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The Implications of WTO Accession on the Pharmaceuticals Industry in China^{*}

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Abstract:

Given the limited capabilities on R&D and global distribution channels, and the virtual non-existence of patented drugs, the Chinese pharmaceuticals industry has little chance to enter the global market of Western prescription drugs and compete with the established global giants head-on. The reality is that they are chasing a moving target and their competitors are becoming bigger and stronger day by day. The substantial reduction of import tariffs and the granting of comprehensive trading and distribution rights to foreign-financed firms after the WTO accession, effectively tilted the level-playing field against the Chinese pharmaceuticals industry. Given the short-term competitive advantages of Chinese pharmaceuticals industry on Chinese drugs, three development strategies are suggested: (1) consolidate local market of herbal and generic drugs, (2) market Chinese drugs via the Internet, and (3) outsource R&D and collaborative marketing.

Keywords: WTO accession, competitive advantages, development strategy, pharmaceuticals industry, China

1 Introduction

The pharmaceuticals industry underwent massive consolidation in the 1990s due to a combination of three factors. First, the cost of discovering and developing new drugs is increasing exponentially due to the high cost of equipment and highly skilled scientists demanded by genetic research, and the expensive human clinical trials needed in order to satisfy regulatory authorities. Second, the global reach of sales and marketing channels is increasingly important in order to gain and to maintain a market share.¹ Third, the booming stock market and the shareholders' pressure to sustain the high profit margin drove the sector to develop 'blockbuster drugs' (those that can earn US\$1 billion or more), something only the largest ones can afford to do. Therefore, a bigger pharmaceutical company with teams of research and development (R&D) and global sales forces in different therapeutic categories has the competitive advantage over their competitors. This explains the unprecedented mergers and acquisitions (M&As) frenzy in the 1990s, which involved approx three dozen drug companies (including about half of the top 25 drugs companies). The value of pharmaceutical mergers reached US\$290 billion between 1995 and 1999, including the formation of AstraZeneca and Aventis.² As the threshold of critical mass to conduct research on a broad scale and to have global development and distribution capabilities is changing overtime, further market consolidation may reduce the number of major pharmaceutical companies from 35 to less than 12 over the next decade.³

¹ Permission to advertise prescription drugs on television in the US since 1997 has increased the marketing costs tremendously. Since the US is the only developed country with no price control on prescription drugs and allows direct advertisement, all major drug companies are targeting this higher value-added market (the US market have skyrocketed from US\$38 billion in 1990 to US\$100 billion in 1998). In the US, it is estimated that it costs up to US\$1 billion plus a 1,000 strong sales-force to market a new drug in its first two years. Subsequently, drug companies spent US\$1.9 billion on direct-to-consumer advertising in 1999; see *Financial Times*, (8 November 1999), p. 21 and (23 November 1999), p. 35 (<http://www.ft.com>); *International Herald Tribune*, (25 January 2000), p. 9 (<http://www.ihf.com>).

² In the first two months of 2000 alone, a staggering of US\$282 billion of M&A deals (including Pfizer acquired Warner-Lambert, Glaxo-Wellcome merged with SmithKline Beecham to form Glaxo-SmithKline, and Pharmacia & Upjohn has agreed to merge with Monsanto to establish Pharmacia) have been agreed; see *Financial Times*, (17 January 2000), p. 18.

³ *International Herald Tribune*, (25 January 2000), p. 9. The industry had about 80 major companies in the mid-1980s.

After the Chinese delegate signed the World Trade Organization (WTO) accord in Doha on 12 November 2001, China formally agreed on the accession treaties after 15 years of on-and-off negotiations.⁴ During the last few years when the US and China governments were negotiating the treaty for WTO accession, a number of reports have focused on the possible effects and implications on a number of strategic industries. For instance, Graham and Liu, Wei, and Blumental analyse the impact on automobile, finance and banking, telecommunication and agricultural sectors.⁵ Despite being regarded as one of the largest potential markets for drugs in the world and classified as one of the strategic industries along with the oil and gas, iron and steel by the Beijing government, there is little comprehensive investigation on the effects of WTO accession on Chinese pharmaceuticals industry. Chow and Fung analyse the effects of foreign investment on the Chinese pharmaceuticals industry and White and Liu investigates the performance of 66 Chinese pharmaceutical manufacturers by using efficiency-oriented parameters.⁶ Using the case studies approach, Nolan,

⁴ China was one of the signatories of the General Agreement on Tariffs and Trade (GATT) in April 1948 but the Taiwan Nationalist government withdrawal from the GATT in March 1950. In 1984, China was granted the observer status and formally applied for the GATT membership in 1986. For the historical background and politics about the WTO accession, see Kym Anderson, 'On the Complexities of China's WTO Accession', *World Economy* 20(6), (September 1997), pp. 749-772; Harry Hongyi Lai, 'Behind China's World Trade Organization Agreement with the USA' *Third World Quarterly* 22(2), (April 2001), pp. 237-255; Yongzheng Yang, 'China's WTO Accession: The Economics and Politics' *Journal of World Trade* 34(4), (August 2000), pp. 79-94; K Zeng, 'Domestic Politics and the US-China WTO Agreement' *Issues & Studies* 37(3), May-Jun 2001, pp. 105-141. Created in 1995, the WTO is an inter-governmental body comprising the majority of the world's countries. Based on the spirit of classical liberalism and the rule of law, the purpose of WTO is to promote multi-lateral trade through reduction in obstacles erected by individual countries to global trade in goods and services, settle trade disputes and lay down rules governing international trade. Although decisions are normally arrived at through consensus of all members, WTO actions are based on non-discrimination and equal treatment of member countries. The WTO accession for China demanded a number of areas for liberalisation ranging from tariffs reduction to quotas elimination. In return, the US government granted the Permanent Normal Trade Relations (PNTR, formally called the Most Favoured Nation or MFN) status to China, which levies the same level of tariffs on Chinese and other US's major trading partners imports, effectively on 1 January 2002. The will also ended the application of the US's Jackson-Vanik amendment, which requires communist countries to show they do not restrict emigration before they can be granted the normal trading relations, see *South China Morning Post*, (28 December 2001) (<http://www.scmp.com>).

⁵ Edward M. Graham and Ligang Liu, 'Opening China's Bond Market – Catalyst to further Reform and a Jumpstart to the Stalled WTO Accession Negotiations', *Journal of World Trade* 32(4), (August 1998), pp. 5-19; Zhao Wei, 'China's WTO Accession – Commitments and Prospects', *Journal of World Trade* 32(2), (April 1998), pp. 51-76; D. M. Blumental, 'Applying GATT to Marketizing Economies: The Dilemma of WTO Accession and Reform of China's State-owned Enterprises (SOEs)', *Journal of International Economic Law* 2(1), (March 1999), pp. 113-154.

⁶ C. K. W. Chow and M. K. Y. Fung, 'Health Care Reform, Foreign Direct Investment and their Impact on the Pharmaceutical Industry in China', *Asian Economies* 25(3), (September 1996), pp.

Wang and Yeung investigate the competitiveness of a particular pharmaceutical firm, Sanjiu Group.⁷ They all provide useful information and analysis but none of them analyse the effects of WTO accession on the pharmaceuticals industry. Chen, and Yu, Zheng and Song did cover pharmaceuticals in their studies on the impacts of WTO accession but neither of them is comprehensive.⁸

To fill in the literature gap, this paper investigates the implications of WTO accession on the pharmaceuticals industry in China. This paper focuses on the differences of production and R&D capabilities between the Chinese pharmaceuticals industry and the global giants as well as the development strategy for the Chinese pharmaceuticals industry. While the actual effects of the WTO accession on the Chinese pharmaceuticals industry is still uncertain, the preliminary assessment based on existing information can still shed light on the level of competition that the Chinese drug companies will encounter in the near future. This has tremendous implications on the direction of future policy implemented by the State Drug Administration (SDA) in China. For instance, should the Chinese pharmaceuticals industry maintaining their 'to conquer the world strategy'? How long can the competitive advantages of Chinese pharmaceuticals industry on herbal medicine over their global giant's counterparts sustained? What development strategy should the Chinese pharmaceuticals industry pursue after the WTO accession? It must be emphasised that the focus of this paper is on pharmaceuticals (generic and patented drugs). Other consumer healthcare products that are included in the product portfolios of pharmaceutical companies (e.g. Johnson & Johnson) will not be analysed.

