
Maximising the Benefit from Scientific Innovation

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The Oxford English Dictionary defines innovation as *the act of introducing something new* while the Department of Trade and Industry take things a stage further and considers innovation to mean *the successful exploitation of new ideas*. In economics, innovation is necessary to meet unsatisfied market needs and increase customer or producer value. In this context innovations are intended to make someone better off, and the succession of many innovations grows the whole economy. Scientific innovation is primarily used to solve scientific problems that constrain the development of human advancement rather than meeting an unsatisfied market need. There are many examples where a scientific innovation also leads to the development of new products and services which have market value. However, it is important to be clear that scientific innovation rarely by itself leads to economic innovation.

Science Innovation

In the UK, Government sponsored research has largely focused on a supply-led model of scientific innovation (science-led innovation) ie research undertaken in universities and national research institutes is monitored for commercial possibilities, intellectual property is protected, commercial partners sought and innovations licensed to industry to commercialise or spin-out companies are created.

There have been commitments to infrastructure and organisational investments to improve the effectiveness of this approach:

- Public scientific research organisations have created commercial teams whose role it is to identify and assess innovations, protect intellectual property (IP) and identify market opportunities and then facilitate/negotiate licensing agreements with relevant acquirers or to assist in the

establishment of spin-out companies.

- Young scientists are provided with commercial/business/entrepreneurship training as part of their PhD studentship or Postdoctoral apprenticeship.
- Science Parks have been established involving businesses and science institutions in order to increase interchange of ideas, approaches and commercial opportunities.
- Knowledge transfer networks are being established in response to concern about general lack of pull-through of inventions. Knowledge Transfer Networks (KTN) “stimulate innovation in the UK’s key technology sectors by promoting collaboration, best practice and knowledge sharing between industry and academia.”

However, given a goal of generating wealth for UK plc, this whole system of science-led innovation represents a rather indirect,

unfocused approach that relies too heavily on good fortune to match innovation against unsatisfied market need. This is not to say that science-led innovation does not have value but rather that it needs to be complemented by a more targeted and focused approach to scientific innovation, one where the market (demand) rather than science (supply) acts as the starting point.

Market-led Innovation

Market-led innovation starts with the needs of customers rather than in the laboratory with the interests of scientists. Market-led innovation provides the means by which scientific innovation is directed towards developing specific products and services. The market is assessed, specific product or service opportunities are identified, innovative approaches utilising science are sought to generate products and services which are developed for sale into a pre-defined market with an extant demand.

An extreme example of market-led innovation occurs during wartime when there is a very definite and focused demand for the specific products. In less demanding times however, scientists tend not to be deployed to solve particular needs of the market but rather to solve problems of scientific interest; their purpose, not the development of a product or service but rather the advancement of knowledge and the publication of scientific papers. There may be the vague notion of a market opportunity when research project applications are made but this is rarely properly defined in terms of the specifications required of a particular commercial product or service.

It is easy to preach market-led innovation, but it is more difficult to practice because it involves a change of mindset, organisation and behaviour at both an individual scientist and institutional level. Large companies such as Unilever and GSK can achieve a market-led approach through their in-house ability to combine and manage the link between market knowledge and scientific innovation. However, it is much more difficult to manage for small-to-medium enterprises with no in-house R&D capability, who at this time have to rely on science-led innovation for opportunities that may or may not meet market needs.

Achieving Market-led Innovation

I would not want to give the impression that there are no current market-led approaches to scientific innovation in the UK. The long standing relationship of Imperial College with industry stands out as exemplary and initiatives such as the LINK Programme seek to achieve the necessary integration of market and scientific innovation. However, these remain a relatively small drop in the ocean and if our goal is for the UK to become “the innovation engine of Europe” we need to take a more committed strategic step towards market-led innovation. One direct way of achieving this would be through Centres of Market-led Innovation that combine:

- Teams of market analysts with the ability to identify market gaps and opportunities in specific sectors relevant to industry, not as a grand centralised think tank but based on detailed specific sector knowledge at the level of potential individual products and services

- Access to the brightest and best innovators – scientists driven by the desire to develop solutions to problems that are a constraint to product and service development rather than purely by the science or engineering that might underpin a solution
- Mechanisms to reward science innovators on the basis of value to industry (number of patents and more importantly the number of licensing agreements or spin-outs created instead of papers published)
- Locations and facilities where there are clusters of scientific institutions, and relevant sector companies

In order to achieve this it would be necessary to re-focus existing science-led capacity in universities or national research institutes, or create completely new dedicated market-led innovation centres. Issues with regard to how much the capability should be centralised and or regionalised would also need to be addressed. However, whichever option is selected (or combination of options) market-led innovation centres would have the great advantage of being able, over time, to generate revenue from exploitation of their intellectual property and hence would not need to be as reliant on funds from central or regional sources as are conventional research establishments.

If this country really wishes to become the “innovation engine of Europe”, then we need to be much better focused in our approach to scientific innovation and the most direct way of achieving this is through the support for market-led innovation.

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