UNIVERSITY OF NOTTINGHAM

The Current and Future State of CHINA's Pharmaceutical Industry

Individual Management Project by:

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MBA

The Current and Future State of CHINA's Pharmaceutical Industry

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CONTENTS

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INTRODUCTION

The report is part of the individual study made to complement our Group Management Project with an examination of China's current and future role in the global pharmaceutical industry. The report represents the individual component of our group project by providing an understanding of the rising competition from pharmaceutical companies like India and China that is becoming the main source of pharmaceutical products in the European Union ('EU') region as outlined in our exploration of future scenarios for the region in the year 2030. Through the analysis of the current state of China's pharmaceuticals industry, future businesses within the generics market in the EU can determine the best strategic decisions to make with consideration of the presence of the Chinese companies operating within the EU environment in the coming years.

THE GLOBAL PHARMACEUTICAL INDUSTRY - OVERVIEW

The global market can be classified into 2 categories: "regulated and unregulated / semi-regulated" (Kumar and Akhilesh, 2010, p.13). Examples of regulated would comprise of Government regulations e.g. intellectual property protection and product patents, while the unregulated/semi-regulated markets comprise of no/lower levels of regulations in existence. In regulated markets, there is a greater element of stability through price and volumes with heavy competition and lower entry barriers appearing for unregulated / semi regulated market category.

The pharmaceutical industry today is a highly competitive non-assembled industry with numerous players in every region around the world. With its origins traced back to the emerging chemical industry of the late 19th century near Basel, Switzerland, many of the early companies gradually moved on to pharmaceutical manufacturing to become global players that we know today. With the industry expanding rapidly since the 1960s - a result of booming healthcare spending, new medical discoveries and a lax regulatory oversight, the industry witnessed major developments in the 1970s with the introduction of regulations governing the production of 'off-patented medicine' otherwise known as 'generics'.

Since the 1960s, the US government had made numerous efforts to 'prove the safety and effectiveness of pharmaceuticals manufactured' (GphA, 2010) which helped to launch the generic pharmaceutical industry. It was only until 1984 with the passage of the Drug Price Competition and Patent Term Restoration Act of 1984, commonly known as Hatch-Waxman that the generic industry truly blossomed (Chem-online, 2010). Hatch-Waxman created a framework for the more timely entry of generic drugs into the pharmaceutical market. Often referred to as the foundation of the modern generic pharmaceutical industry, the law encourages market competition between

brand and generic companies, resulting in significant savings and more varieties for consumers. The presence of generic drugs has made the 2009 pharmaceutical market a very competitive global arena with an estimated value of €57 billion in the top 8 global markets for the generic medicines segment (Sheppard, 2010) alone.

With the global pharmaceutical market currently valued at US$720 billion (MAT, 2009), the generics segment has recorded a far higher growth rate of 8% against the overall pharmaceutical growth of 5% per annum. As development costs for new medicines increases over time, greater regulatory hurdles appear and fewer new 'blockbuster' drugs are being introduced, the introduction of generic medicine when existing patent expire increases the pressure on the R&D-based drug companies to compete in the market especially those involved in traditional strong bases (i.e. US and Europe). The future at this time continues to be positive for the generic drug manufacturers, marking a new direction for the pharmaceutical industry.

HISTORY OF CHINA'S PHARMACEUTICALS INDUSTRY

China's pharmaceutical industry has developed rapidly in line with the growth of its economy after the mid-1980s (Nolan and Yeung, 2001) starting from its first rollout in the 1950s (Langer, 2007). This period marked the time where Chinese authorities had gradually relaxed state controls over the pharmaceutical sector and encouraged competition within that same sector. Ownership structure was liberalised with fund raising and M&A[1]activities becoming tools for private enterprise in the Chinese pharmaceutical industry to consolidate its position (Nolan and Yeung, 2001).

Manufacturing of drugs were at the forefront of China's pharmaceutical businesses in the 1980s with joint-venture vehicles becoming the standard norm for foreign pharmaceutical companies to enter the Chinese market. At this stage, most pharmaceutical company owners had placed production efficiency rather than research activities as their mode of operations in China. Like many other manufacturing sectors over time, this has gradually built up into the state in which Chinese pharmaceutical industry is at present. China's total pharmaceutical market was valued at about US$68 billion in 2008 comprising of three parts: western-style medicines that are chemically synthesized small molecule drugs; biologics drugs; and TCM[2].

