



Photo credit: China Beijing Bioengineering and Pharmaceutical Industrial Park (CBP)

More than just an incubator base for research and discovery, China Beijing Bioengineering and Pharmaceutical Industrial Park (CBP) provides state-of-the-art meeting and conference facilities, and specialized services to bioengineering and pharmaceutical firms.

Biotechnology Parks: China into the Next Future

by **Serene ONG**

Biotech parks in Beijing, Shanghai and Shenzhen set the stage for China to become the next biotech giant in the world in the coming decade. An analytical view into various conducive factors explains the potential for the burgeoning growth.

There are numerous compelling reasons to keep an eye on China's biotech industry, whether on the research front or as a place to invest. In 2004, the healthcare market in China is the seventh largest in the world; by 2010, it is expected to be the fifth largest; and by 2020, some experts say China could surpass the U.S. as the world's largest pharmaceutical market. The Chinese biotech industry grew rapidly, from sales of RMB200 million (US\$29.3 million) in 1986 to RMB78 billion (US\$11.4 billion) in 2004. The compounded average growth rates average over 25% per year, and the biomedicine industry is one of China's most active industries. The biotech market encompasses more than pharmaceuticals; it also includes gene-based medicines, vaccines, diagnostics, biochemical medicines, engineered plants and animals, bio-fertilizers, bio-pesticides and bio-agricultural products.

Foreign Investments in R&D

Well-known multinational pharmaceutical companies have already committed hefty investments in China: Pfizer has invested more than US\$500 million in China since the 1980s, GlaxoSmithKline (GSK) has invested over US\$400 million, while AstraZeneca has invested more than US\$140 million. AstraZeneca has opened an East Asia clinical trial center in Shanghai, Roche established its first Asian R&D center in Shanghai, Eli Lilly has also opened up a research and development (R&D) facility in Shanghai, and Novo Nordisk has an R&D facility in the Beijing Zhongguancun (ZGC) Life Science Park. GSK and Pfizer have also set up R&D centers in China.

While the global biomedical market is slowing down because of governmental efforts to reduce the growth of healthcare costs, greater use of generic drugs, and regulatory hurdles also make it harder for companies to bring new drugs to the market; also, safety issues have led to product withdrawals. China is emerging as a more competitive choice; its biomedical market has been growing at a two-digit rate since 1990. According to estimates by IMS health, a leading provider of market intelligence to the pharmaceutical and healthcare industries, pharmaceutical sales in China grew by 20.4% to US\$11.7 billion in 2005, and medical equipment sales and devices grew at similar rates to US\$6.8 billion. China is currently one of the biggest suppliers of pharmaceutical ingredients in the world, and major pharmaceutical companies like AstraZeneca, Bayer, Baxter and Pfizer have outsourced, or are planning to outsource, their manufacturing to China.



However, the attractiveness of the Chinese biotech industry goes beyond just the low wages and low operational costs. China has a large pool of well-trained scientists and workers, with over 100 000 skilled workers that are involved in biotech research and exploration, and an estimated 30 000 undergraduate and graduate students graduating from Chinese universities and academic institutions annually. Moreover, China is developing its own expertise in fields such as gene therapy and stem cell research. Foreign involvement in the Chinese market are no longer limited to production and sales, but are increasingly conducting R&D activities and establishing partnerships with domestic firms and research institutes. This has led to a need for better organization and centralization of such activities, which is manifested in the science parks.

Universities — the Birthplace of Biotech Parks

The science and technology parks in China were first started in the late 1980s at the universities as

joint projects between the local governments and the universities. Since then, there are currently over 50 science parks, which includes over 10 biopharmaceutical parks, and plans are underway to increase the number of science parks to 80 by 2010. China is investing heavily in scientific R&D; the State Council announced in February 2006 that annual investment in R&D would be increased to RMB 900 billion (US\$131.6 billion) by 2020. This represents an increase in China's GDP spending on research (2006 figures) from 1.3% to 2.5%, and key research areas identified include energy, health, agriculture, biotechnology and nanotechnology.

The parks function as incubators for the over 5000 small and medium-sized enterprises (SMEs), many of which were set up by academics. In addition to their historical ties, the universities remain the main innovation source for the science parks, with the universities winning more than half of the national science and technology prizes awarded between 2000 and 2005. The universities also hold another advantage over research institutes when it came to clinical research, as top universities such as Peking University are usually affiliated with well-regarded hospitals and can conduct clinical research much more easily.

Since the first business incubator was established in 1987 in Wuhan, more than 490 incubators had since been set up across the country by 2005, with the majority located in Beijing, Shanghai and Shenzhen. In the specialized biotech incubators, laboratories and standardized mini-manufacturing facilities have been constructed as the basic infrastructure for incubated firms.

