Dent Associates
Science in Business

The Market as a Platform for Innovation

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When we think of the market we think in terms of a group of consumers who are interested in a particular product or service and who have the money to pay for it. We largely think of the market in terms of the consumer and consumer needs.

However, as innovators or people interested in exploiting innovation our market might be considered something slightly different. Our market is the market for innovation - an individual or group of organisations who are interested in innovative solutions that address real or perceived gaps and opportunities, and who have the resources to pay for them.

The market for innovation focuses on the business, charities, governments and other organisations who are in the market for new opportunities.

It is this market I would like to consider in terms of a market as a platform for innovation.

Traditionally in business the target market is considered important because it affects the type of product or service that may be delivered. Well, with a market for innovation the same principles apply, except we need to think of the sector in terms of the full range of innovations that are relevant to business, namely, business model and process innovation, positioning and promotional innovation, organisational and supply chain innovation.

What I want to demonstrate to you today is that conventional approaches to innovation, which emphasise science and engineering, particularly in countries such as the UK, tend to lock us into a technology centred approach to invention. Such approaches limit the type of innovations developed, the range of players involved in the process, and the overall impact and value to businesses.

The UK has a reputation for high quality science worldwide which is second only to the USA. However, the emphasis that the UK places on the development of radical innovations through blue skies research is perhaps mismatched against the need to innovate to develop the economy.

The UK has contributed well above its weight to world discoveries and inventions. Over the past 50 years, according to Japanese research, more than 40 per cent of discoveries taken up on a worldwide basis originated in the United Kingdom. Over the past 200 years, the UK's inventions have not always been exploited in the UK however, with the USA exploiting a large majority. Interestingly, according to UKTI statistics, overseas organisations own over 35% of patents in the UK (compared to 12% in the USA and 4% in Japan). The UK is not very good at holding on to its inventions and

commercially exploiting them within the country.

In other words we are very good at science-supply, at making discoveries and inventing things and their scientific publication, but not their development and market exploitation.

It became obvious to me that most nations set themselves up with a science supply process of innovation through our university systems. We then establish all sorts of mechanisms: technology and knowledge transfer offices, incubators, research parks as means of bringing industry together with our scientific capability, in order to ensure take up by the commercial sector.

However there are alternative models for promoting innovation. Let me demonstrate what I mean with an example.

Let me give you an example of a Scientific-supply solution and a market led technological solution.

The Problem: Improving nitrogen uptake and utilisation by crop plants

Science supply driven solution

Science is driven by paradigms and use of leading edge methodologies, hence currently , scientists looking at improving nitrogen uptake in plants will naturally turn to genetic manipulation to see if there are ways of manipulating the genome of plants to improve their efficiency of uptake of nitrogen from the soil.

Two ground breaking approaches come to mind which are being undertaken by two of the UKs leading research institutions.

At Nottingham University a major research programme is investigating root architecture and understanding how genes regulate this and its affects on nutrient use efficiency. The work is carried out on a model plant Arabidosis but once the gene switching is understood then this can be transferred to cereals, including rice.

At the BBSRC supported John Innes Centre they are looking at the genetic manipulation of crops which will allow the root nodulation and nitrogen fixing bacteria normally found in legume crops to be transferred to a range of other crops - thus negating the need for fertiliser.

Make no mistake, in both cases this research is leading edge science. The subject is incredibly important because it affects food security and hence with current research demonstrating positive results and a potential 12 year programme of research to deliver, which will hopefully lead to a new transgenic variety, it is likely to go into field trials and be evaluated from a regulatory perspective to determine whether it can be released or not.

Such a transgenic crop on the market in 15-20 years time could significantly improve nitrogen uptake, and hence reduce the amount of nitrogen that needs to be applied for the same or improved crop yield, benefiting the farmer and the environment.

Market-led technological solution

From a market point of view the vast amount of nitrogen used as fertiliser is available thanks to natural gas and what is known as the Haber process. The Haber process produces 100 million tons of nitrogen fertiliser per year, mostly in the form of anhydrous ammonia, ammonium nitrate and urea. Three to five percent of world natural gas production is consumed in the Haber process (roughly one to two percent of the world's annual energy supply) and nitrogen prices for agriculture are affected by fluctuating gas prices.

Nitrogen is applied at much higher rates to soil than can be taken up by the plant because the process of take-up is inefficient with nitrogen in the forms applied. Also the large amounts of nitrogen are converted by soil micro-organisms to nitrates which run-off and pollute waterways. If this was not enough of a problem, conventional nitrogen fertilisers also release the greenhouse gas nitrous oxide.