[1] Mergers & Acquisition
[2] Traditional Chinese Medicine

CHINA GENERIC INDUSTRY

China's pharmaceutical industry is distinct against those in the US and Europe as its modern day pharmaceutical industry mainly comprises of generic drug manufacturers for many foreign companies. Similar to India, it is highly fragmented with approximately 6,800 pharmaceutical companies of which 5,000 from the number are involved in packaging and medical equipment supply. Medical drugs produced in China are over 90% copies of off-patent products with remainder usually of small, insignificant patent drugs familiar only the traditional Chinese market (as disclosed in Figure 1). Generic medicines today still dominate the Chinese market (Langer, 2007) as for healthcare policy, economic, and scientific reasons. It will continue to play a key role in the Chinese pharmaceutical market as in the past several decades with this trend most likely to continue in the future.

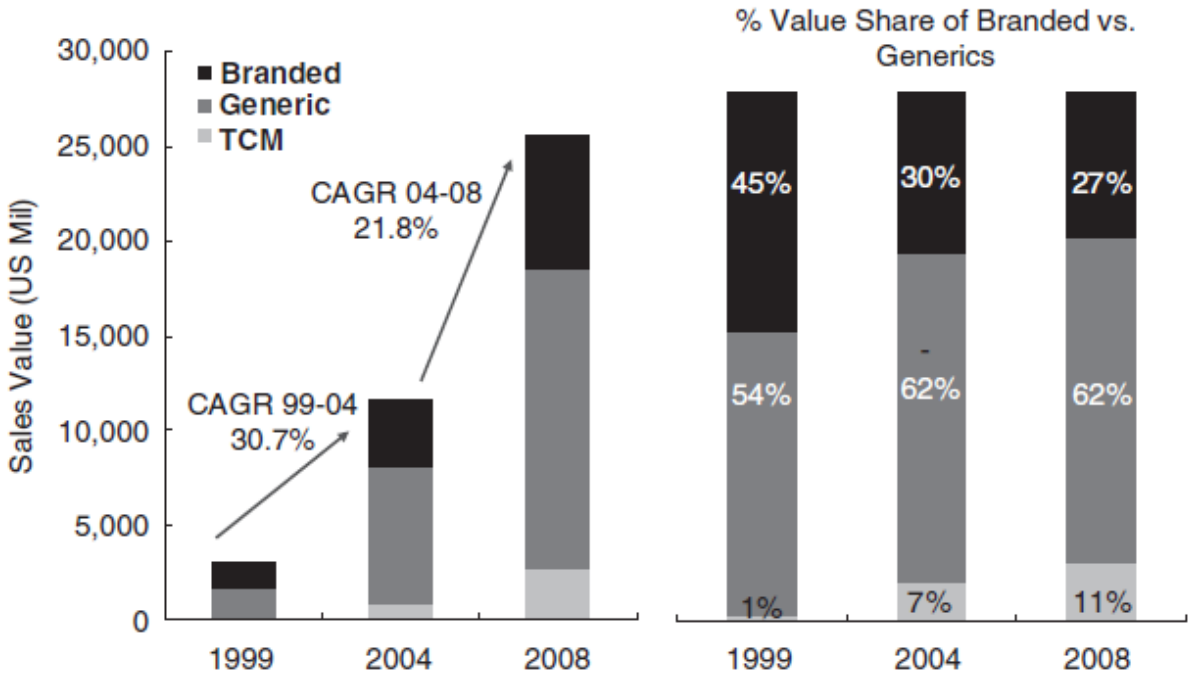

Figure 1: Sales and shares of branded, generics and TCM products from 1999 to 2008

(**Source**: Chui, 2009)

As the results showed above, the value of generics has become all the more important by 2008 with a 62% majority accounted for the sales value in China against our type of medicines. By being one of the main generic drug manufacturers in the world market, the industry itself has created new business opportunities as the importance of generic medicines grows in developed markets in the West.

ANALYSIS OF THE STRENGTHS AND WEAKNESSES OF CHINA'S PHARMACEUTICAL INDUSTRY

It is often said that the pharmaceutical sector has no cyclical factor attached to it as whenever the economy is in a downturn or in an upturn, the general belief is that demand for drugs is likely to grow steadily over the long-term (Kumar, 2010). While it is true in some sense, the decline in growth patterns for patented drug manufacturers against the rise in growth for generic drug producers suggest otherwise. The entry of pharmaceutical producers from countries like Brazil, Mexico, South Korea, India and China has created new competitors into the already competitive market as more patented drugs lifespan reaches their expiry dates without any new 'block-buster' drugs replenishing patented drug producers income.

