Singapore – The Biopolis of Asia

By Dr Beh Swan Gin

About the author:
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Singapore's vision is to become one of the global hubs for biomedical sciences (BMS). This covers pharmaceuticals, biotechnology, medical technology and healthcare services. To achieve this, Singapore has built up world-class capabilities across the entire value chain: from drug discovery and clinical research, to manufacturing and healthcare delivery.

This initiative was launched in June 2000 and the aim is to develop the BMS industry into one of the key pillars of Singapore's economy. The three main agencies that are involved in the BMS initiative are EDB's Biomedical Sciences Group (EDB BMSG), EDB's Bio*One Capital and A*STAR's Biomedical Research Council (BMRC). EDB BMSG is responsible for industrial development, Bio*Capital makes strategic investments in companies, while BMRC takes the lead in coordinating and funding public sector and academic research, as well as supporting the training of scientists.

THE 3Cs STRATEGY

Singapore has adopted an integrated approach towards developing the BMS sector. It focuses on the 3Cs: Industrial Capital, Intellectual Capital and Human Capital.

Industrial Capital

EDB BMSG is responsible for attracting international BMS companies to establish operations in Singapore. Recent examples of companies investing in manufacturing and R&D activities include Novartis and GlaxoSmithKline (GSK). GSK's history in Singapore dates back to the 1970s. The company's operations encompass R&D, process development and manufacturing, clinical development and also serve as its regional headquarters for Asia Pacific.

GSK recently completed a S$100 million expansion of its manufacturing facilities in Singapore and also announced a further S$50 million investment to develop a Technical Centre, targetted for completion in late 2005. In addition, GSK will establish in Singapore, its first pre-clinical research facility in Asia Pacific. The company will invest S$62 million in this facility to study neurodegenerative diseases and represents a 50% increase in GSK's research efforts in the field of neurodegenerative diseases.

Novartis on the other hand, is building a new S$300 million pharmaceutical production facility in Singapore to expand its capacity to supply the global market. This comes closely after the opening of the Novartis Institute for Tropical Diseases (NITD), which was established to discover and develop novel therapeutics against tuberculosis and dengue. CIBA Vision, a Novartis subsidiary, is also in the process of building a contact lens manufacturing facility in Singapore.

On the medical technology front, Siemens Medical Instruments (SMI) is one of the pioneering companies that set up operations here many years ago. SMI is a leading manufacturer of digital hearing instruments, which

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incorporate the latest microelectronic technology. It recently invested S$70 million to expand both its manufacturing and R&D operations for hearing aids. This will bring the company's total investment in Singapore to more than S$120 million by year 2008. Moreover, SMI will intensify research collaborations with partners at local universities, scientific institutes, and companies in order to analyse the life cycle of hearing instruments and to explore the potential of new materials and latest manufacturing technologies.

Other leading players with major manufacturing presence in Singapore include Applied Biosystems, Aventis, Baxter, Becton Dickinson, Ciba Vision, Kaneka, Merck, Pfizer, Schering-Plough, and Wyeth. In R&D, the companies include Eli Lilly, ESI, Merlion Pharma , Paradigm Therapeutics, PharmaLogicals Research, S*Bio, Viacell, and Qugen.

One of the key challenges faced by start-ups and established companies alike, is the need to manage R&D costs and bring products to the market as quickly as possible. At the Biopolis, companies can take advantage of state of the art laboratory space and access to world-class scientific infrastructure to cut down R&D costs significantly and accelerate the development timeline.

With a land area of 183 hectares and an additional 188 hectares under development, the Tuas Biomedical Park plays an instrumental role in attracting the manufacturing investments from global biomedical companies. The range of activities include the production of active pharmaceutical ingredients, final dosage forms including injectables, medical devices and equipment as well as new capabilities such as biologics manufacturing and cell processing. The Tuas Biomedical Park was developed by JTC Corporation.

Another vivid icon of Singapore's commitment to BMS is the S$500 million Biopolis. Also developed by JTC, the Biopolis is an integrated R&D complex with two million square feet of space that houses BMRC's five research institutes as well as R&D laboratories of numerous pharmaceutical and biotechnology companies. BMRC's five research institutes are the Bioinformatics Institute (BII), Bioprocessing Technology Institute (BTI), Genome Institute of Singapore (GIS), Institute of Bioengineering & Nanotechnology (IBN) and Institute of Molecular & Cell Biology (IMCB). About 90% of the space in Biopolis has been taken up and Phase 2 of Biopolis is expected to be launched in early 2005.

