

Research investment decisions: time for change

Helen Wallace highlights the failure of the biotech economy and argues that decisions on R&D investments should be made more democratic and accountable.

Are you concerned that some scientific research gets funded while other research, which may be more useful or important, does not? How are such decisions made and could they be made in a way that is more democratic and accountable, brings greater benefits to society and at the same time preserves important roles of science, such as improving understanding and informing policy?

Following the credit crunch, there has been much debate about what should be cut and by how much. Scientific institutions, such as the Royal Society, are arguing that slashing science spending by too much would damage the economy. Few would disagree that society needs to invest in research and development, including science and technology. But, however big the pot of public money is for science, who should decide how it's going to be spent? What are the right investments for our future? And what should the relationship be between these decisions and R&D investments made by the private sector?

SGR has done much to highlight and critique the influence of the corporate and military agendas on universities and science funding in the UK. Other organisations, such as Fondation Sciences Citoyennes in France, are actively engaged in making the European science agenda more democratic. As part of a contribution to this debate, GeneWatch UK has recently completed a major investigation of funding decisions in the biosciences, funded by the Joseph Rowntree Charitable Trust.¹ The report analyses the current research funding system, and argues that researchers and civil society organisations need to work together to create a system that is more democratic and accountable and delivers greater benefits for society as a whole.

The report's analysis focuses on public research funding for the biosciences in the UK and the European Union. Its starting point is that research funding priorities (at the level of overall programmes, rather than individual applications) are *political* decisions, about how to best spend public money, which institutions to support and what incentives to provide to researchers in academia and industry.

The knowledge-based bio-economy

Looking at the biological sciences, the report describes how the idea of the 'knowledge-based bio-economy' (KBBE) has become a key driver of research investment in Europe and worldwide. This vision of the future assumes the biosciences and biotechnology will be a major driver of economic growth and at the same time will deliver technical solutions to health, agricultural, social and environmental problems.

In order to stimulate a new bio-economy, significant financial and political investments have been made. Scientific institutions and funding systems have been re-structured and new systems of incentives for 'innovation' have been devised. Their aim has been to reward researchers who secure patents and venture capital, and who collaborate with the private sector to create 'spin-out' companies and commercialise new products, based on biological knowledge or biologically-based production systems.

Structural changes to R&D systems and policies designed to exploit the potential of biotechnology and the human genome began in the US under the Reagan administration. These changes were mirrored by the Thatcher and Major governments in the UK, and by the European Commission (EC), which identified biotechnology as a key 'technology platform' in a new knowledge-based economy.

In Britain, the New Labour Government, elected in 1997, invested heavily in the KBBE as the presumed basis of future competitiveness with emerging economies in China and India. The funders of New Labour known as the 'biotech barons', and other key supporters of this idea, were appointed to task forces designed to identify the policies needed for future competitiveness. They promoted the idea of a 'genetic revolution' in both health and agriculture, and advocated policies that strengthened protection for intellectual property (IP), opposed regulation, and attempted to create the 'informed consumer' (presumed to be convinced of the benefits of GM crops, and to identify collection, storage and analysis of their DNA as major benefits to their health and to society). In the UK alone, at least 60 Government policy initiatives and reports were commissioned to support and develop the KBBE over 15 years, with many more initiatives focused on the broader context of the knowledge-based economy in general.

The information contained in medical records stored in the NHS was identified as Britain's 'unique selling point' (USP) in the knowledge-based economy, and a

plan to create a central database of electronic medical records ('the Spine') in the NHS was adopted and funded at a cost of £12 billion. The idea was to replicate the DNA database of the Icelandic population being built by DeCode Genetics, and ultimately to introduce gene screening for the whole population, allowing the genetic 'prediction and prevention' of common diseases, such as heart disease and cancer. The concept of a 'genetic revolution' in both health and agriculture was promoted at the highest levels in the British Government. For example, it was highlighted in the then Prime Minister Tony Blair's speech at the joint announcement with President Clinton of the completion of the first draft of the human genome in June 2000, and again in Blair's major speech on science to the Royal Society in 2002.

A lack of benefits

However, in practice, the benefits of the bio-economy to the UK and EU have been extremely limited:

- The net value of the bio-economy worldwide has been estimated by a Harvard University researcher and from the industry's own figures to be zero or negative, with only two US medical biotech companies (Amgen and Genentech) and one US agricultural biotech company (Monsanto) making significant profits.
- Only two types of GM crops have been commercialised on any scale: insect-resistant and herbicide-tolerant. These crops are grown largely in North and South America for use in animal feed and (subsidised) industrial-scale biofuels (agrofuels). Concerns remain about environmental impacts, food safety, liability for contamination of non-GM crops and foods, and the extent of corporate control of seeds exercised through patents and licensing agreements.
- A number of new biotech drugs have been developed, but Britain's only blockbuster biopharmaceuticals were discovered in the 1980s. Most new biotech 'spin-out' companies from UK universities are never profitable and are a net drain on the economy: according to the Office of Life Sciences they employ only 1,000 people in total.
- Genetic tests of multiple genetic factors are poorly predictive of common diseases and most adverse drug reactions, and none are sufficiently predictive or useful to meet medical screening criteria for use in the general population. The idea that genetic make-up would be highly predictive of who developed cancer was originally promoted by the eugenicists who went

to work for the tobacco industry in the 1950s and is based on a flawed view of the role of genes and environment in common diseases.^{2,3}