The background and the possible impacts of the WTO accession on the Chinese pharmaceuticals industry will be presented and assessed in sections 2-3.

55-74; S. White and X. L. Liu, 'Organizational Processes to meet New Performance Criteria: Chinese Pharmaceutical Firms in Transition', *Research Policy* 27 (4), pp. 369-383.

⁷ Peter Nolan, Xiaoqiang Wang and Godfrey Yeung, *Globalisation, Industrial Concentration and Catch-up in Pharmaceuticals: The Case of China's Sanjiu Group*, (Sino-Indian Liberalisation Research Project Discussion Paper No. 5, Sidney Sussex College, Cambridge, England, 1998).

⁸ Yuming Chen, *Zhongguo jiaru WTO ge hangye qianjing fenxi [The Prospects of Chinese Industries after the WTO Accession]* (Beijing: Economic Daily Publishing House, 2000); Yongding Yu, Bingwen Zheng and Hong Song, eds, *Zhongguo rushi yanjiu baogao: Jinru WTO de zhongguo chanye [Research Reports on the WTO Accession of China: The Analysis of Chinese Industries]* (Beijing: Social Sciences Documentation Publishing House, 2000).

Before concluding the major findings of this paper in section 5, three development strategies for the Chinese pharmaceuticals industry will be outlined in section 4.

2 Background of the Chinese Pharmaceuticals Industry

China is an important pharmaceuticals market. At US\$13.24 billion in 2000, the total value of pharmaceutical sales accounted for about one-third of the East Asian market outside Japan.⁹ It was the same size as the combined markets of Malaysia, the Philippines, Thailand and Indonesia, and was more than double that of India.¹⁰ From the early 1980s to the mid-1990s, output of both Western and traditional Chinese medicines increased more than fourfold.¹¹

Despite the fast growth of output and consumption, per capita pharmaceuticals consumption in China was still small in international terms. In 1995, it was less than US\$3/person, compared to US\$132/person in the UK, US\$334/person in the US and US\$488/person in Japan.¹² It was also much smaller than in neighbouring East Asian developing countries, where the comparable figures were US\$13/person in Malaysia, US\$16/person in the Philippines, US\$47/person in Hong Kong and US\$75/person in Taiwan.¹³ It is expected that the Chinese market will grow from the world's ninth largest to one of the largest in the world. Not only will demand rise due to increases in incomes, but also China is likely to have a rapidly ageing population in the next century, which will tend to boost demand for pharmaceuticals even further.¹⁴

⁹ *South China Morning Post*, (28 June 2001).

¹⁰ Morgan Stanley Dean Writer, *The Asian Edge: A Closer Look*, (29 May 1998), p. 151.

¹¹ State Statistical Bureau, *Zhongguo tongji nianjian* [*China Statistical Yearbook*] (Beijing: China Statistical Publishing House, 1981 to 1995 issues)

¹² The per capita pharmaceuticals consumption in China increased to US\$5.5 a year in 2000; see *South China Morning Post*, (15 May 2001).

¹³ Morgan Stanley Dean Writer, *The Asian Edge: A Closer Look*, p. 151.

¹⁴ Western diets and western illness following the increase in wealth: infectious diseases are replaced by diseases of affluence, e.g. diabetes, asthma, cancer, heart conditions, obesity and depression. For the issues of ageing and medical care in China, see The International Bank for Reconstruction and Development, *Financing Health Care: Issues and Options for China*, (Washington, D. C.: The World Bank, 1997); The International Bank for Reconstruction and Development, *Old Age Security: Pension Reform in China*, (Washington, D. C.: The World Bank, 1997); H. Naci Mocan, Erdal Tekin and Jeffrey S. Zax, *The Demand for Medical Care in Urban China*, (NBER Working Paper Series 7637, April 2000), (<http://www.nber.org/papers/w7673>); T. Ping, 'On the Issues of Population Ageing and Population Control in China', *Social Sciences in China* XVIII(3), (1997), pp. 129-138.

2.1 Domestic liberalisation

China's pharmaceutical industry was under tight state control before the government allow competition to develop among suppliers since the mid-1980s. As controls were relaxed, the industry was able to earn relatively high profits.

However, even in the late 1990s, China's large, old-established state plants remained quite tightly controlled by the government, with production and sales 'tasks' for its main products. These plants mainly produce relatively capital-intensive upstream intermediate pharmaceuticals, especially off-patent antibiotics, which are then processed by smaller factories, as well as producing generic, low-margin final products, e.g. penicillin and aspirin. Many of these were on a downward spiral, with obsolete equipment, poor research facilities and a high debt-asset ratio. By contrast, manufacturers of traditional Chinese medicines and foreign-funded enterprises enjoyed much greater freedom to set prices.

Despite formal liberalisation, the *de facto* intervention in the market remained as a large fraction of pharmaceuticals are prescribed by hospitals, mostly run by the state. These are gradually moving towards financial autonomy. The proportion of healthcare costs, including medicines, that must be financed by the individuals employed in state institutions is rising, providing an incentive to source drugs from the lowest-cost source. In fact, the central government recently issued formal directives and informal instructions to hospitals and healthcare centres to buy local products. To combat the over-supply and its financial impact in the domestic pharmaceuticals industry, the Beijing government banned the imports of ten drugs, including Vitamin C and penicillin, in 1999.¹⁵ To reduce the widespread over-prescription abuses that drove up pharmaceutical spending to more than 60% of total health care costs, the government introduced a multi-faceted price control system on imported drugs and those manufactured by Sino-foreign joint ventures (JVs).¹⁶ The price ceiling would be fixed after the authority compared the quality and price of the import drug with the generic versions manufactured by domestic or other developing countries pharmaceuticals firms.

¹⁵ *South China Morning Post*, (6 February 1999).

¹⁶ The new system is introduced to replace the price capping system in place since 1996; see *Financial Times*, (1 June 2000), p. 13.

The State Development Planning Commission suggests that the profits for generic and patents drugs should be restricted at 10% and 25%, respectively.¹⁷

Alongside product market liberalisation, the pharmaceuticals sector gradually liberalised the structure of ownership, as emerging firms sought capital in the face of declining direct investment sources from the state. An important facet of this was raising funds on the stock market. By the end of 2000, there were about 60 pharmaceuticals corporations listed in the stock markets in Shenzhen, Shanghai and Hong Kong. For example, Shandong Xinhua was able to generate 280 million *yuan* of capital by listing its H-shares on the Hong Kong Stock Exchange in December 1996, while Sanjiu Medical and Pharmaceutical (a unit of Sanjiu Group) raised 1.67 billion *yuan* by listing its A-share (for domestic investors only) on the Shenzhen Stock Exchange in November 1999.¹⁸ M&A is becoming more common. One of the most important M&A deals is the merger of the Shandong Xinhua Pharmaceutical Group and the Shandong Lukang Pharmaceutical Group in 1999.¹⁹ The combined company, Shandong Xinhua Lukang Pharmaceutical Group, is controlled by Shandong provincial government. In 1998, the third largest Chinese drug company had a turnover of 3 billion *yuan*, profits of 300 million *yuan*, total assets of 4.1 billion *yuan* and 20,000 of employees.²⁰

2.2 International liberalisation

Foreign investment in the Chinese pharmaceuticals industry was permitted from early on in the reform process. By the mid-1990s, following the gradual liberalisation of the domestic industry, investment had increased to significant levels. By 1999, there was a total of about 1,800 pharmaceutical JVs.

¹⁷ *Financial Times*, (15 July 1999), p. IV and (1 June 2000), p. 13.