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Governmental Support

The government also retains a predominant role in the parks' management, and centralized development is a key characteristic of biotech industry development in China. Different government levels have built many biotech parks and incubators in efforts to form research and industry centers. Unlike the Western biotech model, where financing is usually dependent on risk capital investors, Chinese biotech companies typically receive initial funding from state-owned enterprises (SOEs), and from local, provincial or state government programs; thus Chinese biotech companies are highly dependent on government support at all levels. The central (state) government is the largest supporter of science R&D with biotech being consistently promoted as a priority by the government under the Five-Year Plans since the Seventh Five-Year Plan (1986-1990). Major state funding programs that support biotech in particular include the National High-tech R&D Program ("863 Program") and the National Basic Research Program of China ("973 Program"). The "973 Program" concentrates more on early-state research projects, while the "863 Program" focuses more on applied research and commercialization. Other government funds that support biotech enterprises include the National Innovation Fund, National Key Scientific Development Plan and

National Hi-tech Industrialization Projects.

These parks have several characteristics that are geared towards creating a favorable investment and operational environment: (1) well-planned and functional infrastructure; (2) tax incentives enjoyed by high-tech firms; (3) a new governance model that aims to reduce companies' transaction costs and to facilitate their activities more efficiently, and (4) a cluster structure that encourages closer interaction and cooperation between the different firms in these parks. Since China's accession to the WTO in 2001, the biotech industry in China has rapidly transited from a plan-based to a market-driven system. At the same time, the domestic market has become more open, particularly to foreign investors.

To focus and coordinate all these efforts, the China National Center for Biotechnology Development (CNCBD) was established on November 3, 1983 under the Ministry of Science and Technology (MOST) as a clearinghouse for biotechnology policy, project management, personnel training, and international information exchange and promotional service for biotechnology and bioindustry. The CNCBD manages and distributes funding for biotechnology research in agriculture, food processing and pharmaceutical manufacturing. In addition, the CNCBD also oversees

the administration of the China-EU Biotechnology Center and the China Affiliated Center to International Center for Genetic Engineering and Biotechnology.

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Major Biotech Parks

Most of the recent developments and biotech parks' activity have occurred in the eastern and coastal regions, particularly in Beijing, Shanghai and Shenzhen. This section offers an overall view of the most important biotech parks in these cities.

With its wealth of educational, technological and scientific resources, Beijing is the political and cultural and international communications center of China. It is thus unsurprising that various industry clusters have developed around the China's capital city. Shanghai is China's most populous city, China's busiest port, and an economic powerhouse. Similar to Beijing, Shanghai, too has its own industry clusters, including the Zhangjiang Hi-Tech Park in Pudong. Shenzhen, a city in the Pearl River Delta (PRD) in the southern Guangdong Province, was the first of China's five special economic zones. The city borders Hong Kong and is a center of foreign investment. Since the late 1970s, it has been one of the fastest growing cities in the world, with an annual growth rate of over 30%, and it is China's second busiest port (after Shanghai).



BEIJING: ZHONGGUANCUN LIFE SCIENCE PARK

Zhongguancun, a technology hub in Beijing, has been synonymous with information technology and electronics, and more recently with the development of China's biggest science park, with the life sciences as well. Launched in 1988, the Beijing Zhongguancun (ZGC) Life Science Park is located in the Haidian District, which is the northwestern part of Beijing city. It is China's biggest science park, spanning 100 sq km, and is part of the Zhongguancun Science & Technology Zone, a zone comprising of ten parks: Haidian Park (also known as ZGC Life Science Park), Fengtai Park, Changping Park, Electronics Town, Yizhuang Park, Desheng Park, Yonghe Park, Shijingshan Park, Tongshou Park and Daxing CBP (Beijing Bioengineering & Pharmaceutical Industrial Park).

The ZGC Life Science Park aims to build a national innovation base for the life sciences, new medicines and advanced pharmaceuticals. It is closely involved with major national life science developmental projects and strictly follows the directions of the government and the State Council. Such a centralized approach integrates the biotech industry at all levels, from R&D to mid-testing and production, from enterprise incubation and intangible assets appraisal to venture capital and projects evaluation, and from personnel training to international exchange.

With its proximity to leading universities and research institutions such as Beijing University, Tsinghua University, Chinese Academy of Sciences and National Science and Research Institution, the ZGC biomedical park and the surrounding

area is often referred to as "China's Silicon Valley". The biomedical park aims to act as an incubator for SMEs; with an investment of RMB22 million (US\$3.22 million) by the Beijing local government and generous tax breaks for SMEs, the park is the largest professional incubator of high-tech businesses. Some 400 000 highly educated academics, researchers, engineers, scientists and support staff work in the park, and 138 research institutions, 56 higher-learning institutions and about 6000 high-tech companies are based in the park. Since its inauguration, the park's economy has been growing at an average rate of 30% per year.

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BEIJING: CHINA BEIJING BIOENGINEERING & PHARMACEUTICAL INDUSTRIAL PARK

Launched in June 2003, the China Beijing Bioengineering and Pharmaceutical Industrial Park (CBP) was developed by the Beijing Municipal Government with an investment of RMB2 billion (US\$0.3 billion) and occupies almost 7000 acres (28.3 sq km).

