

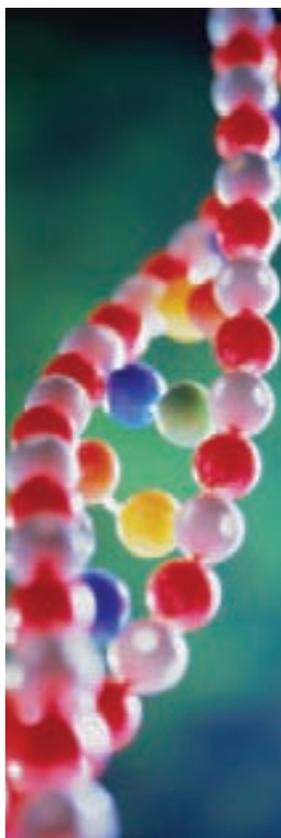
Bio business in Asia

FICTION OR FACT?

Development of ‘successful’ indigenous biotechnology industries in Asia

By Dr Guy Heathers

Singapore, South Korea and Taiwan – three countries that have made the development of a biotechnology industry a cornerstone of their transformation from world-leading manufacturing economies to new, ‘knowledge-intensive’ economies of the 21st century. To this list can be added three developing economic behemoths, China, Japan and India, all of which have recently been pushing forward an aggressive biotechnology agenda. Other countries such as Malaysia and perhaps Thailand have, to date, been less aggressive, but with their rich natural resources could well play a significant role in the development and success of biotechnology in Asia. But will these countries succeed? Clearly many countries in Asia have been hugely successful in modernising past economies, particularly from trading to manufacturing during the latter half of the last century. But is this past success a guarantee of future success, particularly in the transformation to knowledge-intensive industries such as biotechnology? Are there any particular characteristics in the biotechnology field that make creating a successful new industry depend on more than just investment dollars? In looking to develop this area into a sustainable and successful pillar of such ‘new economies’ are there specific features which need to be addressed?



Perhaps more than any other business the biotech industry relies extensively on creating new and innovative knowledge and in protecting and developing that knowledge over a very long development time. In the US, UK and many other countries in the West, the 'value' of such innovative knowledge is readily recognisable and relatively easy to protect. Such knowledge is sometimes difficult to assign a precise financial value to and indeed is usually open to some debate, however, due to extensive past experience and a plethora of 'deal-making' arrangements, a reasonably accurate valuation of such knowledge is reached. This 'value' system gives probably more than 90% of biotech companies in the West their 'worth' long before these companies actually start to generate revenues through sales of products. Thus, it can be said that most of the biotech industry in the West survives on such valuations of biotechnology inventions, long before these inventions actually give rise to real revenue-generating products.

The reason why this concept is fundamentally important in the Asian context is that such 'value' concepts are quite new for many Asian countries and their manufacturing-based economies. These countries and economies have developed over many years on trading or manufacturing visible goods where revenues and profits can be almost immediate and based on cost of goods and price sold. Thus, in developing new knowledge industries, and in particular biotechnology, a radically new value system has to be learned.

A number of Asian countries such as Singapore, South Korea and Taiwan are investing large amounts of capital into attracting pharmaceutical manufacturing facilities, or investing equally impressive quantities of capital into building up their research infrastructure. However, although there are clear signs of impressive development in the large scale pharma/biotechnology infrastructure, the initiation, development and growth of high quality indigenous biotech companies (the foundation of the biotech industry in the US and UK) has, to date, been a lot less spectacular. Thus, a difficult question is whether this is due to the early stage nature of the industry in these countries, or is it of a more fundamental question about the inherent difficulty in recognising and rewarding 'value' in a knowledge-based industry such as biotechnology?

Singapore

After seven years in the pharma industry in the US and another six in the biotechnology industry in the UK, I have been based in Singapore for the past

two years. Thus I have gained a close-up perspective of the biotechnology industry in Singapore and can compare this against experiences in the US and UK. Perhaps alone among Asian countries, Singapore is attempting to both import, as well as develop indigenously, a biotech industry. Many other countries in the region are focusing their efforts solely on developing indigenous industries, so much so that many senior level jobs in the industry are advertised only for their respective nationals. One cannot help but wonder how such a new industry can flourish in such a 'local' environment. Indeed, experiences in the UK indicate that much of the initial expertise and 'business know-how' was transferred across the Atlantic and this continues today. For its part Europe has also taken a lead from the many US/UK to continental Europe exchanges. Thus, for its 'international' view of the industry Singapore must be highly commended and, perhaps, this alone may give it the best opportunity in developing a biotech industry in Asia.