¹⁸ Editorial Board of China Pharmaceutical Yearbook, *Zhongguo yiyao nianjian 1998* [*China Pharmaceutical Yearbook 1998*] (Beijing: China Pharmaceutical Technology Publication, 1998), p. 260; *Financial Times*, (2 November 1999), p. 34.

¹⁹ Shandong Xinhua mainly engage in developing and manufacturing of bulk pharmaceuticals, which include antipyretic and analgesic medicines (mainly analgin, aspirin, aminopyrine and ibuprofen), antiseptic medicines (pipemidic acid), central nervous system medicine (caffeine) and cerebrovascular medicines (nimodipine). Shandong Xinhua is the largest producer of antipyretic and analgesic drugs in China.

²⁰ *South China Morning Post*, (1 January 1999).

Most (20 out of the biggest 25) of the world's top pharmaceutical companies set up JVs in China. Bristol-Myers Squibb's JV in Shanghai (Shanghai Shiguibao) was set up in the mid-1980s, and by 1996, it claimed to account for 20% of the Chinese vitamin market and 80% of the Chinese multi-vitamin market. By 1997, SmithKline Beecham's JV in Tianjin (Tianjin SmithKline) had become one of China's top ten pharmaceutical companies by value of sales, and a large JV with US\$100 million investment was due to be opened in Shanghai in 1999 (Table 1). Janssen (Belgium) set up a large JV in Xian (Xian Yangseng) in the mid-1980s which had grown to be the fourth largest pharmaceuticals company in China by 1997. Glaxo-Wellcome invested US\$124 million in Suzhou to produce anti-hepatitis B tablets (lamivudine), a drug developed and designed for the Chinese market, after securing a Class 1 drug certification with an eight-year exclusive manufacturing right in China.²¹ JVs were also set up by Schering Plough and Johnson & Johnson in Shanghai, Merck in Hangzhou and Eli Lilly in Suzhou. By 1997, it was estimated that Western medicines accounted for around 60% of the total value of medicines consumed in major cities.²²

INSERT TABLE 1 ABOUT HERE

The multinationals brought technology and new standards of management to the Chinese pharmaceuticals industry. They also brought a portfolio of high-margin patented drugs, e.g. lamivudine. From 1993 onwards, China basically applied internationally recognised practice in respect to intellectual property rights (IPRs) for pharmaceuticals patented in other countries, protecting the company concerned from cloning of the product by local producers. The leading JVs, such as Xian Janssen and Tianjin SmithKline, were able to generate much greater total profits than their leading indigenous competitors, and dramatically higher ratios of profits to sales and assets, e.g. Tianjin SmithKline recorded a profits-sales ratio of 63%, which was at least 20% higher than the other nine top pharmaceutical corporations in China in 1997 (Table 1).

²¹ *South China Morning Post*, (9 January 1999 and 15 April 1999). It is estimated that there are 120 million hepatitis B carriers in China and 10% of them may develop chronic hepatitis B. The wholly foreign-owned Suzhou plant also used to manufacture antibiotics currently made in the UK and sold in China. The plant can be used by Glaxo-Wellcome to side-step the "buy local" directives; see *Financial Times*, (15 July 1999), p. IV.

²² *China Daily: Business Weekly*, (14 December 1997).

2.3 Industrial structure

Under the command economy, the largest pharmaceutical manufacturers were the traditional state producers of Western medicines, mainly antibiotics. The largest of these were the Huabei plant at Shijiazhuang and the Dongbei plant in Shenyang, with over 7,000 employees each.

In the emerging market economy, entities with the characteristics of a genuine 'firm' began to take shape. The relatively large profits obtained in the sector led to a wave of new plants being established across the country. In 1987, there were over 2,600 enterprises producing medical and pharmaceutical products, with almost 700,000 employees.²³ By 1997, the number of pharmaceutical enterprises in China had risen to 3,411, an extraordinarily large number for a market of China's size.²⁴ There were almost 3,000 tiny labour-intensive, handicraft enterprises, producing a single product under primitive conditions, without benefit from economies of sale or scope. These accounted for about 80% of the total number of enterprises in the Chinese pharmaceuticals industry, but for only 15% of the industry's total output value.²⁵ Indeed, in 1997, each of the enterprise size groups of below 30 million *yuan* (roughly US\$3.7 million) per annum made losses (Table 2).

INSERT TABLE 2 ABOUT HERE

The vast bulk of the industry's profits were generated by the largest enterprises, which increasingly benefited from economies of scale and scope, with better technology and quality control, more modern management systems, brand names and growing marketing systems. In 1997, enterprises with annual sales of over 100 million *yuan* (around US\$12 million) accounted for around one-half of the pharmaceutical industry's fixed assets, two-thirds of its sales value and the sectors' value-added (Table 2). However, within the largest size group of pharmaceutical firms, the firm-level concentration was still low. In 1997, the top

²³ State Statistical Bureau, *Zhongguo tongji nianjian 1988*, p. 298.

²⁴ In 1998, there were 6,391 drug companies (including 1,790 JVs) in China, with a total production value of 163 billion *yuan*. The industrial profits on sales averaged 5.91% and the industrial profit-assets ratio was 5.52% (down from 20.38% in 1991); see *South China Morning Post*, (1 November 1999).

ten and twenty firms had a total market share of just 16% and 22%, respectively (Table 1). In the international market, the corresponding market shares of the top ten and twenty firms were 36% (pro-forma 43% in 1998) and 56%, respectively.²⁶ Sales and profits of the leading firms were tiny compared to the global industry. In 1997, China's top ten pharmaceutical firms had an average annual sales of only around US\$207 million and an average annual pre-tax profits of around US\$45 million. At US\$28 billion in 1999, the pro-forma sales value of Pfizer-Warner-Lambert was double the amount of the total sales value (about US\$13 billion) of the whole Chinese pharmaceuticals industry!²⁷ The world best selling drug, Losec (for anti-ulcer), manufactured and marketed by AstraZeneca reached US\$5.6 billion in 1999.²⁸ This is 175% higher than the sales value of the top twenty pharmaceuticals corporations (US\$3.2 billion) in China in 1997! The pro-forma pre-tax profits of Glaxo-SmithKline reached more than US\$7.8 billion in 1999, which was more than four times higher than the corresponding figure recorded in the entire Chinese pharmaceuticals industry in 1997!²⁹ Undeniably, the gap in terms of the absolute value of sales and pre-tax profits between the Chinese pharmaceuticals industry and the global giants is insurmountable in the near future.

3 The WTO Accession: David Vs Goliath?

According to the WTO accord signed in November 2001, the major areas of liberalisation relating to the Chinese pharmaceuticals industry are as follows:³⁰

- Import tariffs will be reduced by about 60%, from an average of 9.6% to 4.2%, before 1 January 2003.
- Chinese quotas and other quantitative restrictions will grow from the current trade level at 15% per annum and to be phase-out no later than 2005.

²⁵ Editorial Board of China Pharmaceutical Yearbook, *Zhongguo yiyao nianjian 1998*, pp. 398-422.

²⁶ *Financial Times*, (4 February 2000), p. 28; IMS, *The Pharmaceutical Market World Review 1997*, (1997) (<http://www.imshealth.com>).

²⁷ *Financial Times*, (20 January 2000), p. 28 and (8 February 2000), p. 34.

²⁸ *Financial Times*, (23 November 1999), p. 35 and (7 December 1999), p. 28.

²⁹ *Financial Times*, (17 January 2000), p. 18 and (18 January 2000), p. 23.