Beijing, which has a deep, comprehensive medical infrastructure, has placed a huge emphasis on the bioengineering and pharmaceutical industries. Beijing has the biggest pharmaceutical market in China, over 4800 medical

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institutions including 530 hospitals, over 1500 pharmaceutical shops and over 1000 registered medical operators and retailers. Nationwide, Beijing accounts for the largest share of China's pharmaceuticals sector, with an annual growth rate of 20%.

The CBP has developed into the leader in the R&D, testing, evaluation, control and clinical testing for food, bioengineering and pharmaceutical products. To date, 73 companies have invested in the park, accounting for a quarter of the total number of bioengineering and pharmaceutical firms in Beijing. Its annual production value of RMB2.3 billion (US\$337 million) accounts of 28% of the pharmaceutical industry in Beijing. Prominent institutions located in the park include the Chinese Academy of Medical Science, Chinese Center for Disease Control and Prevention (CDC), Academy of Military Medical Sciences, Academy of Traditional Chinese Medicine, Beijing Union Medical College, Beijing University Hospital, Capital Medical Sciences University, the State Food and Drug Administration (SFDA), and the National Institute for the Control of Pharmaceutical and Biological Products. Well-known domestic companies such as Beijing Tri-Prime Genetic Engineering Company and the Union Medical Pharmaceutical Group have also set up business in the park.

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SHANGHAI: ZHANGJIANG DRUG VALLEY

Founded in July 1992, the Shanghai Zhangjiang Hi-Tech Park is located in the middle of the Pudong New Area and has an area of 25 sq km. Within Zhangjiang Hi-Tech Park, the Shanghai National Biomedical Industry Base was set up on August 1996 by the Ministry of Science and Technology, Ministry of Health, Chinese Academy of Science, State Food and Drug Administration, and Shanghai Municipal Government. The Shanghai Zhangjiang Biomedicine Base Development Company was founded in September 2001 to manage the building, construction, business promotion, investment attraction and resource integration of this biomedical base.

The park comprises five zones: Technical Innovation Zone; Hi-Tech Industry Zone; Scientific Research and Education Zone, and Residential Zone. The park's main industries are information technology, and biotechnology and pharmaceuticals. These industries are supported by the park's national level bases: the National Shanghai Biotech & Pharmaceutical Industry Base, the National IT Industry Base, the National 863 Information Security Industry Base, and the National

Technology Innovation Base.

As of 2005, there were 110 R&D institutions, including over 30 national institutions, and 327 companies in the technology park, including 200 biopharmaceutical companies. National and Shanghai municipal key research institutes located within the park include the Shanghai Institute of Materia Medica, Chinese Academy of Sciences, National Center for Drug Screening, NSCDSE, National Engineering Research Center for Pharmaceutical Preparation, National Engineering Research Center for TCM (NERC), Shanghai Innovative Research Center of Traditional Chinese Medicine, National Center for Safety Evaluation and Shanghai New Medicine R&D Center. Prominent multinationals that have set up shop here include Pfizer, Roche, GSK, Eli Lilly, Beohringer Ingelheim, Sankyo, Tsumura, SK and Dupont.

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SHENZHEN: SHENZHEN HI-TECH INDUSTRIAL PARK

One of the five state-level high-tech parks particularly supported by the Chinese central government, Shenzhen High-tech Industrial Park (SHIP) was established in September 1996 and occupies an area of 11.5 sq km. The park accounts for 60% of Shenzhen's industrial output. The Shenzhen Municipal Government is responsible for the leadership, decision-making, planning and macro-management of the park. However, the enterprises in SHIP are not only supported by governmental funds from the Chinese Central Government and the Shenzhen Municipal Government but also received funding from venture capital firms such as IDG, Walden, Bahrain, H&Q Asia Pacific, which have invested more than RMB2 billion.

One of the professional incubator groups within SHIP, the Shenzhen Virtual University Park is one of the park's important support system. Founded in September 1999, there are 48 park-entered organizations and 18 network members in the Virtual University which includes 35 famous Chinese universities such as Tsinghua University, Peking University and Harbin Industry University. Other prominent members include the Chinese Academy of Sciences and the Chinese Academy of Engineering, and 17 foreign universities, that includes five universities from Hong Kong: The Hong Kong University of Science and Technology, Hong Kong Polytechnic University, City University of Hong Kong, Hong Kong Baptist University, and University

of Hong Kong; the Lyon Central Polytechnic University of France (L'Ecole Centrale de Lyon de France), the Bauman Moscow State Technical University, the Russian Academy of Science Far Eastern Branch, the National Technical University of Ukraine and Tunghai University. Over 10 000 postgraduate students have graduated from the Virtual University, and over 1000 enterprises have been founded.

In early 2006, Shenzhen's ties with Hong Kong was further strengthened when a strategic alliance was signed between Shenzhen Hi-tech Industrial Park and Hong Kong Science Park. ■

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