China offers a larger market and an almost similar low cost base with India (Norman, 2007) with the production cost running to within 50% of a typical Western cost (Houdarf, 2010). Having an early background in manufacturing active pharmaceutical ingredients[3] ('API') has marked one of the key strength for the Chinese as this it becomes one of the main competitive advantages the country has against a close competitors such as India. The Wall Street Journal estimates that Chinese firms can easily sell the API for 10% to 15% less than the Indian manufacturers (Goldstein, 2007) due to the wider availability of manufacturing facilities and better road infrastructure. It is interesting to note that while India currently supplies the majority of APIs to the more regulated markets in the global market, a significant proportion of the ingredients that are necessary for Indian API production originated from China (KnowledgeWharton, 2008).

The low production cost has long been the country's main advantage over other western and developing economies (as a result of its high population numbers and pursuant of a volume based manufacturing industrial policy). This allowed Chinese pharmaceutical businesses to become a global producer of bulk antibiotics such as penicillin, terramycin, streptomycin, sulfanilamides and others common generic drugs (KnowledgeWharton, 2008) as it builds up the industry using its traditional strength. In the US pharmaceutical labour cost for instance, Gerald Chan[4] had estimated the staff cost of a chemist at US$225,000 per year as compared to US$70,000 in China; a significant difference as the industry experiences lower margins in the developed markets (which were the main consumers of medicine previously).

Cost advantages is also observed at the clinical trial stages as a review of a typical drug development phase in the west was found to take a total of 16 years at a cost of up to US$1.3

[3] APIs are a key part of the generics industry and the availability of the right API determines how quickly a generic can be developed (KnowledgeWharton, 2008)

[4] a co-founder of Morningside, an investment company active in China (Crynoski, 2008)

billion (refer Figure 2 below). The setting of China as the alternative location allows a 20% - 30% cost saving due to the reduced time frame from regulatory approval to production time, an important factor for the generic drug producers seeking to supply the global market with a reasonable margin.

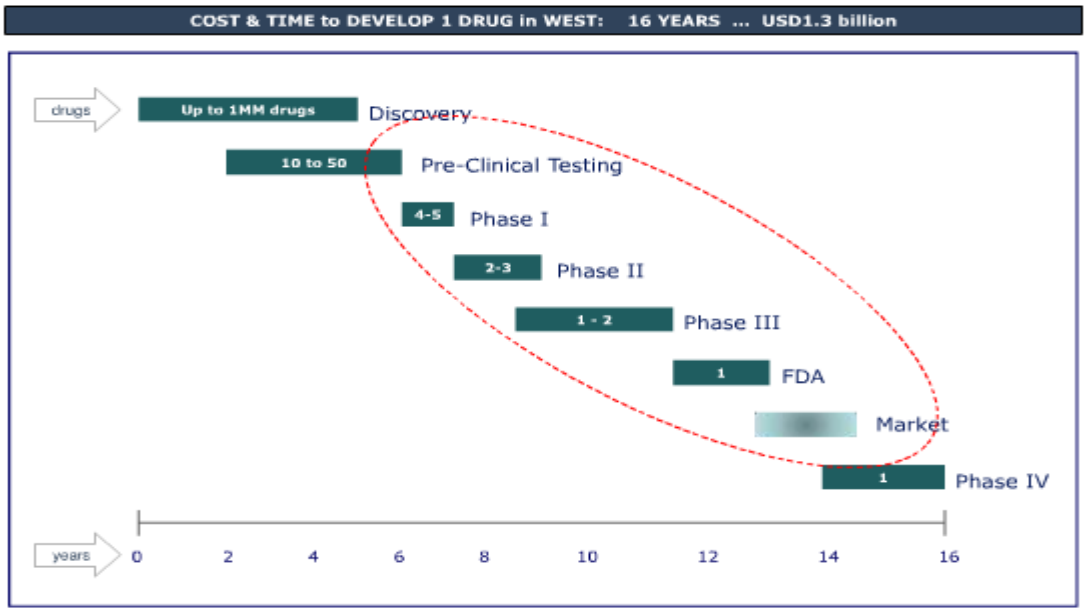

Figure 2: Cost and Time of an average drug development in Western markets

(**Source**: Houdard, 2010)

Researchers, Zhang & Jiawen (2009) further points out that besides the obvious cost advantage, the manufacturing capabilities associated with China's pharmaceutical sector has been another key attraction for consideration. The Chinese's involvement for the pharmaceutical development stages relating to target identification and validation as well as their related areas (such as genomics and proteomics research) enjoy stronger service capabilities compared to their Indian counterparts. They determined that from the top 50 players in these 2 countries, 20 Chinese businesses offer good quality services in these areas as compared to only 13 Indian companies possess similar capabilities in 2009. Also, Chinese companies were found to be more experienced in large scale manufacturing of macro compounds (i.e. vaccines, antibodies, recombinant proteins, small interfering Ribonucleic Acid (siRNAs), etc) (Zhang & Jiawen, 2009) as there are 15 Chinese companies that possess such capabilities against India's 6 companies. Local pharmaceutical businesses such as China National Pharmaceutical Group Corp (SINOPHARM) and Shanghai Pharmaceutical Group Corp (SPGC) focused on volume-based production for the drugs as their business strategy thus creating a gradual but growing presence in the generic drugs market.