Billions of taxpayers' money has been spent but the UK and EU have failed to develop new competitive economies, as a result of reliance on the idea that a new biotech economy would be developed. More practical solutions to existing problems have been neglected, as has much R&D that is not seen as contributing to the KBBE. For example, the agricultural extension services in England and Wales, which used to provide on-the-ground scientific support to farmers, were cut in order to prioritise laboratory-based research. Public sector plant breeding, which used to generate income as well as bringing significant international economic benefit and increases in food production, has been abandoned in favour of GM crop research, which has delivered zero return. Alternative 'on-the-ground' approaches to improving health and farming have been sidelined, starved of funding, or even axed altogether, leading to significant opportunity costs due to the failure to implement existing knowledge and best practice in areas such as public health and farmland management.

This does not mean that biotechnologies and the biosciences cannot contribute to health, agricultural or sustainability objectives, or to the economy. However, it does mean that it is necessary to re-think the whole idea of the KBBE and its role in the knowledge-based economy in general. The key features of the KBBE distort the market in ways that make research investment decisions unaccountable to either market forces or democratic processes. Problems include the following:

- 'Pre-competitive' subsidy, via research funding decisions, lacks accountability and transparency and hides political and commercial commitments to the bio-economy and to imaginary markets presumed to be created in the future;
- Public-private partnerships and public procurement policies shift investment risks and externalities onto the taxpayer, intermediaries such as farmers, doctors and health services, and members of the public;
- 'Light-touch' regulation fails to address market failures and protect health or the environment;
- A 'cycle of hype' drives research investment decisions, which become disconnected from reality;
- Policy commitments are not debated but are instead 'sold' to the public as if they were the



inevitable consequences of science and progress.

Reforming the system for science funding

The GeneWatch UK report concludes that review of the research funding system should lead to a major overhaul. There should be significant reforms to improve the scientific and technical advice available to the UK Government and to the European Union, reform to the patents system, and re-structuring of the funding institutions and systems of incentives for researchers. Objectives should include:

- More democratic decisions about research funding priorities and a more diverse research agenda;
- Greater accountability and scrutiny of major research investment decisions – including economic assessments and appraisals, scrutiny of scientific and technical assumptions, and active steps to prevent political 'entrapment' in research agendas based on false assumptions and misleading claims;
- A role for public engagement in setting research questions and priorities – including consideration of a variety of alternative approaches to addressing problems, and greater democratic accountability for science policy decisions;
- More public engagement in research itself, involving closer co-operation between universities, communities and civil society organisations;
- More funding for research that does not necessarily benefit large corporations but may deliver other benefits, including economic ones (for example, public health research, and research into improving agro-ecological farming methods);
- Funding for 'counter-expertise' and multi-disciplinary research that can identify long-term scientific uncertainties and regulatory gaps;

- Ensuring a thriving scientific culture that can analyse, critique and develop the theoretical concepts that often underlie decision-making, and that are key to developing new understandings;
- A commitment to take public opinions into account in decisions about science and innovation, including methods to ensure full consideration of the broader social, environmental and economic issues associated with adopting particular approaches and technologies.

Making these changes happen will not be easy but, despite the cuts, there are signs of a growing recognition throughout society that our political systems need to change if we are to find answers to the problems that we face. Making the right investments in research and development is central to addressing all the major national and global challenges, including tackling hunger and obesity and creating a sustainable future. These decisions deserve greater public scrutiny and accountability.

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References

(web links correct as of 1 December 2010)

1. Wallace HM (2010) Bioscience for life? Who decides what research is done in health and agriculture? GeneWatch UK Report. April 2010. Available on: http://www.genewatch.org/uploads/f03c6d66a9b354535738483c1c3d49e4/Bioscience_for_life.pdf
2. Wallace HM (2009) Big Tobacco and the human genome: driving the scientific bandwagon? *Genomics, Society and Policy*, 5(1), 80-133. <http://www.gspjournal.com>
3. Wallace HM (2009) Genetic screening for susceptibility to disease. In: *Encyclopedia of Life Sciences*. John Wiley & Sons Ltd., Chichester. <http://www.els.net/> [Doi: 10.1002/9780470015902.a0021790] September 2009.