³⁰ White House, *White House Factsheets: Pharmaceuticals*, (2000) (<http://www.uschina.org/public/wto/factsheets/pharmacy.html>); Ministry of Foreign Trade and

- China will provide comprehensive trading (import and export) and distribution (wholesaling, retailing, transportation, etc., including the provision of services and the goods made in China) rights to foreign-financed firms for the first time. Trading and distribution rights will be phased in progressively over three years.
- China will eliminate and cease enforcing contractual requirements on trade and foreign exchange balancing, and local contents upon the WTO accession.
- China will only impose and enforce laws or other provisions relating to the transfer of technology or other know-how, if they are in accordance with the WTO agreements on the protection of IPRs and trade-related investment measures.
- China will ensure that the sales and purchases of state-owned enterprises (SOEs) and state-invested enterprises (SIEs) are based solely on commercial considerations, such as price, quality and marketability, rather than 'government procurement'. Moreover, the SOEs and SIEs are under the WTO Agreement on Subsidies and Countervailing Measures, e.g. no export subsidies.
- The US will be allowed to keep its anti-dumping methodology (regarding China as a non-market economy) for 15 years after the WTO accession.

Apart from the tariffs reduction, quotas elimination and IPRs protection, the foreign-financed firms have for the first time been granted trade and distribution rights in China. To gauge the possible impact of these trade liberalisation measures on the Chinese pharmaceuticals industry, two important questions are asked. Without the government subsidiary and various forms of administrative protection, will the existing comparative advantages of Chinese pharmaceuticals industry in the domestic market be maintained? In other words, can the Chinese pharmaceuticals industry maintain their domestic market share? Will the Chinese pharmaceuticals industry be competitive globally before the market is fully liberalised within the next three to five years? In other words, will the WTO accession of China generate golden opportunities or be a deadly blow to the Chinese pharmaceuticals industry?

To answer the above questions, the competitive advantages of Chinese pharmaceuticals industry is analysed from two benchmarks: (1) R&D capability and product portfolio, and (2) production capability and market share.

3.1 R&D capability & product portfolio

As one of the ‘strategic industries’, China’s goal is to be **‘one of the world’s pharmaceutical giants by the middle of the next century’**.³¹ To achieve this aim, China recognises that it must develop its own R&D capabilities in order to produce patent drugs to compete in the international market. The central government promised that it would support R&D in the sector through research conducted at the China Administrative Centre for New Drug Research and Development, under the SDA.

In terms of R&D capability, the Chinese pharmaceutical firms are not only miles behind the global giants, but also well behind their Japanese counterparts, who are using herbal ingredients in their products. Between 1985 and 1998, only 62 out of 1,500 new medicines developed in China met international standards and merely **two** were original products with a unique chemical structure.³² Moreover, not a single Chinese chemical drug had achieved an international patent. For chemical drugs, the fact is that the R&D budget of a mediocre Japanese company is higher than that for the whole Chinese pharmaceuticals industry. For instance, the whole Chinese pharmaceuticals industry spent one billion *yuan* (about US\$121 million) on R&D in 1998, which is even lower than the US\$134 million spent by Ono Pharmaceutical (Japan), which ranked 74th in the international R&D league.³³ The R&D expenditure of the entire Chinese pharmaceuticals industry is about 3.4% of the US\$3.59 billion spent by Aventis and 4.8% of the US\$2.5 billion spent by Merck (the top R&D spender before the formation of Glaxo-SmithKline and Pfizer in 2000-2001). With an average R&D intensity (ratio of R&D expenditure to the sales value) of less than 1%, the Chinese pharmaceuticals industry also spend much less proportionally than the

³¹ *China Daily: Business Weekly*, (14 December 1997).

³² *Financial Times*, (15 July 1999), p. IV; *South China Morning Post*, (1 November 1999).

³³ It must be emphasised that the inter-country comparison of R&D capability is suffered from the drawbacks of fluctuation on currency exchange rate and the differences on real costs (productivity)

global giants. In a stark contrast, the global giants spend an average 10-19% of its revenues on R&D.³⁴ The R&D gap between the global giants and the Chinese pharmaceuticals industry can be further illustrated by the comparison of the R&D expenditure of the former and the sale value of the latter. In 1997, the total sale value of the entire Chinese pharmaceuticals industry was about US\$14.1 billion, which is even lower than the US\$16.57 billion spent by the top 10 global giants on R&D (Table 3). In fact, the total sale value of Chinese pharmaceuticals industry accounted for only about 26% of the total R&D expenditure spent by the major Western pharmaceutical corporations. In the late 1990s, the discovering and development costs of a new drug is estimated to be about US\$500-600 million and the estimated minimum level of R&D investment necessary for a global drug company to remain competitive ranges between US\$1.5-2 billion per annum.³⁵ As a result of focusing their huge R&D budgets on a few selected areas, the emerging patterns of sectoral global dominance is clearly illustrated by the therapeutic market share of the global giants. In terms of market share, Glaxo-SmithKline ranked first in three therapeutic categories (anti-infective, respiratory, and antibiotics and vaccines) and second in another two therapeutic categories (central nervous system, and alimentary and metabolic) in 1998.³⁶ Moreover, it is a world leader in automated combinatorial chemistry, genomics, bioinformatics and DNA microchips. AstraZeneca is a world leader in gastro-intestinal (including ulcers), cardiovascular, cancer and oncology.³⁷ Obviously, the gap in R&D capabilities

of R&D scientists. Given the lack of alternative benchmark, however, the R&D expenditure is used as the 'second best' indicator to illustrate the R&D capability.

³⁴ *South China Morning Post*, (1 November 1999); Department of Trade and Industry, *The UK R&D Scoreboard 1999*, (Innovation Unit, DTI, UK Government, 1999) (<http://www.dti.gov.uk/finance>).

³⁵ *Financial Times*, (16 March 1998), p. 5 and (15 March 1999); Centre for Medicines Research, *CMR International 1998 Annual Report*, (1999) (<http://www.cmr.org/1998/8.htm>). From 1994 to 1998 alone, annual R&D expenditure for the top ten pharmaceutical companies rose from US\$9.8 billion to US\$17.5 billion, an annual rate of increase of 16%.

³⁶ *Financial Times*, (18 January 2000), p. 23.

³⁷ Despite the fact that the R&D expenditure has quadrupled in real terms during the last two decades, the number of innovative new products surviving the toxicology testing and clinical trials has actually decreased from 60 per annum in the mid-1980s to about 4 per annum. A top-tier pharmaceutical company is only able to introduce a new drug once every 27 months on average. Andersen Consulting estimates that, in order to sustain the average 10% growth per annum in the industry, the top ten pharmaceutical companies will each have to launch five important new drugs a year with annual sales of US\$350 million for each product. However, none of them has such a strong pipeline. The ten leading companies were each able to launch an average of only 0.45 new drugs per annum between 1990 and 1994 and only 8% of those new products had sales value of US\$350 million. Moreover, the patents of 100 medicines, with annual sales of US\$35 billion, will

between the global giants and the Chinese counterparts is simple insurmountable in the near future.

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As the R&D expenditure of the Chinese pharmaceuticals industry accounts for only about 20% of the discovering and developing costs of a new drug in the West, it is no longer surprising that not a single Chinese chemical drug has obtained an international patent. The lack of R&D capability in the Chinese pharmaceuticals industry also partly explains why the parallel imports, localisation (herbal versions of the patented drugs, which claimed to have the same effects) and other forms of blatant violation of IPRs, especially the violation of brands and patent infringements (from local imitations of the drugs to cheap copies of packaging containing only a placebo) are not uncommon in China. Likewise, it is no surprise that some small-scale drug companies take the cheap option in producing imitated products. The lack of communication between the complex web of ministries, government departments, bureaux and agencies responsible for managing and policing the industry also facilitates the IPRs violation. The classical case of violation of IPRs is Vigara. Although without the government approval, all forms of Vigara, either via smuggled imports or local imitations, were on sales in China just weeks after Pfizer launched its patented version.³⁸ This explains why the global giants have only a 25% of market share in China, one of the lowest penetration rates in Asia.³⁹

As part of an effort to join the WTO, the Chinese government has implemented a series of reforms to strengthen the protection of IPRs. In 1998, the restructuring of bureaucracy is expected to clarify the lines of control over the industry and improve the protection of brands and patents for drugs. The State Economic and Trade Commission (SETC) was re-launched to be responsible for the administration of pharmaceutical companies, while the newly established SDA (formally known as the State Pharmaceutical Supervision Administration) supervises

expire between 2000 and 2002. See *Financial Times*, (16 March 1998), p. 2 and (28 October 1999), p. VII.

