Harnessing Biotechnology

Potential of biotechnology as a key to competitiveness and a source of new opportunities

Introduction

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Distinguished participants
Ladies and Gentlemen

It is an honour for me to be here and my thanks to the organisers of the event, 'The Nation' for inviting me.

In addressing this international conference on, ' Competitivness: Challenges and Opportunites for Asian Countries' I will keep my remarks to three parts.

I shall begin by addressing the state of the United Kingdom's biotechnology sector, outlining the lesson's learned in its growth to becoming the second largest biotechnology market in the world - after the USA.

I will then address the challenges I perceive for any nation entering this sector …

… and finally I will focus on what I believe are the specific challenges faced by Thailand and Asia in today's market.

General statement on UK Biotech
Like the biotech industry across the world, the UK sector has been through a challenging period over the last 3-4 years, but because of its maturity I believe it has come through in reasonably good shape.

Throughout the downturn biotechnology continued to grow in the UK. In 2002 UK companies secured about 41% of the European venture capital for biotech.

And a recent survey showed there were currently about 485 biotech companies in the UK, an increase of around 100 since the equivalent survey a year ago. Together, these companies employ about 26,000 people.

We also have the supporting framework of big Pharma such as AstraZeneca, GSK and Pfizer.

This makes us the largest biotech sector in Europe, and the UK is also one of the most successful. The excellent prospects for UK biotechnology companies is illustrated by their strong product pipeline. More than 194 biotechnology-based drug candidates are in development 23 of these candidates are now in Phase III clinical trials.

UK biotechnology products at all phases of clinical trials in fact account for 43% of biotechnology drug candidates from all European public companies. Moreover, there are 42 products marketed by UK bioscience companies that were developed and/or invented in the UK.

In March 2004 we had our first IPO for a number of years, with Ark Therapeutics successfully raising USD$100 million and we expect more in the near future with Microscience and possibly Cyclacel which has the Singapore Economic Development Board as a major shareholder.

In addition, 2004 reinforced the UK's continuing global attraction with Genzyme's recent decision to establish a new R&D facility in Cambridge.

And so, given the success of the industry the question you may ask is how was this achieved ?

One of the UK's major strengths is found in its network of biotechnology clusters. Based throughout the country, they have grown up next to the UK's world-class research institutions. As well as offering all the benefits of shared expertise and services, they have enabled regions in the UK to develop particular technological strengths. You will most likely be familiar with the clusters in Oxford and Cambridge, which have developed around these historic cities' famous universities.

But there are also maturing clusters in other localities. For example London, which has been boosted by the presence of several outstanding research hospitals and universities.

Scotland continues to excel in stem cell research and neuroscience. Liverpool has a growing reputation within the field of Tropical Medicine. York houses world-class plant science together with the John Innes Centre in the east of England.

Also, the Rothamsted Institute outside London will be holding a conference in November this year on bio products for foods.

All are examples of centers of excellence outside of Cambridge.

Other strengths in the UK are to be found in a strong science base, a good technology transfer record, a sophisticated and educated financial market, availability of VC and institutional investment, effective IP protection, and skilled management.

And many of these areas are being addressed by some of the highly respected presenters and delegates here today.

Key, I believe, to all of these points however is the ability to effectively leverage the IP and turn it into successful products. The learning process of

how to do this has been tried and tested over a number of years and I believe the UK has a very good model.

Today, UK universities can rely upon the business services and mentoring of technology transfer organisations to initiate this process. For example, Imperial Innovations is a leading technology transfer organisation wholly owned by Imperial College London.

In line with others throughout the UK, it boasts an impressive portfolio of spinning-out over 50 companies since 1997. One such being IC-VEC, now a well, established biopharmaceuticals company spun out in December 2001.

Technology transfer organisations offer a ‘hands-on’ approach to commercialisation. They work closely with university researchers to evaluate, protect, and market IP. They can fund patent applications and legal costs, as well as negotiate the exploitation and advice on ‘spin-out’ agreements.