Certainly, Singapore is devoting considerable capital and energy into building up its biotech infrastructure and facilities, a \$5 billion fund making the island state probably the largest investor in biotech per capita in the world. But how is this being spent?

Importing an industry

High profile alliances or ventures with major multi-national pharma companies are certainly eye-catching. For example, Novartis' recent decision to base its Research Institute into Tropical Diseases in Singapore and Eli Lilly's establishment of its Systems Biology Institute provide a boost to the commercial research angle. In addition, pharma companies have long been used to using Singapore as a base for both manufacturing facilities and clinical trials in the Asian region. GlaxoSmithKline has had a presence in Singapore since the 1970s, while Merck Sharpe & Dohme, Wyeth, Pfizer and Schering-Plough have all built manufacturing plants there. Similarly, Eli Lilly, GSK, Merck & Co, Novo, Nordisk A/S, Astra Zeneca and Pharmacia have all based significant clinical trial centres in Singapore, mainly to test their drugs on an Asian population within a well-educated and highly efficient healthcare system. Thus, since the early 1990s Singapore has had a well-established pharmaceutical industry comprised almost entirely of regional centres of manufacturing, distribution and/or clinical testing for US and European pharma companies. But what of Singapore's indigenous biotech/pharma industry?



The indigenous industry

As with South Korea and Taiwan, and more recently India, China and Japan, Singapore is aggressively funding basic research. The recent establishment of a number of well-funded research institutes – chief among them, the Genome Institute of Singapore, the Bioinformatics Institute, the Institute of Bioengineering and the amalgamation of the highly-regarded Institute of Molecular and Cellular Biology with the Institute of Molecular Agrobiolgy – attest to Singapore's desire and commitment to transform the country into the premier biotech research environment in Asia. Not content with this, the government has recently embarked on a plan to move all of these institutes, together with a whole raft of new companies and service providers to an enormous, state-of-the-art campus near the National University of Singapore, 'Biopolis' or '1N' (as it is 1 degree north of the equator). Grandiose schemes indeed and highly commendable, certainly the envy of many less well-endowed countries. But this has all been well documented, and often elaborately presented, previously. What is less clear, and perhaps more difficult to detect, is the country's efforts at promotion and support of the indigenous biotechnology industry.

Despite the recent huge increases in research funding and, indeed at least in Singapore, an

already significant period of time in funding high quality and world leading research, the appearance and growth of an indigenous biotech industry to date is, at best, disappointing. But why?

Elements to put in place

For a successful biotech industry to flourish, a number of clearly identifiable factors need to be in place:

- Solid, high quality research base
- Adequate sources of funds (public and private)
- Technology transfer organisations/ infrastructure
- The right people
 - Energetic/enthusiastic scientists
 - Business managers with experience
 - Legal, Patent, Financial expertise, in relation to biotech
- 'Entrepreneurial culture'
- Risk-taking
- Incentives
- Recognition of the 'value' basis of biotechnology

Clearly, countries like Singapore, have a solid and high quality research base. Perhaps not quite to the standard of the US or UK but impressive enough considering the relatively short length of time many of these institutions have been in exis-

tence. Additionally, recent large-scale capital investments should provide an impressive platform for further growth in both output and quality.

As discussed, funding in Singapore and many of its competitor countries in Asia, should not be a problem, or is it? Despite impressive funds being allocated by governments to 'venture capital' activities, almost all of these funds have been invested in US or European venture capital funds and little, to date, has found its way to Asian companies. Certainly a case can be made that there is, as yet, little opportunity for investing such large funds in a relatively young indigenous biotech industry, but then we arrive at a chicken and egg situation. Without some degree of government support, many fledgling local initiatives will find it difficult to survive, particularly given the appalling lack of real 'risk' venture funds in the local venture capital community. A situation not unlike that in the UK in the early 1990s when the venture capital community focused investments in established companies with significant numbers of late stage development candidates. Clearly, if Singapore is to have a local home-grown biotech industry a gap needs to be filled between the promising early stage research being conducted, and indeed rapidly expanded in the country's research institutes, and the private venture capital community. A gap which, in part, is currently being filled by relatively small government initiatives. This issue is quite country dependent, South Korea and Taiwan certainly are attempting to 'kick start' their industries by focusing investments in home-grown companies while India, China and Japan are likewise looking at specific ways to stimulate their local biotech initiatives.