³⁸ In 2000, the Chinese authority eventually allowed Pfizer to sell Vigara in China after almost two years of clinical trial.

³⁹ *Financial Times*, (15 July 1999), p. IV.

research, production, distribution and use of pharmaceuticals. The Ministry of Health will oversee all hospitals and healthcare centres. But the long-term effects of such restructuring on the industry are still unknown since the restructuring of the local drug administration bureaux (which normally have close ties to local drug companies and hospitals) is still underway. Nonetheless, there are some significant improvements on the implementation of IPRs in China. For instance, Beijing has banned the best-known mainland version of the Viagra, made by Shenyang Feilong Health Products.⁴⁰

The R&D in the pharmaceuticals industry is a long-term and risky investment. The restriction of government subsidies on SOEs and SIEs after the WTO accession will certainly limit the channels of funding for the pharmaceuticals industry. As they are subjected to hard-budget constraints, the R&D budgets must be sourced from internal capital. Worse still, the Chinese banking sector is not keen to provide credit for R&D. Without the capital to conduct R&D on Western drugs, the Chinese pharmaceuticals industry is likely to be confined in the vicious circle of low value-added generic drug production and low profit-margin businesses.

3.2 Production capability & market share

The Chinese pharmaceuticals industry is well behind the global giants in production capability, especially in high value-added drugs and quality control. In terms of production value, the largest Chinese pharmaceutical firm, Huabei, had output value of 3.54 billion *yuan* (about US\$428 million) in 1998, which is about 2.5% of the prescription drug sales of Merck.⁴¹ The entire Chinese pharmaceuticals industry produced 163 billion *yuan* (about US\$19.69 billion) of drugs and healthcare products in 1998, which is about US\$9 billion smaller than the US\$28 billion recorded in Glaxo-SmithKline.⁴² In fact, the production value of the whole Chinese pharmaceuticals industry is not much higher than the US\$17 billion of prescription drug sales of Merck.⁴³ Similar pattern appeared in the sale value, where the total sale value (including sales of non-prescript drugs) of the entire Chinese pharmaceuticals industry was only 16% of the prescription drug

⁴⁰ *Financial Times*, (15 July 1999), p. IV.

⁴¹ *South China Morning Post*, (1 November 1999).

⁴² *Financial Times*, (18 January 2000), p. 23.

sales recorded by the top 10 global giants in 1997 (Table 3). For individual corporation, there is not a single Chinese pharmaceutical corporation recorded a sale value higher than 3.5% of their global giant's counterparts in 1997. With the multi-billion dollars mega-mergers undertaking in the pharmaceuticals industry since 1997, the absolute gap in production capability between the global giants and the Chinese players is widening all the time. Apart from manufacturing low value-added generic drugs, the poor quality control of the Chinese pharmaceuticals industry in general also prevents a large proportion of their output being exported.⁴⁴ This partially explains the low production value of the industry. As it can cost up to 50 million *yuan* to upgrade the facilities, industrial analysts expected that about one-third of Chinese pharmaceutical firms could close for failing to meet the internationally recognised Good Manufacturing Practice (GMP) standard by the 2004 deadline.⁴⁵

In China, the distribution of medicine is largely monopolised by the 16,000 state-owned wholesales outlets at various level all over the country. However, the overwhelming majority of them are too small to enjoy the economies of scales as less than 400 of them have annual sales of over 20 million *yuan*. Their average profit-margin was below one percent in 1999 and about half of them recorded severe losses. To address the existing inefficient and antiquated distribution system, the Pharmaceuticals Department under the SETC is planning to allow private entrepreneurs and foreign investors to invest in the medicine distribution sector by forming joint-stock or limited companies by 2003. In fact, at least five Chinese pharmaceutical firms have signed contracts or letters of intent to establish Sino-foreign joint-chain stores, e.g. U.S.'s Wal-Mart and Chinese Associated Guangzhou Pharmaceutical are co-operating retailing in Shenzhen. The Pharmaceuticals Department is also planning to reduce the number of wholesales outlets dramatically to between 45 and 50 over the next five years through M&As.⁴⁶

⁴³ *Financial Times*, (4 November 1999), p. 32.

⁴⁴ The poor capability of quality control is especially pronounced among the army of small-scale pharmaceutical firms scattered all over China.

⁴⁵ *South China Morning Post*, (3 August 2000).

⁴⁶ *South China Morning Post*, (11 July 2000, 3 August 2000, 8 September 2000 and 27 November 2001).

Although the global giants may still only account for 25% of the Chinese drug market, their rate of market penetration is rising rapidly. If the market share of foreign-financed JVs is included, it is estimated that the global giants account for about one-third of the Chinese drug markets.⁴⁷ The global pharmaceuticals giants spent an astonishing 20% of their sales value on the marketing.⁴⁸ With much deeper pockets on marketing and sales, the global giants can establish their distribution channels on their own and/or through acquisitions in China by 2003. The recent government measures to separate hospitals and dispensaries, allowing patients to buy prescriptions at retail outlets of their own choosing, further open the market to foreign-financed drug distributors.⁴⁹

The market of Chinese herbal drugs is basically monopolised by the locally-funded firms. This pattern is expected to be continued, at least in the short to medium-terms. China has a long history of experience in classifying and 'testing' traditional medicines. Unlike Western patented medicines, the development of the bulk of these products were attributable mainly to the knowledge accumulated over centuries by unknown practitioners of traditional Chinese medicine, and cannot be patented under either Chinese or international law. By 1997, there were 1,013 enterprises producing traditional medicines, compared to 1,544 producing Western medicines.⁵⁰ The two sectors have very different economic characteristics. The unit value of Western medicines was far higher than for Chinese medicines. In 1997, Western medicines accounted for 68% of the pharmaceuticals industry's fixed assets, 63% of the sector's total sales value and 47% of its total profits (Table 2). Despite the absence of patents for most products, many of the most successful Chinese medicines are able to command premium prices. In 1997, Chinese traditional medicine enterprises accounted for only 18% of the sector's fixed assets and 22% of the sector's sales value, but they accounted for 30-38% of the sector's value-added and net profits. Moreover, Chinese medicines achieved a ratio of profits to sales of 10.57% compared to 4.54% for Western medicines, and a ratio of profits to fixed assets of 18.47% compared to 6.19% for Western medicines. The largest size group of

⁴⁷ *South China Morning Post*, (1 November 1999).

⁴⁸ *Financial Times*, (21 June 2000), p. 24.

⁴⁹ *South China Morning Post*, (3 August 2000).

traditional Chinese medicine producers achieved a ratio of profits to sales of 17.16%, and a ratio of profits to fixed assets of 45.25%. Partly due to the lower required investment in R&D, Chinese medicine manufacturers are able to earn profits even though they operate at a smaller scale than chemical pharmaceuticals manufacturers. For instance, Chinese medicine firms with gross output value of 10-30 million *yuan* are profitable, while chemical pharmaceuticals firms are only profitable with gross output value of 30-50 million *yuan*.

With the Goliath (global giants) growing day-by-day, while David (the Chinese firms) remains under-nurtured, it is likely that the gap of R&D and production capabilities on chemical drugs between them will only be increased. The fact is that David is chasing a moving rather than a static target! The Chinese herbal drug is probably the only category in which the Chinese pharmaceuticals industry has potential international competitive advantages in the short- to medium-term.

4 Development Strategies for the Chinese Pharmaceuticals Industry

From above, it is obviously that the Chinese pharmaceuticals industry is unable to compete head-on with the global giants on Western drugs. Given the competitive advantages of the Chinese pharmaceuticals industry on Chinese drugs, three short and long-term development strategies are suggested: (1) consolidate the local market of herbal and generic drugs, (2) market Chinese drugs via the Internet, and (3) outsource R&D and collaborative marketing.

