

What is "useful" in the world of science?

Guinea Pigs and People

Must all research yield useful results? To answer that question, we should first consider why science is done in the first place. First and foremost, because of our innate curiosity about the surrounding world. Second, because science comes with a socially valuable "side effect" - there is no better method of education than to get young people involved in research work. As it turns out, this teaches students independent thinking and greater creativity, as a result of which they fare better in the job market. Thirdly, science supplies the economy with products and innovative technologies. Fourthly, because of its cultural impact. Given all these reasons, I would like to propose that we abandon the outdated division between "basic" vs. "applied" science. In today's reality, it will be better to distinguish between science initiated by the researcher's own inquisitiveness, and science commissioned by sponsors.

A researcher wanting to pursue curiosity-driven research usually proposes the topic himself or herself (or as part of a team). Whether the idea secures funding depends on whether it gains recognition from other researchers, in what is known as the "peer review" system. This bottom-up approach stands in contrast to situations in which a sponsor (e.g. the state or an entrepreneur) stipulates in advance what the research objective will be (the top-down approach). The state is typically worse at being an investor than entrepreneurs, because the money it invests is not its own, but taxpayers'. There are, however, some good examples of top-down state initiatives that have led to significant research discoveries, such as the anti-HIV program launched in 1990 by the US National Institutes of Health (NIH). State governments have also been responsible for the creation of such significant research centers as the European Organization for Nuclear Research (CERN) and the European Molecular Biology Laboratory (EMBL). An important element shared by all these examples is that in each case the state set an ambitious objective, but did not specify how it should be achieved, allowing the researchers to keep their freedom and liberty.

Interestingly, the countries considered to excel at innovation manage to strike a certain funding balance between bottom-up and top-down research. The two are interrelated in complex ways. As Bernard Houssay, winner of the Nobel Prize in medicine, once aptly put it: "There is no applied science if there is no science to apply." Without producing original research results, we will lapse into mere imitation and relegate our country

to staying on the sidelines. The findings of research once purely stimulated by curiosity are today yielding new drugs, technologies, and products.

In developed countries, of course, there is also a kind of feedback loop: research done by global companies for the sake of their commercial objectives stimulates the development of many fields of science. The hallmark innovation of the 20th century, the transistor, was devised at the labs of Bell Telephone Company. Its discovery not only contributed to the development of solid-state physics, but also earned the discoverers a Nobel Prize. The high degree of innovation in countries like the United States, Japan, and Germany is stimulated by research done by corporations. Unfortunately, not one of the 500 largest global companies is from Poland (the "Global 500" ranking, 2013). It is not surprising that private

investors do not look very favorably on science meant to satisfy someone's thirst for knowledge, as a high-risk investment with an unpredictable outcome.

And yet the history of scientific discoveries tells us that lots of money can be derived from seemingly useless research. What sense did it make for the US National Science Foundation to invest in studying the sexual life of the screwworm, an insect parasitic on animals? America gained more than \$20 billion in profits from greater animal husbandry output. Research on guinea pigs' reactions to acoustic signals, in turn, has led to early diagnostics and hearing loss treatment for hundreds of thousands of children.

We could go on and on citing such examples. They offer proof that both research work stimulated by scientific curiosity and commissioned research serve as driving forces of development. That is why I feel that the state has an obligation to invest in the future, by providing significant funding to research stimulated by inquisitiveness. On the other hand, the state should also support tools facilitating the development of commissioned research. The competent management of ownership issues and budgetary funding for commissioned research projects should enable global-scale companies to emerge in Poland, which by engaging in research activity will also supply the market with innovative new products and technological solutions.



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