Private companies that have moved to the other two buildings are Novartis Institute for Tropical Diseases, Vanda Pharmaceuticals, Illumina, Paradigm Therapeutics, Proligo, Waseda-Olympus Bioscience Research Institute and Johns Hopkins. In addition, the Health Sciences Authority, the local regulatory body for healthcare sciences and services in Singapore, the Swiss House, as well as the Regional Emerging Diseases Intervention Centre (REDI), have also moved into the Biopolis. REDI was established jointly by Singapore's Ministry of Health and the Communicable Disease Centre (CDC) and National Institute of Health (NIH) in the US.

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Biopolis is also home to the BioVenture Centre, which is a full-service life science incubator dedicated to assisting start-ups in Singapore. It offers the full complement of services needed by an emerging biomedical venture such as:

- Wet lab facilities
- Vetting of scientific concepts
- Interim management and business planning services, such as business plan preparation and market research
- Access to a network of third-party service providers for things such as marketing communications, human resources, accounting and finance, and so on.

Singapore's strong intellectual property rights protection and a pro-business regulatory infrastructure are some of the other factors that attract global companies to invest here.

In addition to attracting international companies, Singapore aims to nurture the growth of local BMS companies. Rockeby Biomed, Cygenics and MatrixView are some of the companies that have successfully gone for public listing.

Bio*One Capital is EDB's venture capital arm that is dedicated to BMS investments. It manages S$1 billion in several funds to invest in overseas or local projects with economic spin-offs to Singapore. Bio*One also has a BMS Innovate 'N' Create (INC) Scheme to provide seed capital for start-ups.

EDB BMSG also launched the Proof of Concept (POC) Scheme in 2004 to help scientists at the local universities,

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polytechnics, hospitals and specialty centres develop early research ideas, demonstrate proof-of-concept of the technologies, and bring them to the market. POC will provide funding of up to S$300,000 per project in the areas of therapeutics or vaccines, diagnostics, medical technology or platform technologies. At the point of application, scientists must secure an interested investor or industrial partner who can provide them with business or technical advice from concept through commercialisation.

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Intellectual Capital

A strong scientific base supports Singapore's growing BMS industry. There are five intramural research institutes under BMRC (mentioned above). In addition, BMRC provides extramural grant support for university and hospital-based researchers in Singapore.

To accelerate the commercialisation of impactful research findings, partnerships and collaborations are actively encouraged and fostered between private corporations and academia. Exploit Technologies is A*STAR's technology management company that facilitates this transfer of leading-edge technologies from the research institutes to industry.

Human Capital

To support Singapore's BMS initiative, A*STAR is embarking on an aggressive programme to increase the number of Singaporeans pursuing PhD studies and post-doctoral fellowships locally as well as in top universities around the world. Since 2001, more then 400 students have received scholarships and fellowships to pursue biomedical sciences related studies. By year 2010, more than 1,000 Singaporean PhDs would be added to the research community.

To complement the training of local Singaporeans, Singapore welcomes international talent from all around the world. Singapore adopts a pro-foreign and pro-local policy. Good science, a cosmopolitan environment, and flexible immigration policies for professionals, attract such research talent to Singapore. The following are recent additions to Singapore's research community:

- Dr Sir David Lane, from the University of Dundee, Scotland, is the Executive Director of Institute of Molecular and Cell Biology.
- Dr Alan Colman, formerly from U.K.-based PPL Therapeutics, is Chief Scientific Officer of ES Cell International.
- Dr Axel Ullrich, while heading the molecular biology department at Max Planck Institute, is also with Singapore Onco Genome Laboratory.
- Dr Edison Liu, former director of clinical sciences at the U.S. National Cancer Institute, is Executive Director of Genome Institute of Singapore.
- Dr Jackie Ying, from the Massachusetts Institute of Technology, is Executive Director of Institute of Bioengineering and Nanotechnology.
- Dr Yoshi Ito, from the University of Kyoto in Japan, is Principal Investigator at Institute of Molecular and Cell Biology.

GOING FORWARD

Singapore's BMS manufacturing output grew to S$11.3 billion in 2003. This represented a 15.9% increase over the year before, while employment grew by 3.4% to 7,597 in 2003. Singapore's BMS industry is in an exciting growth phase and on track to easily achieve more than S$12 billion in manufacturing output in 2004, one year ahead of target. The new goal is to double the manufacturing output to S$24 billion in 10 years and achieve an employment figure of 15,000. ■