4.1 Consolidate the local market of herbal & generic drugs

The sales value of western drugs has grown by 10-12% per annum since 1997 and the value of the Chinese pharmaceuticals market is expected to exceed US\$10 billion in 2000.⁵¹ The Chinese market is still much smaller than the US\$46 billion recorded in Japan and US\$89 billion recorded in the US, but it is as big as

⁵⁰ Editorial Board of China Pharmaceutical Yearbook, *Zhongguo yiyao nianjian 1998*, pp. 398-399.

⁵¹ *Financial Times*, (15 July 2000), p. IV.

the Italian and British markets in 1999.⁵² If the Chinese pharmaceuticals industry can accelerate the long overdue consolidation (via M&As and closing down thousands of poorly equipped and non-profitable small drugs firms which produce one to two products) and maintain their existing market share of 75% after the WTO accession, this is equivalent to about US\$10 billion in 2000. As China is likely to be one of the world biggest drug markets in the future, there is still plenty of prospect for further growth for the Chinese pharmaceuticals industry.

The deteriorating market share of the Chinese pharmaceuticals industry on the global natural drugs scene illustrates the urgency of consolidation. In 1998-2000, the Chinese pharmaceuticals industry accounted for a mere 3-5% of the US\$15-16 billion of global market on herbal drugs (the market is about US\$30 billion if natural cosmetics, health foods and flavouring are included). Despite centuries of experience in the application of herbal medicines, the Chinese pharmaceuticals industry is not only well behind the international leaders on herbal drugs, such as Japan, Taiwan and South Korea, but also behind Singapore, Indonesia and Thailand as most of the Chinese products failed to meet international quality standards.⁵³ In stark contrast, US companies account for about 50% of the global drugs market (Asian firms account for less than 10% of the market). The US-based Metabolife will spend US\$11 million in the next three years on marketing its Chinese herbal products in China.⁵⁴ Undeniably, the competitive advantage of the Chinese pharmaceuticals industry with regard to herbal drugs, the only area in which it can be competitive internationally, is slipping away quickly. There is simply no room for complacency!

Given the high growth rate of the Chinese drug market, it is not implausible that the global giants will move into the manufacturing and distribution of herbal drugs in the near future. Given the fact that there is no international patent protection on herbal drugs and their strong R&D capabilities, the global giants can easily enter the Chinese drug market shortly through

⁵² IMS, *IMS Health Drug Monitor*, (2000) (<http://www.imshealth.com>).

⁵³ China mainly exports raw herbs, which are in turn processed by importing countries and marketed as higher value-added herbal drugs; see *South China Morning Post*, (1 November 1999 and 10 May 2001).

⁵⁴ Mark Mitchell, 'Tradition at Risk', *Far Eastern Economic Review* 163(29), (20 July 2000), p. 37.

‘reverse-chemical-engineering’ and/or the transfer of know-how via JVs with Chinese firms.⁵⁵ Once the global giants establish their manufacturing and distribution networks, it is not inconceivable that they can ‘beat the Chinese pharmaceutical firms at their own games’! Therefore, it is plausible that the first priority of the Chinese pharmaceuticals industry is to consolidate the domestic market of herbal and generic drugs, before the ‘reverse-engineering’ by the Western giants, rather than by trying to conquer the global market prematurely.⁵⁶ Getting the priority wrong, as with the exiting ‘to conquer the world’ strategy, the Chinese pharmaceuticals industry may ended up **losing both of the domestic and international markets of herbal and chemical drugs.**

4.2 Market alternative remedies via IT

The argument on consolidation of local market does not imply that the Chinese pharmaceuticals industry should not look at the overseas markets. It is merely argued that the Chinese pharmaceuticals industry should consolidate the local market first, before diverting their scarce resources to develop the overseas markets.

With the advancement of information technology, it is suggested that the Chinese pharmaceuticals industry can not only utilise the technology to reduce R&D costs, but can also market alternative remedies (including Chinese drugs) on the Internet. As all packaged Chinese medicines are sold as dietary supplementary (which do not require regulatory approvals or proof of efficacy in most countries), marketing (based on consumers’ belief) is the key to success.⁵⁷ With the support from the Chinese pharmaceuticals industry, the SDA can co-ordinate the effort and set up an official website.⁵⁸ The proposed multi-lingual interactive website is a

⁵⁵ The decision by the US’s National Institute of Health to spend US\$50 million per annum in the research of efficacy of traditional Chinese medicine is one of the signals that the West is preparing to enter the Chinese market; see Mark Mitchell, ‘Tradition at Risk’, *Far Eastern Economic Review*, p. 37.

⁵⁶ Recently, Sanjiu and Wanji Pharmaceutical planned to open up to 10,000 chain-store pharmacies each in China within the next five years is apparently one of the important strategic moves to consolidate their market shares in China; see *South China Morning Post*, (28 June 2001).

⁵⁷ Mark Mitchell, ‘Tradition at Risk’, *Far Eastern Economic Review*, p. 38.

⁵⁸ There are a number of websites offering medical information in China. However, they are not organised and some of them contain misinformation. At the moment, the most authoritative one may be the forthcoming website (PRC-medical.com) set up by a Hong Kong-based Internet service provider, Speednet Communications, Bozhou government of Anhui province and the China Centre

‘one-stop’ online healthcare provider for customers (patients and hospitals), medicinal practitioners (including doctors), pharmaceutical providers (including drugs manufacturers, distributors and suppliers) and other relevant institutes (such as medicinal insurance companies) of Chinese medicine: it provides authoritative and up-to-date information about alternative remedies and herbal medicines, on-line diagnosis, on-line pharmacy backed up with mail-order service on ‘certified herbal drugs’ (i.e. no fake or intimated drugs), offer visitors’ subscriptions to e-mail updates on their areas of interests, discussion forums and web-links to the participating Chinese pharmaceutical companies, etc. Moreover, it can improve the acceptance of Chinese drugs in the Western societies as this can dispel the mysteries and misinformation of such treatments.⁵⁹ Without the need to establish a distribution channel and all the associated overhead costs, this application of information technology is a cost-effective way to pave the way to enter the Western market via brand name establishment and marketing.

The market potential of on-line healthcare provider is increasingly realised by analysts. However, a number of big pharmaceutical websites are not well developed, providing only static or even out of date information, e.g. www.bayer.com contains information on a suspected trial for lung cancer.⁶⁰ Therefore, there is still a virgin market on the internet to be conquered by Chinese pharmaceuticals industry.

4.3 Sub-contracting of R&D & collaborative marketing

To be approved by the regulatory authority, every new drug must undergo a series of expensive clinical trials. To improve the cost effectiveness of new drug

for International Pharmaceutical Exchange. Speednet invests 100 million *yuan* to build a database of 600 types of popular Chinese medicines and 300 lesser-known treatments and an on-line market information and order system; see *South China Morning Post*, (19 January 2000). The other websites, such as Medicinechina.com, JK123.com and Daoyi.com, contain only information on simplified versions in Chinese and is intended for people living in the mainland only. Sanjiu and several leading Chinese pharmaceutical firms are planning to establish a global on-line network for diagnosis and prescriptions. Sanjiu also interested in being the project leader of the proposed Chinese medicine centre in Hong Kong, with an investment of about US\$2.3 billion; see *South China Morning Post*, (2 August 2000).

⁵⁹ The lack of authoritative and self-monitoring organisation on alternative remedies is one of the biggest obstacles to gain acceptance in the Western societies, e.g. almost no medical insurance company in the West recognises the benefits of alternative remedies and allows their policy-holders to claim consultation fees.