Asides from their own commercial operations, technology transfer organisations in the UK make use of government funding, such as the University Challenge Seed Fund, which offers a potential source of seed funding of up to £250,000.

There has always been an element of government involvement in the UK, even during the earliest days of biotechnology.

Celltech, for example, the UK’s first biotech company, was set up in the late 1970’s by a government body - The National Enterprise Board - as the major shareholder.
The company used leading edge recombinent DNA technology licensed from the Medical Research Council (MRC), a national organisation funded by the UK taxpayer.
As with all biotech companies, Celltech has reinvented itself over the years, most recently being taken over by UCB - a Belgian company.

The National Enterprise Board was also a major stakeholder in one of the UK’s most successful technology transfer companies, BTG. In fact, the history of the NEB goes back almost 60 years when, even then, there was recognition by government of the need to commercialise publicly funded research.

Another example of UK government involvement was the privatisation of Amersham which completely transformed itself for a radionuceotide supplier to a diagnostic and now a healthcare company.

This is a very different approach from the Cohen Boyer story at Genetech. In which the funding for the first US biotech was received from Boyer’s neighbour who happened to be a VC. This was the original supporting biotech model where large funds of VC money was invested based on sentiment rather than strategy.

Part 1b – Lessons Learnt

The road to success for the biotechnology industry has however not been always been smooth. Over the last 20 years of so there have been evolutionary changes both by industry and government that have encourage the development of successful technology industry.

In the 1980's the Thatcher government recognised early on the need for universities to license out their research findings. This was almost as a direct result of Milstein and Kohler's failure to patent monoclonal antibodies.

The Department of Trade & Industry then launched the SMART award scheme aimed to support SME's involved in near market research and development projects. Since its inception, SMART award has provided finance of more that USD$360 million to more than 3,000 companies.
In 1994 The Biotechnology and Biological Sciences Research Council (BBSRC) was set up. The organisation then previously existed as the agriculture & food research council, which went back to the 1950's. This organisation is now the leading funding agency for academic research and training in the biosciences at universities and institutes throughout the UK and receives its money through a government office and is an example of an institution re-inventing itself.
Another notable institution is the MRC, Medical Research Council (MRC) is a national organisation funded by the UK taxpayer. Promoting research into all areas of medical and related science with the aims of improving the health and quality of life of the UK public and contributing to the wealth of the nation.

Other evolutionary changes have been in the introduction of R&D Tax Credits to help the cash flow of many bioscience companies. It is designed specifically to assist those high value-added companies who engage in leading edge research and development. The scheme was started in April 2000 (SMEs only) and extended to large companies in April 2002. According to the tax office, 8000 claims were received up to Nov 2003 and USD$900m of support provided (all sectors, not just biotech).

Part 2 Challenges for all countries

Given that the developments of this sector have undergone evolutionary change in the UK, what are the challenges for nations entering or considering entering this sector? I believe there are five areas that need to be addressed.

The first challenge is possessing a high quality science base and complimentary policies targeting the sharing of this knowledge - both internally and globally.

The second is that a country has an appropriate regulatory framework to support a knowledge-based industry.

The third is having a skilled workforce both in terms of having the science and commercial knowledge of understanding what is actually worth patenting and commercialising.

The fourth is to encourage an environment of innovation, training programmes, mentoring support and reward. These are vital to foster a new generation of entrepreneurs.

Fifth and finally, any nation interested in entering this sector must put into place a system that will encourage investors.

None of these points are trivial and all take time to develop, but for those of you that follow the industry none of these points are particularly new.

There are however two points I would like to discuss in dealing with challenges for any nation entering the biotech sector and they are: direct government funding and the change in the funding model for biotech companies.

Globally many governments have recognised the importance of biotechnology and have taken steps to encourage the development of this industry. The criticism from many of the quarters of the biotechnology industry is that it is not possible for government to kick start such an industry.