From a market perspective; a nitrogen fertiliser is required that uses much less nitrogen, say a third, to produce the same or improved crop performance and yield, stays in the soil longer, but reduces the rate of breakdown to nitrous oxide gas and conversion to nitrates. All the for same or a lower price than conventional nitrogen fertlisers.

A nitrogen fertiliser meeting these specifications has been developed through contract research with a university. Within five years a product has been developed by the innovative UK company Plant Impact plc and is currently being tested by growers and research institutes around the world and is now avilable for sale.

Which is better?

Which then is the better approach - the science supply innovation or the market led innovation?

The answer is of course - that neither one is better than the other - both approaches - the scientific supply approach and the market led approach provide perfectly sound solutions to solving the same problem - however they do have different attributes and in this case take different amounts of time to deliver.

In all cases with these examples, the output is a technological product; the transgenic seed of a crop or a fertiliser formulation - both were developed through research carried out in universities, but the transgenic plant research is driven by the latest paradigm of biotechnology, innovative methodologies and is seen as leading edge science - it is science supply driven.

The second example of the fertiliser is also an innovative technology developed through university research but the specifications and characteristics were defined by the market. Business and the market defined the fertiliser product - science and the research community defined the second - the transgenic plant. Both approaches address the problem.

The Need for Balance

The point that I want to make is that nations need to achieve a balance between science-supply led innovation and market led innovation, in order to achieve a balance between short term and long term delivery of solutions. Between those that create a risk of scientific solutions not meeting a market gap and those where the market is defined but their is a risk that a scientific solution cannot be achieved to those specifications.

Achieving this balance between science supply and market led innovation is not an easy one to achieve. However their are many advantages to doing so.

In any analysis where the market is the market for innovation, then we look at the opportunities and gaps that exist and may be of value to businesses, charities and governments. Organisations who may be in the market for innovative solutions to problems they face, or even solutions for opportunities they did not realise existed.

Just this simple change of perspective to a market for innovation means we start to look at options other than just technology development, which tends to lead to new products and services. It opens up the additional possibilities of:

- Business model innovation
- Positioning and market innovation
- Organisational innovation
- Process innovation
- Supply chain innovation

It also means that the approach de-emphasises science and engineering as central to the innovation process and opens up the possibility of a wider range of disciplines engaging in innovation within our universities and research institutes. Innovations can be generated by disciplines such as business and social studies, humanities subjects, design and creative arts, all with their greater emphasis on end-users, social drivers and acceptability, human behaviour, ergonomics, organisational behaviour etc.

The Market Driver

In this approach, science and engineering becomes a tool for developing solutions to predefined market gaps. The market becomes the driver.

A whole range of techniques exist to assist in analysing the innovation market place from traditional consumer based voice of the customer approaches;

- customer focus groups, lead user analysis, customer brainstorming, advisory groups and visit teams
- accessing ideas from the external technical community, partners and suppliers, requests for external product designs and submission of ideas
- reviewing the external trends and threats, patent mapping and internal idea capture

All of these approaches can be used, but when we use the science supply model of innovation we tend to only emphasise research as the innovative process.

Additional techniques for analysing the market for innovation include:

- categorisation by sector of organisations, business types, products and services, technology and information use
- categorisation by sector of business models and processes, supply chains and promotional schemes
- gap and opportunity analysis and efficiency assessments
- solution identification and specification

The solutions that may arise using all these techniques will be broad-based and inclusive of science and technology solutions.

Market Innovation Centres

There is an opportunity to create centres of expertise to carry out such market analyses that sit between the business community and academia and service both parties. The centres do not have to be major new facilities, on the contrary, the expertise employed can be flexibly applied to suit a range of organisations (universities, technology innovations centres, contract research organisations) but each should have the following key features and capabilities:

- identifying market gaps and opportunities and solutions to defined specifications
- ability to utilise market intelligence
- ability to commission scientific research
- ability to generate spin-out companies and secure appropriate equity investment

This combination of capability will be able to transform innovation, broadening it beyond just science based technology solutions - a market based platform for innovation.

In summary:

The market can provide a platform for innovation:

- It will deliver a both different and wider ranging solutions to a conventional science-supply approach
- It can potentially engage a wider range of players and organisations in the innovation process
- But it does require that we look at the market for innovation as more than just consumer needs and use science as a tool to develop market defined solutions
- However, it will often provide quicker solutions than a purely science-supply approach

Thank you

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