



The (ir)rational consideration of the cost of science in transition economies

Science makes a substantial contribution to the economy of developing countries such as Vietnam and its costs must be put into perspective, argues Quan-Hoang Vuong.

Modern society is facing a dilemma between the demand for better cost consideration by scientists and appreciation of the value that the scientific enterprise contributes to society.

Despite priceless achievements in science over the centuries, politicians at times attack the scientific enterprise for populist motivations and cast doubts on the value, validity and economic contribution of science. Such questioning has become almost commonplace in countries such as the United States. For example, in May 2016, US Senator Jeff Flake announced a list of the 20 'most wasteful' science projects (<http://bit.ly/2zTxU0e>); in response, many scientists commented that this attack reflected the old-fashioned views towards science often favoured by populist politicians. Some in the scientific community responded by arguing for the value of 'wasteful' research. One of the most elegant was an essay titled 'Confessions of a wasteful scientist' by Georgia Tech University scientist David Hu (<http://bit.ly/2AVCkYi>), in which he eloquently writes about how absurd and illogical such an attack was.

Even in Vietnam, a transition economy in which education and science have been identified as the major means for a better future, the public's resentment towards so-called wasteful science is growing. In a plenary session of Vietnam's National Assembly in May 2016, the Deputy Minister of Science and Technology had to address the concerns of the public over investments in basic research that had arisen from a report that the average cost of publication of a scientific study, funded through the National Foundation for Science and Technology Development (NAFOSTED), was around US\$40,000 (<http://bit.ly/2BOItCS>). Interestingly, this amount is only one-tenth of the smallest scientific grant in most developed countries, where sound scientific research is not usually the subject of cost reductions.

The cost of publication does sound high, and there is nothing inherently wrong with the public's concern over the costs of doing science. Taxpayers have a right to question the value of their tax contribution to the state's budget, especially in Vietnam, where gross domestic product per capita

was reported to be at US\$2,300 at the 2015 year-end. But there is something not quite right about the public's irrationality in their consideration of cost justification, especially when the notion that science is the pursuit of knowledge for its own sake is raised. Yes, the purpose of science is, to a certain extent, to satisfy humankind's curiosity about nature and society, but the idea that science is the pursuit of knowledge for its own sake is wrong. The mechanism of scientific discovery is not straightforward and the existence of 'sleeping beauties' in science — precious ideas that have taken a long time for society to realize the true value of — highlights the efforts of generations of scientists despite the risk that their contribution might not gain adequate recognition.

Data from NAFOSTED also show that productivity in science has risen by 20% annually, while the contribution of science and technology to the gross domestic product jumped from 11.7% in 2011 to 28.7% in 2013, and remained around 35–40% during 2014–2017 (<http://bit.ly/2AeQhB1>). When the public receives only the message that a scientific publication 'costs' \$40,000, how can they understand the contribution of science to the country at large? In fact, lay people and politicians have ignored what scientific enterprise brings to the society: integrity and self-correction, which are underpinning values in the process of social evolution. Phong Tran, a Vietnamese scientist, proposed the simple concept that scientific work is hugely expensive if it is of poor quality, but very inexpensive if the research leads to valuable advances in our understanding of, and potential solutions to, societal problems.

The public demands scientists spend less on science but the government calls for "better policy to attract world-class experts" to realize Vietnam's development goals, an agenda that always results in a bigger spending plan. So what costs are genuinely expensive for a society like Vietnam?

Policy failures cause huge and long-lasting costs to societies. In Vietnam, people still recall the price–currency–wage innovation that almost brought the whole economy to its knees in 1984–1985, necessitating the extensive reform in 1986 amid a three-digit

inflation tsunami. When implementation of science policy fails to deliver scientific knowledge to the public, that failure usually reflects several problems: weak planning and management of resources; inadequate capacity of the science institutions — scientists included — in addressing problems faced by the society, from science, technology, engineering and mathematics education to productivity at work, and to emerging healthcare issues, and so on; and missed opportunities to bring about timely and valuable change, not just in science and technology but in the development of humankind. Failing to communicate sound science concepts to the public can generate distrust towards science. In a still-developing country like Vietnam, that increasing distrust could push laypeople back to the arms of superstition and belief in 'supernatural powers' rather than forward to data-driven solutions to scientific problems. These failures are genuinely expensive, far exceeding funding for basic research studies, and are well known to hard-working researchers in numerous disciplines. In response, our scientists have chosen to work harder and look for financial alternatives, be they contractual arrangements with the private sector or foreign grants when and where their technical expertise has value to add.

For a developing country like Vietnam that wishes to catch up with the developed world, the best way is to fully appreciate and strongly support the value of science as a foundation for technological advance. The real value of science is in improving quality of life. Education and communication of science and scientists' efforts to better serve the public with their research, directly or indirectly, will become the next challenge if Vietnam is to move forward in a more competitive world. □

Quan-Hoang Vuong

Centre for Interdisciplinary Social Research,
Western University Hanoi, Hanoi, Vietnam.
e-mail: hoang.vuong@wu.edu.vn

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