These people's view is that the success of the existing industry is due to their historic position, a result of their natural cluster development, and already strong and well developed science base.

I fundamentally disagree with the view that government cannot kick start a biotech industry and whilst there is some merit in cluster development and a strong science base, it doesn't mean that this cannot be created.

Recent examples of countries that have taken the kick start route to a biotech industry are Germany, Singapore and Japan.

Each of these countries have taken differing approaches to fostering and supporting this sector, and each one has had varying levels of success. Whilst time does not permit me to take each one as an example, I will outline the German model to illustrate my belief that an industry can be promoted with the right type of support.

Germany launched its 'Biotechnology 2000' programme in 1990, with the aim of developing new processes and methods in genetic engineering and molecular biology. Building on this, 1995 saw the launch of the Bio Regio contest to promote the development of regional clusters. One of the ways in which it managed this was through the provision of seed capital to start ups. The German government financed these schemes with an annual budget of USD$224 million.

The availability of government finance for biotechnology start-ups led to a rapid increase in the number of biotechnology companies – from 173 to 220 between 1998 and 1999). This catalysed an expansion of venture capital funds.

However, the pace of expansion has been such that there is an understandable concern over the long-term viability of these companies, a large number of whom will require funding in an increasingly competitive market.

According to the Ernst & Young report, 2002 saw a continued consolidation of the German biotech market, with most of the key parameters for the industry falling during the year. For the first time, however, the losses of the sector also decreased, even though the number of insolvencies exceeded the number of newly founded firms. And, although the number of drugs in pre-clinical development increased by 14%, the figures on financing suggest that a considerable number of German biotech firms may run out of cash by the end of 2004. Not a disimiliar position to the UK biotech industry in 2002-2003, but I believe I have demonstrated how the industry has strengthened.

The criticism from some people in the industry was that Germany invested a lot of government money to encourage biotech start-ups and then left the companies to fight for their survival.

If we consider this from a purely Darwinian perspective, it could very easily be argued that that the industry has done well, especially when starting from a very low starting block. Companies such as Qiagen, Lion Bioscience, Evotec and GPC Biotech all have significant market capitalisation, and employment figures. I don't believe that any of these companies would have been as successful if the German government hadn't had a hand in initiating an industry.

Clearly there is always an issue of wastage of public funds, and we need to acknowledge that there has to be some level of accountability on the efficiency of how these funds are spent. But historically all governments have used public money to 'kick-start' an industry at some point in their countries industrial and economic development.

The USA for example invested huge amounts of public funds to enter the space race. In Europe, a consortium was set up to develop an aerospace industry. The British government was at one time a major shareholder in one of the country's most successful biotech companies.

All nations find themselves walking a tight rope when it comes to how and where to invest public money for the benefit of the country's industry. Vigilance and realistic targets about what can and cannot be achieved need to be set. But I don't think it is fair to criticise any government for kick starting an industry, especially when history demonstrates that biotechnology is just another industry that is following a well trodden route.

The second point I want to raise in terms of challenges to any nation is that the time has come to recognise that the old model for supporting and funding a biotech company has fundamentally changed and this is linked to how governments view the need to support the industry.

If you recall the point I made about Cohen and Boyer at Genetech in the USA in the 1980's and the access to funds even though any revenue generating stream was years away. I believe that is in now beginning to become an outdated model for the industry especially given the maturity of the sector and the current sentiment of the VC community.

The new model for new and savvy biotech companies is to develop a company that has a revenue stream selling some form of product or service that supports them in developing a long term product that would traditionally would have been developed through the sole support of outside investors in the past. Some of the new and brightest companies in the UK and USA are taking this route to market.

Part 3 Challenges for Thailand and Asia

Finally, I would like to address the challenges which I believe Thailand and Asia face specifically today which are primarily base on my experience in the UK and Japan.

One of the current 'hot topics' is that of IP rights as countries in this region moves into more knowledge-based industries. However, I believe that this subject has been well covered in recent months and so I do not intend to discuss these issues.