⁶⁰ *Financial Times*, (3 February 2000), p. 13 and (21 June 2000), p. 24.

research and shorten the time-lag of the development cycles, more and more big pharmaceutical companies sub-contract the research and clinical trials of new drugs to biotechnology companies or contract research organisations (CROs), e.g. Quintiles.⁶¹ The years of premium pricing enjoyed by patented drugs are over as every company is racing against time to push their products into the market, e.g. Merck's super-aspirin Vioxx followed Pfizer's Celebrex on to the market after just a few weeks. It is estimated that up to 25% of the research budgets of big pharmaceutical companies is spent on alliances with biotechnology companies offering compounds, projects or drug-discovering tools, creating a global market of US\$6.6 billion. To lower the overhead costs of new drugs introduction, especially in the US where salesforce with expertise on the product is essential, drug companies has employed collaborative marketing for years. Several Japanese drug companies take this strategy further by being 'pure research organisations' and out-sourced their manufacturing and overseas marketing.⁶²

Given the fact that Chinese pharmaceutical firms are unlikely to develop all-around R&D capability in the medium-term, outsourcing the R&D from western biotechnology companies is one of the ways to improve their pipelines within a shorter period of time. This strategy also allows Chinese pharmaceutical firms to concentrate their scarce capital on certain R&D areas that have competitive advantages.⁶³ In fact, the Chinese pharmaceuticals industry can enhance their competitive advantages through specialisation and division of labour, i.e. develop several 'pure research organisations' (as with their Japanese counterparts) to complement the major integrated large pharmaceuticals firms. It must be emphasised that the contracted out (out-sourcing) of R&D is not an alternative means to replace in-house R&D capability. In-house R&D capability is still required for the long-term development of drug companies, e.g. the knowledge to choose research projects with potential of success.

⁶¹ Other global giants, such as Johnson & Johnson and Warner-Lambert, acquired biotechnology companies to enhance their in-house R&D capabilities in five separate deals worth more than US\$15 billion in 1999; see *Financial Times*, (28 October 1999), p. I.

⁶² *Financial Times*, (15 July 1999), p. V.

⁶³ However, this outsourcing strategy demands a sustainable amount of foreign capital, in which most of the Chinese pharmaceutical firms does not have (partly due to foreign exchange control and the inconvertible of Chinese currency).

Chinese pharmaceutical firms can also consider being engaged in collaborative marketing with the global giants in the future, especially on globally marketable products. Through demonstration effects, Chinese pharmaceutical firms can learn the direct-to-customers (or consumer-oriented) marketing skills and the profit-sharing-based collaborative marketing scheme can be considered as the ‘tuition fees’ levied by the global giants. Therefore, the possibilities of such an arrangement should not be ruled out in the medium- to long-term.

5 Conclusions

With limited capabilities on R&D and global distribution channels as well as the virtual non-existence of patented drugs, the Chinese pharmaceuticals industry has little chance of entering the global market of Western prescription drugs and to compete with the established global giants head-on. The reality is that they are chasing a moving target and their competitors are becoming bigger and stronger every day. The substantial reduction of import tariffs and the granting of comprehensive trading and distribution rights to foreign-financed firms by 2003 effectively tilted the level-playing field against the Chinese pharmaceuticals industry, as the global giants can penetrate the Chinese market with all their available weapons, ranging from direct importation, manufacturing and distributing locally or through their exclusive global sourcing, marketing and distributing channels. Equipped with much deeper pockets and backed-up by much stronger R&D capabilities and product pipelines, it is only a matter of time before the global giants can overwhelm the Chinese pharmaceuticals market, provided that the SDA and the industry maintain their ‘to conquer the world’ strategy.

The grim reality is that there is not a single Chinese pharmaceutical firm with a R&D budget remotely capable of rival their Japanese counterparts, whose R&D budgets are already much lower than their Western counterparts. In fact, Japan has several pharmaceutical firms who are successfully manufacturing and marketing medicines with herbal ingredients, e.g. Takeda. Given the fact that the **Japanese pharmaceutical firms** already have a certain degree of knowledge on the usage of herbal medicines and equipped with a much stronger R&D team and

marketing personnel, it is argued that they (rather than the global giants) are the **major competitors** to Chinese pharmaceutical firms (even in the Chinese market). This is because the Chinese pharmaceutical firms have virtually no chance of overtaking the global giants in the near future, yet it is more realistic to regard the Japanese pharmaceutical firms as their competitive targets.

Even in herbal medicines, the only pharmaceutical (health care) product with which the Chinese pharmaceutical industry has competitive advantage over the Western giants, the long-term prospect is not as bright as assumed by the SDA. The lack of patent protection on herbal medicine means that any of the established giants in the West can form JVs or even take over local pharmaceutical plants and enter the market within a short period of time. It is possible that the Western giants can conquer a significant proportion of Chinese drugs in the coming decades. Several profitable large Chinese pharmaceutical firms, such as Sanjiu, can survive the competition through strengthening their product pipelines and market shares in China. However, the majority of small and medium-size pharmaceutical firms are likely to be either taken over, merged or their operations closed altogether. If the market of the Chinese medicine is profitable, with their powerful multi-billion budget on R&D, it is relatively easy for the Western giants to ‘reverse-engineering’ the chemical components of herbal medicine, mass manufacturing and then marketing under their brand names and distribution channels. Therefore, it is not inconceivable that the Western pharmaceutical giants can beat the Chinese counterparts in their own game.

If the above arguments hold any water, they also implicitly suggest that the existing business strategy (the so-called ‘national champion’ and ‘to conquer the world’) of the Chinese pharmaceuticals industry (including some large Chinese pharmaceutical firms, notably Sanjiu) is **intrinsically flawed**.⁶⁴ First, the objective to nurture its ‘national champions’ to become the world’s largest pharmaceutical firms is too naive. Even with central government support, the benchmark is too high and almost impossible for any Chinese pharmaceutical firm or even the whole industry to achieve under the present fiercely competitive business

⁶⁴ Apart from the establishment of 100 new franchised clinics in the US, Europe and Hong Kong between 2002 and 2004, Sanjiu is negotiate to acquire a pharmaceutical plant in the US as part of its overseas expansion moves; see *South China Morning Post*, (10 May 2001).

environment in the industry. Second, the priority of market domination is incorrect. They have to consolidate their own market locally before spending their scarce resources to develop overseas markets. It may be more cost-effective for them to divert the resources from the expansion of overseas markets to enhance their R&D capabilities, including the ‘Westernisation of herbal drug’ (herbal drug in pills or injection) and the possible application of herbal drugs on chronically illness (the areas where existing Western drugs have limited effectiveness). The Chinese pharmaceuticals industry can also outsource the R&D from Western biochemical firms to improve their pipelines and competitive advantages within a shorter period of time. The logic is simple and clear: the bigger the firm, the higher the investment and costlier the price of failure when the industry (firm) is non-competitive globally.

Furthermore, the intrinsic flaw of the existing business strategy of the Chinese pharmaceuticals industry also reveals similar and the equally flawed business strategy of big businesses implemented by the central Chinese government as ‘big’ may not be equivalent to economies of scale. Size *per se* is not the sufficient condition to success (or having competitive advantages over competitors). In capital-intensive (both human capital in terms of R&D capability and monetary capital) sectors where China has little prospect of catching-up with the global giants, including the pharmaceuticals, it is cost-efficient for the industry to focus on the niche market (such as the application of information technology on herbal medicine on marketing as mentioned above) rather than competing with the global giants head-on. Rather than improving their competitiveness, a head-on collision with the global giants is likely to crush the local pharmaceuticals industry completely!

