plans are to continue conducting research. I am involved in a five-year European Research Council project financed by the EU that is just starting. I will continue to offer a course in the Physics Department of the University of Crete and I may publish new editions of some of my books.

INTERVIEW BY KOSMAS TSAKMAKIDIS