**The social responsibility of academic research**

Conference: Research as the driver of development (IV) Reseach and wise governance. Riikikogu, Tallinn, 4.10.2017

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If you were a member of the parliament of a democratic country, would you approve a budget proposal to allocate substantial sums of taxpayers´ money to someone who only wants to satisfy his curiosity? Such a question may seem absurd and the instinctive answer would be a definite NO! Yet every year the 22 member countries and associates finance, with over one billion euros, the research conducted by academic physicists at the European Nuclear Research facility CERN in Geneva. The contribution of Finland is over 13 million euros for 2017. The function of CERN is to find out what the smaller components of atoms are and how they interact. There is no obligation to develop commercial inventions, although a number of useful applications have emerged as by-products, including the World Wide Web.

CERN is a prime example of curiosity-driven, or ”blue skies” – research, which is the main responsibility of universities. I am very glad that despite occasional economic recessions the support of decision-makers has been maintained. As a result, important new knowledge has been generated about the fundamental structures of matter. The general public is very interested in such abstract and almost mystical findings. This was manifested in the world-wide media interest some years ago, when the Higgs boson was discovered. It is difficult to predict, what benefits may follow progress in basic academic research. An interesting example of this is a story about the visit, in the year 1850, of the English Finance Minister, William Gladstone, in the laboratory of Michael Faraday, who had just discovered a phenomenon called electricity. When Gladstone asked, what utility this discovery might have, Faraday answered: ”One day, Sir, you may tax it!”.

Despite its unpredictable benefits, fundamental research is the essential basis for progress in applied research, product development, and technological advancement of nations. Therefore, it should continue to receive adequate public funding, but on one important condition. That is QUALITY. The best way of making wise use of resources is competition between applicants, and expert review of research proposals, with quality and future potential as the main criteria. World-class science does not need to demonstrate societal relevance.

With the exception of some religious organizations, universities are the oldest surviving institutions in society. However, during their almost thousand years of existence their evolution has been dramatic. The three guiding principles that most European universities still follow were formulated by Wilhelm von Humboldt in Berlin about 200 years ago. These are teaching based upon research, freedom of teaching and research, and autonomy of the university. These principles have been incorporated in the legislation in many countries. In Estonia and Finland, academic freedom and autonomy of universities are even guaranteed by the Constitution.

Two hundred years ago the relationships between universities and societies were quite different from today. Recent decades have witnessed a transformation to what has been labelled the information society. The general level of education has risen, university education has become accessible to millions. Knowledge and innovation have replaced natural resources and even financial capital as the main drivers of the economy. This has fostered demands for more efficient exploitation of research for economic gain. Furthermore, societies are facing difficult problems, often called “grand challenges” or “wicked problems”, like climate change and population explosion. These cannot be handled by decision-makers without the help of multidisciplinary science. Because universities are dependent on the taxpayer for funding, political pressure on them has increased in most countries. More societal relevance, more rapid completion of studies, more skills for better employability, more commercial application of research, more accountability to counterbalance autonomy. These mounting expectations and demands have been feared to threaten academic freedom and university autonomy. Are these fears justified and do they apply to Estonian universities? How do universities best serve the societies, of which they are an integral part?

Freedom to teach and to conduct and publish research are not directly threatened in most European countries, except Turkey. However, indirect pressure is exerted by decisions to prioritize public funding. The same fashionable topics appear in many national strategies one after the other, such as information technology, biotechnology, nanotechnology, cleantech, genomics, or digitalization. Funding agencies tend to follow such fashions. For example, in 2016 the world´s largest funder of biomedical research, the National Institutes of Health of the USA, allocated 15 billion dollars out of a total of 26 billion in projects identified by the search terms gene, genome, stem cells, or regenerative medicine. Yet despite over 20 years of heavy investment, only marginal progress and few successes in clinical care or public health have been achieved. The quest for breakthroughs or commercial applications will squeeze the humanities and social sciences, particularly research on national culture, history and language. Yet these fields have to be cultivated, because they are necessary for the identity and cultural development of nations and societies.

An autonomous university must, by its own decisions, guarantee the balanced development of its fields of study and teaching, with academic excellence, not commercial potential, as the main criterion. Fortunately, Estonian universities enjoy a high degree of autonomy, as shown by a study commissioned by the European University Association. Countries were assigned a score from zero to 100 in four different categories that reflect various aspects of university autonomy, namely organization, finances, staffing and academic decision-making. Estonia scored among the top four countries out of 28 in all categories, and beat Finland in all but one. However, being autonomous is not only a blessing but also an obligation: The university must continually evaluate its relationship with society and find the best balance between academic ambitions and societal expectations. Despite the constitutional protection of autonomy and academic freedom, retiring into an ivory tower is not an option.

Of the basic functions of the university, research has achieved a higher status than teaching. This is partly due to the common understanding that science and innovation are important. It is also explained by the reward system of universities, where career advancement is based mainly on scientific merits. Ranking of universities has become fashionable during the past decade. Several ranking systems have been developed, all of them mainly based on research achievements, and all of them questionable. Nevertheless, they receive a lot of publicity, making politicians either proud or worried.