In additional to the above, an increasingly skilled workforce has been a factor for the industry as it continues to expand further. France Houdard[5] (2010) estimates that roughly 1.6 million science graduates from Chinese universities enter the workforce as compared to the numbers of some of their equivalent western counterparts (refer figure 3) thus ensuring a ready pool of people for the industry to cater for the growing expansion of the sector. This factor is strengthen by GlaxoSmithKline ('GSK')'s decision to commit a large and permanent facility suggest the confidence that GSK has in what can be accomplished in China despite laying off employees globally in autumn 2007 (Crynoski, 2008).

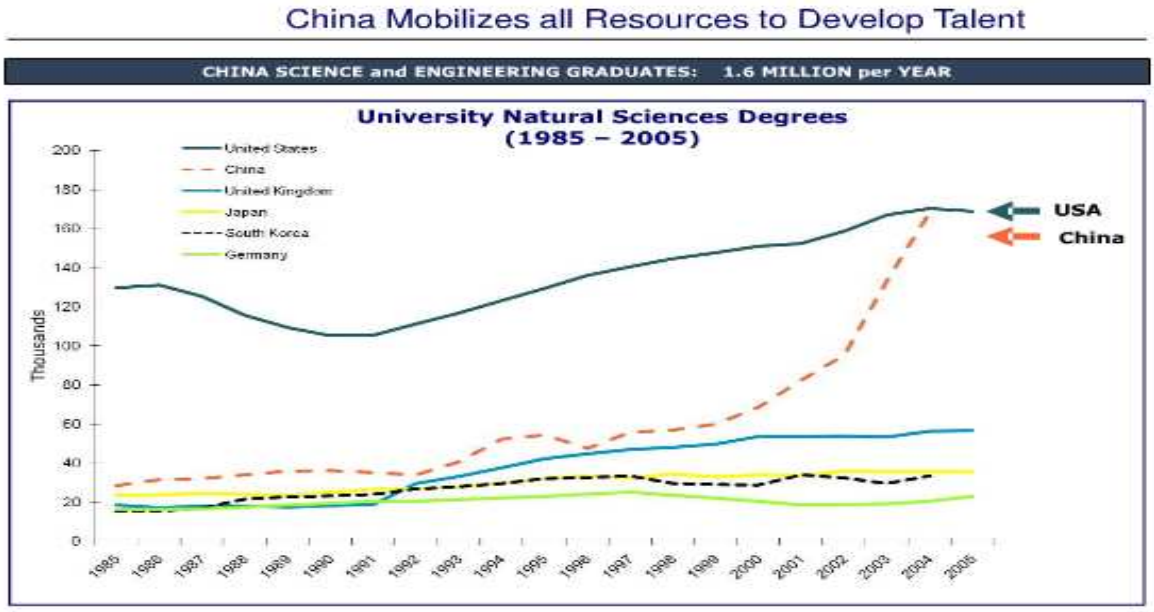

Figure 3: Comparison of Science Graduates between China and major economies for the last 20 years

(**Source**: Houdard, 2010)

Despite the many science graduates migrating to foreign countries over the last decade, the improving economic prospects (along with employment) in China has slowly stem the outflow to a smaller amount. Hence, a smaller number is expected to go abroad in the future but with many just as keen to return towards working in their homeland. As explained by Jingwu Zang[6], this was one of the main reason that GSK was drawn to the Chinese pharmaceutical sector to do its R&D activities as it aims to benefit from those US and Europe-trained scientists that would be cheaper in the long run. GSK has also pointed that the presence of such trained work force would enable a faster transition of western developed drugs to the growing Chinese market more easily (Crynoski, 2008).

[5] Managing Director of Exolus International Advisory, a US based strategic investment advisory firm
[6] Head of R&D China – a GSK outpost (Crynoski, 2008)

While the strength of China's pharmaceutical sector is appealing to many industry observers, weakness in the country's industry has also been noted. With a highly fragmented industry of over 6,000 small-medium sized companies operating, it is of no surprise that China's supply chain is still considered complex and inefficient at this stage (JianQiang, 2010). Although the country has an overall better road system compared to India, the numerous small-medium sized companies and fragmentation occurring within the sector has made the development of a standardised supply chain similar to those deployed in the US and EU difficult to accomplish. Lack of integration as well as a suitable nationwide, large scale distribution networks continues to become a challenge for China's pharmaceutical industry to develop to its fullest potential for the global market.