In addition to specific funding initiatives, there exists a significant lack of technology transfer organisations and infrastructure. Whereas in the US, with many entrepreneurial scientists and a history of very early seed stage funding on 'blue sky' commercial research, technology transfer infrastructure has long been a feature of most universities and research institutes. Similarly the UK, although probably less entrepreneurial, nonetheless the technology transfer infrastructure is in place and the rules and policies governing this critical process are mostly understood. However, in most Asian countries, including Singapore, the technology transfer infrastructure, and indeed the understanding of the importance of technology transfer, has been far too slow in coming. Indeed, a strong case can be made that, because of the lack of past experience, entrepreneurial culture and general risk aversion, professional, well-resourced and experienced technology transfer organisations



are a critical prerequisite for the successful start up of an indigenous biotech industry.

To quote a well-respected venture capitalist from the UK, 'business is about people' and it is certainly true in biotech. Having the 'right' people is critical, particularly the right people with experience, those who have made a mistake or two in their past and have learnt from them and are prepared to try again. There are many bright and energetic scientists in Singapore and other Asian countries, but experienced business managers with a couple of 'mistakes' and one or two 'hits' in their resume are, as yet, few and far between. Obviously this is an area in need of a significant degree of attention in the next few years if local biotech industries are to take off. But perhaps more important than importing or training a number of individual business managers is a country's ability to understand and implement the much talked about 'entrepreneurial culture'.

Many Asian countries freely, and exhaustively, talk about the need to create an 'entrepreneurial culture' in their societies. Unfortunately there is no real understanding of the enormous change this requires in most Asian cultures. Entrepreneurialism involves taking risks, sometimes failing and trying again; it means trying your own ideas, sometimes refusing to accept the comments/instructions of others, sometimes even going against the ideas of your superior; it means forsaking a steady salary for the opportunity of making a large sum of money at some indeterminate point in the future; it means rewarding those with new and innovative ideas, independent of their age. Many of these 'traits' don't sit comfortably in many Asian business cultures today where rewards are often given for long and loyal service and to 'go against the grain' is frowned upon. Thus, to implement such a change in culture is not something that can be initiated overnight, or even in a few years. It may be that a true entrepreneurial culture as we understand it in the West may never exist in Asia.

In addition, not only must an 'entrepreneurial mentality' prevail, but sufficient incentives must be provided to those making the risks. Thus, it is imperative that adequate compensation, usually in the form of shares in start-up companies, are given to those who are committing time, energy and risk in order to spin out biotech ventures from research institutes. Again, such share distribution is very common in the US and Europe (with, until recently the exception of France) while in Asia such share incentives seem to be considerably restricted. Such rigid policies have often been cited as major problems in the initiation of biotech industries in Japan and France. Similar rigid policies can be seen in other Asian countries today producing a significant disincentive for the creation and development of spin-off biotech ventures from research institutes.

Lastly, and returning to perhaps the most difficult element characteristic of successful and sustainable biotechnology industry, there exists today in most Asian countries a significant difficulty in assessing the true 'value' of a biotechnology invention. In the US and UK familiarity with increasing value as an invention moves along the development path toward a marketable product is familiar territory, but, in Asia, yet to be fully understood. Even more difficult is the value of early stage 'platform' technologies. On a number of occasions I have heard the value of a company being attributed to the number of patent applications filed, with no understanding of the development position of the patent, invention or product. Such a misunderstanding of value leads to a somewhat variable val-

uation of biotech companies (to put it mildly!). But perhaps with more experience and greater exposure to the increasingly global biotechnology industry, an understanding and appreciation of the value of biotechnology knowledge will improve.

Summary

Thus, despite impressive funds being spent in developing biotech industries across Asia, and equally impressive infrastructure initiatives being launched, the question of whether Asia can develop a truly competitive and world-leading indigenous biotech industry remains unanswered. There are still significant hurdles to overcome, particularly in the creation of an entrepreneurial culture and an understanding of value in a biotechnology context. To coin a phrase, 'the jury is still out' on this question. However, perhaps a different question is more pertinent... does it really matter? If Singapore can attract the world's leading pharmaceutical companies to base regional manufacturing facilities and research institutes on its island and can persuade a few of the world's leading biotech companies to likewise follow suit, or if China, Japan and India can create indigenous home-grown biotech companies focusing not on the global market but on their own home markets (which are already huge and expanding), do these countries actually need to establish successful, world-leading biotech companies in a global context? Certainly, in terms of the effect on their economies, pursuing these two strategies may be more worthwhile, and indeed achievable, than attempting to compete against the US and Europe on the world stage. **DDW**



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