Table 1: The Top 20 Pharmaceutical Corporations in China by Market Share, 1997

Pharmaceutical Corporations	Sales	Output	Pre-tax profits	Fixed assets	Market share	Sales/output	Profits/sales	Profits/fixed assets
	(in million yuan)							
Huabei (North China)	3,049	2,875	460	3,142	2.61%	106%	15.08%	14.63%
Jinan Sanzhu	2,536	2,333	514	267	2.17%	109%	20.26%	192.78%
Shenzhen Nanfang (Sanjiu)	2,055	2,065	445	657	1.76%	100%	21.68%	67.80%
Xian Yangseng (Janssen)	1,719	1,691	636	229	1.47%	102%	37.00%	277.71%
Beijing Tongrentang	1,715	447	130	540	1.47%	384%	7.59%	24.12%
Shanghai shi	1,701	554	61	206	1.46%	307%	3.57%	29.46%
Shandong Xinhua	1,576	1,087	172	838	1.35%	145%	10.89%	20.47%
Guangzhou Baiyunshan	1,380	1,201	59	502	1.18%	115%	4.27%	11.74%
Wuhan Gongtaokai	1,260	1,598	550	89	1.08%	79%	43.61%	618.45%
Tianjin SmithKline	1,111	1,243	704	308	0.95%	89%	63.38%	228.56%
Top 10:	18,101	15,094	3,730	6,777	15.52%	120%	20.61%	55.04%
Sichuan Taiji	1,059	727	44	252	0.91%	146%	4.11%	17.31%
Shandong Lukang	939	899	138	596	0.81%	104%	14.68%	23.12%
Harbin	935	951	80	607	0.80%	98%	8.54%	13.16%
Zhuhai Lizhu	908	686	146	713	0.78%	132%	16.12%	20.52%
Dongbei (Northeast)	877	773	n/a	1,299	0.75%	113%	n/a	n/a
Hebei	783	809	105	372	0.67%	97%	13.38%	28.14%
Shenzhen Ribaolaifu	705	735	74	n/a	0.60%	96%	10.55%	n/a
Shijiazhuang	700	605	44	481	0.60%	116%	6.34%	9.22%
Shanghai Shiguibao (Bristol-Myers Squibb)	642	837	66	252	0.55%	77%	10.35%	26.36%
Oumulong	538	443	n/a	83	0.46%	122%	n/a	n/a
Top 20:	26,187	22,558	4,428	11,431	22.45%	116%	16.91%	38.73%
China:	116,619	142,994	14,492	78,708	100%	82%	12.43%	18.41%

Source: compiled and calculated from Editorial Board of China Pharmaceutical Yearbook, *Zhongguo yiyao nianjian 1998*. [*China Pharmaceutical Yearbook 1998*] (Beijing: China Pharmaceutical Technology Publication, 1998), pp. 398, 410, 422 and 434-461.

Table 3: The Top 10 Pharmaceutical Corporations by Market Share and by R&D Expenditure, 1997

The Global Giants:				China:			
	Sales		R&D		Sales		
	(in million US\$)		(in million US\$)		(in million US\$) ^a	% of global giants' sales	% of global giants' R&D
Merck & Co., US	11,224	Novartis, Switzerland ^b	2,241	Huabei (North China)	368	3.28%	16.44%
Glaxo-Wellcome, UK ^b	10,980	Hoechst, Germany	1,964	Jinan Sanzhu	306	2.79%	15.60%
Novartis, Switzerland ^b	10,492	Johnson & Johnson, US	1,892	Shenzhen Nanfang (Sanjiu)	248	2.37%	13.12%
Bristol-Myers Squibb, US	9,028	Roche, Switzerland ^b	1,760	Xian Yangseng (Janssen)	208	2.30%	11.80%
Johnson & Johnson, US	8,540	Pfizer, US ^b	1,705	Beijing Tongrentang	207	2.43%	12.15%
Pfizer, US ^b	8,296	Glaxo-Wellcome, UK ^b	1,670	Shanghai shi	205	2.48%	12.30%
American Home Products, US	8,052	Merck, US	1,489	Shandong Xinhua	190	2.36%	12.79%
SmithKline Beecham, UK ^b	7,320	American Home Products, US	1,382	Guangzhou Baiyunshan	167	2.28%	12.06%
Hoechst, Germany	6,832	Rhône-Poulenc, French	1,251	Wuhan Gongtaokai	152	2.23%	12.17%
Eli Lilly, US	6,344	Bristol-Myers Squibb, US	1,222	Tianjin SmithKline	134	2.12%	10.99%
Top 10:	87,108		16,576		2,187	2.51%	13.19%
Total:	244,000		53,835		14,089	5.77%	26.17%

Sources: calculated from Department of Trade and Industry, *The UK R&D Scoreboard 1999* (Innovation Unit, DTI, UK Government, 1999) (<http://www.dti.gov.uk/finance>); Centre for Medicines Research, *CMR International 1998 Annual Report* (1999) (<http://www.cmr.org/1998/8.htm>); IMS, *The Pharmaceutical Market World Review 1997* (1997) (<http://www.imshealth.com>); Editorial Board of China Pharmaceutical Yearbook, *Zhongguo yiyao nianjian 1998*. [*China Pharmaceutical Yearbook 1998*] (Beijing: China Pharmaceutical Technology Publication, 1998)

Notes:

a: Estimated from the exchange rate of US\$1=8.2773 yuan

b: Glaxo-Wellcome and SmithKline Beecham merged and formed Glaxo-SmithKline in 2000, Pfizer merged with Warner-Lambert in 2000 and Novartis may merge with Roche after acquired 20% of its shares in 2001.

Table 2: Selected data on China's Pharmaceuticals Industry in China by Gross Output Value, 1997 (independent accounting enterprises)

Gross value of output (in yuan):	Sales value	Value-added	Net profits	Fixed assets	Profits/sales	Profits/fixed assets
	(in million yuan)					
500 thousands & below:	81	-128	-40	686	-49.38%	-5.83%
<i>Chemical pharmaceuticals</i>	16	-96	-66	345	-413%	-19.13%
<i>Chinese medicines</i>	31	-11	38	229	123%	16.59%
500 thousands – 1 million:	125	8	-76	512	-60.80%	-14.84%
<i>Chemical pharmaceuticals</i>	29	-2	-17	133	-58.62%	-12.78%
<i>Chinese medicines</i>	44	10	-32	155	-72.73%	-20.65%
1-5 millions:	1,997	649	-355	3,710	-17.78%	-9.57%
<i>Chemical pharmaceuticals</i>	712	167	-198	1,612	-27.81%	-12.28%
<i>Chinese medicines</i>	574	221	-99	950	-17.25%	-10.42%
5-10 millions:	3,606	1,193	-415	4,736	-11.51%	-8.76%
<i>Chemical pharmaceuticals</i>	1,543	420	-244	2,353	-15.81%	-10.37%
<i>Chinese medicines</i>	1,114	472	-107	1,264	-9.61%	-8.47%
10-30 millions:	13,913	4,912	-273	12,495	-1.96%	-2.18%
<i>Chemical pharmaceuticals</i>	7,305	2,296	-261	6,825	-3.57%	-3.82%
<i>Chinese medicines</i>	3,838	1,863	62	3,263	1.62%	1.90%
30-50 millions:	9,057	3,115	209	6,824	2.31%	3.06%
<i>Chemical pharmaceuticals</i>	4,951	1,495	25	4,050	0.50%	0.62%
<i>Chinese medicines</i>	2,326	1,087	110	1,615	4.73%	6.81%
50-100 millions:	17,055	5,895	529	12,079	3.10%	4.38%
<i>Chemical pharmaceuticals</i>	10,938	3,292	63	8,755	0.58%	0.72%
<i>Chinese medicines</i>	3,790	1,760	374	1,846	9.87%	20.26%
100 millions & above:	70,784	25,137	7,457	37,666	10.53%	19.80%
<i>Chemical pharmaceuticals</i>	47,705	14,736	4,021	29,598	8.43%	13.59%
<i>Chinese medicines</i>	13,562	6,968	2,327	5,142	17.16%	45.25%
Total:	116,619	40,783	7,037	78,708	6.03%	8.94%
<i>Chemical pharmaceuticals</i>	73,200	22,307	3,323	53,671	4.54%	6.19%
<i>Chinese medicines</i>	25,279	12,370	2,672	14,465	10.57%	18.47%

Source: compiled and calculated from Editorial Board of China Pharmaceutical Yearbook, *Zhongguo yiyao nianjian 1998*. [China Pharmaceutical Yearbook 1998] (Beijing: China Pharmaceutical Technology Publication, 1998), pp. 398-399, 410-411 and 422-423.

Note: The sum of the above figures is below the national value since the pharmaceuticals industry including other sectors, e.g. medical equipment, etc.

