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Singapore's Biomedical Sciences Strategy

Singapore's vision is to become a global hub for the biomedical sciences (BMS) with world-class capabilities ranging from basic and clinical research to manufacturing and healthcare delivery. This vision encompasses pharmaceuticals, biotechnology, medical technology, and healthcare services.

Singapore's BMS initiative was launched in June 2000 with the goal of developing the industry into a key pillar of Singapore's economy. It is overseen by a Ministerial Committee chaired by Deputy Prime Minister Dr. Tony Tan and implemented by an executive committee led by Mr. Philip Yeo, who is chairman of the Agency for Science, Technology, and Research (A*STAR) and co-chairman of Singapore's Economic Development Board (EDB).

The two lead government agencies involved in the BMS initiative are EDB's Biomedical Sciences Group (EDB BMSG) and A*STAR's Biomedical Research Council (BMRC). EDB BMSG is responsible for industrial development 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 toward developing the BMS sector by focusing on the 3Cs: intellectual capital, industrial capital, and human capital.

Intellectual Capital

There are five research institutes under BMRC. These are the Bioinformatics Institute (BII), the Bioprocessing Technology Institute (BTI), the Genome Institute of Singapore (GIS), the Institute of Bioengineering and Nanotechnology (IBN), and the Institute of Molecular and Cell Biology (IMCB). In addition, BMRC provides extramural grant support for university- and hospital-based researchers.

To accelerate the commercialization of academic research findings in Singapore, partnerships and collaborations are actively encouraged and fostered between private corporations and academia. For instance, BTI has core capabilities in mammalian cell culture, microbial fermentation, gene expression, and viral vector technologies, as well as in proteomics and peptide technologies. It is collaborating with numerous biotechnology and pharmaceutical companies, and has also spun off a cGMP contract manufacturing company. Exploit Technologies, A*STAR's technology management company, plays an active role in facilitating the transfer of leading-edge technologies from the research institutes to industry.

Industrial Capital

Singapore's strong base of biomedical manufacturing activities is growing rapidly and expanding to include new capabilities such as biologics manufacturing and cell processing. With a land area of 170 hectares and an additional 150 hectares under development, the Tuas Biomedical Park plays an instrumental role in attracting global pharmaceutical and medical technology companies to set up their production base in Singapore.

Another vivid example of Singapore's commitment to the BMS sector is the S$500 million (US$300 million) Biopolis, which opened in October 2003. The Biopolis is an integrated R&D complex with two million square feet of space that will house BMRC's five research institutes as well as the R&D laboratories of numerous pharmaceutical and biotechnology companies. The Biopolis also offers fully equipped laboratory space for startups as well as support services specifically tailored for biomedical companies. In addition, tenants will be able to tap into shared facilities such as laboratories for mass spectrometry and DNA sequencing, as well as a library, an auditorium, meeting rooms, and lifestyle amenities.

In terms of financial assistance, companies setting up operations in Singapore can enjoy various incentives including tax incentives, employee training grants, and R&D grants. In addition, Bio*One Capital, the investment arm of EDB, manages US$700 million in funds to invest in overseas or local projects with economic spin-offs to Singapore. The Biomedical Sciences Innovate 'N' Create Scheme provides seed capital for startups, while the EDB's Proof-of-Concept scheme offers pre-seed funding to support the development of locally developed, patentable, early ideas that could lead to the formation of new startups or to licensing deals with industry.

The strong government support, world-class infrastructure, and pro-business environment have helped attract industry leaders — such as Aventis, Baxter, Becton-Dickinson,

Eli Lilly, GlaxoSmithKline, Johns Hopkins, Merck & Co., Novartis, Pfizer, Schering-Plough, and Wyeth — to choose Singapore as their preferred location for manufacturing and R&D investment.

Human Capital

Singapore is embarking on an aggressive programme to increase the number of Singaporeans pursuing Ph.D. studies and post-doctoral fellowships locally and at top universities around the world. More than 200 students have received biomedical sciences scholarships and fellowships since 2001. By 2010, more than 1,000 Singaporean biomedical Ph.D.s will be added to the research community.

To complement the training efforts, Singapore welcomes talent from around the world. Good science, a cosmopolitan environment, and flexible immigration policies for professionals attract research talent to Singapore. Recent additions to Singapore's research community include:

- Edison Liu, former director of clinical sciences at the U.S. National Cancer Institute, is executive director of the Genome Institute of Singapore.
- Yoshi Ito, from the University of Kyoto in Japan, is principal investigator at the Institute of Molecular and Cell Biology.
- Alan Colman, from U.K.-based PPL Therapeutics, is chief scientific officer of ES Cell International, which provides products and services derived from human embryonic stem cells.
- Jackie Ying, from the Massachusetts Institute of Technology, is executive director of the Institute of Bioengineering and Nanotechnology.

Going forward

Singapore's biomedical manufacturing output reached S$11.3 billion in 2003. This represented a 15.9% increase over 2002, while employment grew by 3.4% to 7,596 in 2003. In addition, despite the challenging global economic climate last year, the level of biomedical investment commitments has been sustained. Singapore's BMS industry is thus in an exciting growth phase. Going forward, it is on track to achieve the target of S$12 billion in manufacturing output by 2005.

For more information, please visit *www.biomed-singapore.com.*

Dr. Beh Swan Gin *(swangin@edb.gov.sg) is director of the Biomedical Sciences Group at the Singapore Economic Development Board.*