There are three points I would like to consider which are more related to cultural and social issues of entrepreneurship and society at large.

Earlier on in my talk I discussed the UK's biotech clusters, the development of technology transfer offices and appropriate supportive legislation. These have all greatly aided biotech research and development. The clusters in turn have given rise to dedicated laboratory and office space to satisfy industry demands.

But, I believe that there is little point in putting up buildings at considerable expense if commercial support structures are not also put in place.

It is sometime easy to forget that whilst we may have a love of science that this is only part of what drives a company to profitability.

The commercial support structures I am referring to are the needs of the entrepreneurs running the companies - be it advice in identifying sources of money, or assistance in the complex legalities of IP.

My own role as an adviser to the British government department UK Trade & Investment part of the Department of Trade & Industry (DTI), is to support UK companies in identifying global opportunities and helping them do business in those markets.

This service is government supported and therefore free of charge to UK companies. I believe such support is essential to those individuals who have limited experience in taken starting up a new company. They may possess the science and technology skills but often need support in preparing themselves for the global market place.

My second observation relates to the Thai government's focus on biotechnology and improving public health and agricultural productivity.

Clearly, agricultural production is essential to Thailand's economy and therefore, the Agro-bio sector warrants the country's research and development interest.

But, as I am sure you are all aware Agro-bio is currently facing some extremely challenging times, especially in Europe.

With this in mind, and without directly addressing the current ethical debate surrounding GM foods, I would like to draw your attention to the affect that public opinion has had on the Agri-bio industry.

The strength of feeling has effectively put a stranglehold on the industry. I refer specially to a paper that has been published by Prof George Gaskell, Director of the Methodology Institute and Professor of Social Psychology at the London School of Economics.

Professor Gaskell, refers to the watershed years of 1996-1999 in which three events stood out in the UK. In different ways they set the agenda for policy making, dominated media coverage and raised the public profile of biotechnology.

In 1997, the cloning of Dolly the Sheep turned science fiction into reality, leading to fears about what could, and probably would, happen in the future.

Whilst nothing to do with biotechnology directly, the BSE crisis in 1996 demonstrated the limitations of scientific expertise and introduced the public to industrialised agriculture.

Finally, there was the long running GM food debate. Starting in 1996, with the importing of the first GM soya into the UK, it reached a crescendo with the controversy over the work of Pusztai in 1999 and since discredited ensuring biotechnology became an issue for party politics.

Depending on one's perspective, this debate either showed the over reliance of how science can support society or how the media can damage and mis-inform the general public.

It is still difficult to predict the how the British public will support the GM debate, but I think this is an important lesson to be learnt, that all stakeholders need to be involved in the debate about the Argi-bio industry.

My third observation is the need to position the region in an area of science in which it excels and needs. Being a follower of biotechnology for the traditional diseases that western countries are following will not place Asia in a unique and sustainable position. Conditions that are unique to this part of the world, and from which the rest of the world can learn from will be what draws companies and expertise to the region. A good example is Thailand's considerable experience in shrimp biotechnology a clear example of where the country can excel and create global interest. Other areas which I understand you are examining are in biodiversity. Many of the countries in this region have a rich biodiversity when it comes to extracts and medication. There are obviously huge difficulties in tapping into these areas, but it something that appeals to western biotech and pharmaceutical companies.

Remember however with all of this comes the need to promote the region and the skills. Western biotech and pharma companies are not going to be beating a path to your door, you need to engage with them on their own home ground.

Conclusion

In conclusion I hope that having outlined both the state of the UK biotech industry and how it got there has helped illustrate a possible approach to developing a competitive industry through government support. The lessons learned are that there are other ways of achieving this goal. I certainly don't think we have seen all the possible permutations and combinations of building a competitive industry and that I look forward to the day when I see the development of an Asian model that takes its strength from both the East and the West, that the whole world can look to with envy.

Thank you for your attention.