One outcome of the overemphasis of research has been a huge increase in scientific productivity. The number of published articles now exceeds a million per year, in medicine half a million. Very few of these actually report real advances, whereas the vast majority are worthless or even incorrect. Research is important but not all research and not at any cost. Again, quality is decisive.

The most important contribution of the university to society is the education of the young generation. The values and attitudes, not only the factual knowledge and skills, that they espouse in their formative years will define their own success and that of their society. Unfortunately, we have no valid methods to assess, how a university has performed in its important task of providing added value to the development of a young person. In my opinion, the most important product of a university is not a scientific publication, but a well-educated young graduate, who walks out of the university into society and may change the world.

In addition to its traditional tasks, a university can be an active contributor to societal development in other ways. In producing new knowledge and, more importantly, in importing global scientific progress into its own environment, the academic community can provide a sound basis for decisions. An evidence-based approach to decision-making has been adopted in many areas, including the largest peer-review system in the world, the Intergovernmental Panel on Climate Change, IPCC.

Climate change is an example of a global problem tackled at the intergovernmental level. However, most of the decisions that affect ordinary citizens are made by local, national or regional policymakers. At any level, evidence-based decisions will in the long term be more useful than those pulled out of a hat or made for political expediency. Scientific research is able to provide the most reliable evidence, because it is constantly corrected and refined by the joint efforts of a large community of scholars. However, in order to bring scientific advice into the political process, a number of questions have to be resolved. Who or what is a reliable source of information? How can science advice be provided in a timely and understandable fashion? Are political decision-makers really interested in using scientific information? At what stage of the policy process should information be made available?

Science advice to government is a topic of increasing interest all over the world, and several countries are developing their own systems. Civil servants at all levels of government could benefit from scientific information at all stages of the administrative and legislative process, not only politicians at the final decision-making session. Timetables are often pressing, complex emergencies may arise, and advice has to be available when needed and in a form understandable to non-scientists. For example, in the 1980´s the so-called “mad cow disease” started spreading rapidly in England and infected also humans, causing brain damage and dozens of fatalities. The government faced the decision, whether or not to slaughter four million cows to stop the epidemic. Such a decision cannot be made without solid scientific evidence. Another example was the 2011 earthquake and tsunami on the coast of Japan, which severely damaged the Fukushima nuclear power plant. Several scientists were consulted but in an uncoordinated fashion, resulting in confusing and often scary information to the media and decision-makers. As a result, the government science advice system was reorganized, and recently a Chief Scientific Advisor was appointed.

Most university faculty members are willing to donate their time and expertise to such activities. The main problem is at the receiving end. Politicians often either are not interested in scientific evidence or they turn to unreliable sources, usually Dr. Google or an acquaintance whose competence may be limited. Proposals to bring scientific advice to the policymaking process often arouse suspicion among civil servants and politicians, who dislike the idea of a besserwisser from outside coming to disturb their traditional circles. Therefore, it important to emphasize that the advisor advises but the politician decides. Scientific evidence can be overridden by value judgements or economic considerations.

Climate negotiations are not the only international forum where scientific facts and arguments are important. Science diplomacy proposes to bring factual arguments to international negotiations. This is particularly important for small countries like Estonia or Finland, who are often pushed aside by the international heavyweights. In a study of the workings of the European Union, an experienced Finnish diplomat commented that “if a representative of Germany speaks, everybody listens, but if we want to make our voice heard, we have to have solid evidence-based arguments”.

The Oxford English Dictionary selects annually a Word of the Year, usually a recent addition to the vocabulary that has become increasingly popular. The word for 2016 was “post-truth”. It refers to circumstances where objective facts are less influential in shaping public opinion than appeals to emotion and personal beliefs. Its use had increased by 2000 % over one year, mainly in the context of the British Brexit referendum and the American presidential campaign. Post-truth political campaigns seem to have their own reality, outright lies and insults are shamelessly shouted, absurd promises about policy are made, but after the election quickly and quietly discarded. Fact-checking organizations exist and often clearly document misleading or false information, but the public seems not to be interested and vote on an emotional basis. These developments are dangerous for democracy and rational decision-making. They are made possible by the failure of mainstream media to exercise the basic journalistic function of searching factual information and transmitting it to the public. Social media fostering introverted groups of like-minded thumbs-up friends reinforce the uncritical attitude among citizens, wild and unfounded “news items” and conspiracy theories spread like wildfire. Scientists trying to present factual information often find themselves in a public argument with self-appointed “experts”, who have fresh and revolutionary, but often totally wrong ideas about nutrition recommendations, vaccinations, genetically modified organisms and other issues. There are, of course, uncertainties in scientific knowledge and researchers sometimes have honest disagreements. However, the media seem to have the misguided attitude that every opinion has the same value and deserves to be publicized.

How should the university and the academic community face this new situation? Many scientists feel cheated by the media, and prefer to retire to the peaceful environment of the laboratory or library. This leaves the arena to the forces of darkness and disappoints the fraction of the public, who still want to find out how things really are. Therefore, despite the inevitable frustrations, the university should encourage its faculty to engage in public discourse, tell about their research and that of others, present valid evidence and arguments in controversial issues, and build contacts to decision-makers. This is the only way to help truth and reason to prevail in society.

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