R&D activities has also been another stumbling block, Because the focus of the industry currently is on generics and off-patent drugs, there is a lack of innovation drive coming from the manufacturers due to various reasons, including financial resources (JianQiang, 2010). The workforce is still relatively inexperienced in drugs development hence the approach on replicating existing formulae or APIs for the market. It then brings another problem which is familiar to all foreign businesses in China. Intellectual Property Rights (IPR).

IPR protection has frequently been cited as a reason by foreign companies for not doing business with/in China. Although patent laws have been strengthened in recent years, enforcement of such laws has been inconsistent. Unlike Indian pharmaceutical companies, Chinese pharmaceutical drugs have not made a significant impact in the export market with their standards lagging against their Indian counterparts (China Business Newswire, 2010) as a result. Furthermore, the reputation of China as one of the main source of counterfeit medicine owing to its weak regulatory enforcement (WHO, 2010) has resulted in a negative stigma on the medical drugs supplied to the regulated markets. Although incidents involving counterfeit generics are not substantial at the moment, the EU has highlighted it as one of their main concerns involving outsourcing of pharmaceutical manufacturing to unregulated / semi regulated markets at these countries.

CURRENT STATE OF CHINA'S PHARMACEUTICAL INDUSTRY

Pharmaceutical companies in China are experiencing a better than expected prospect compared to those in developed economies. An impressive economic growth rate at between 8-15 percent for the past 15 years (Chui, 2009) from the statistics report published by the China National Statistics Bureau, together with a rapidly aging population has been fuelling the demand for pharmaceutical products. As middle-income group in China continues to grow particularly in the

urban areas, current income earned or those saved from younger days are being spend on medical services (which provides medical drugs than TCM) especially when traditional Chinese remedies fail to cure past ailments (refer Figure 4). The trend towards unhealthy lifestyles and increase in the incidence of chronic diseases are also boosting sales of products to treat hypertension, diabetes, heart disease and cancer (Chui, 2009) as awareness of Western-based medicine for treating such diseases gain grounds in the Chinese market. As we can see in Figure 5, both growth rate and sales performance for the industry has been growing constantly for the last 10 years recorded.

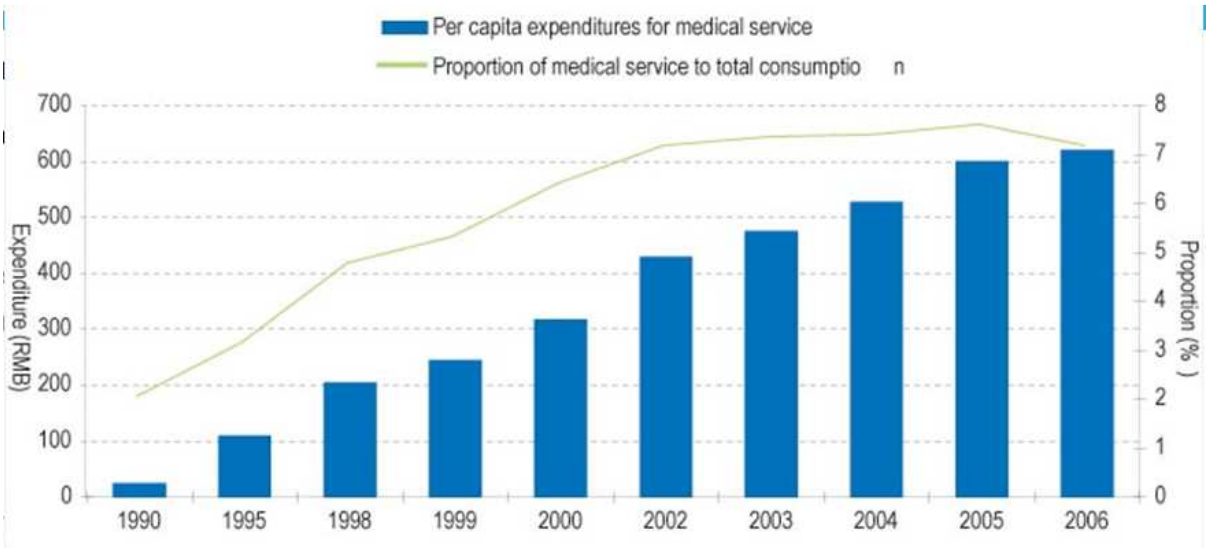

Figure 4: Urban Household consumption of medical services

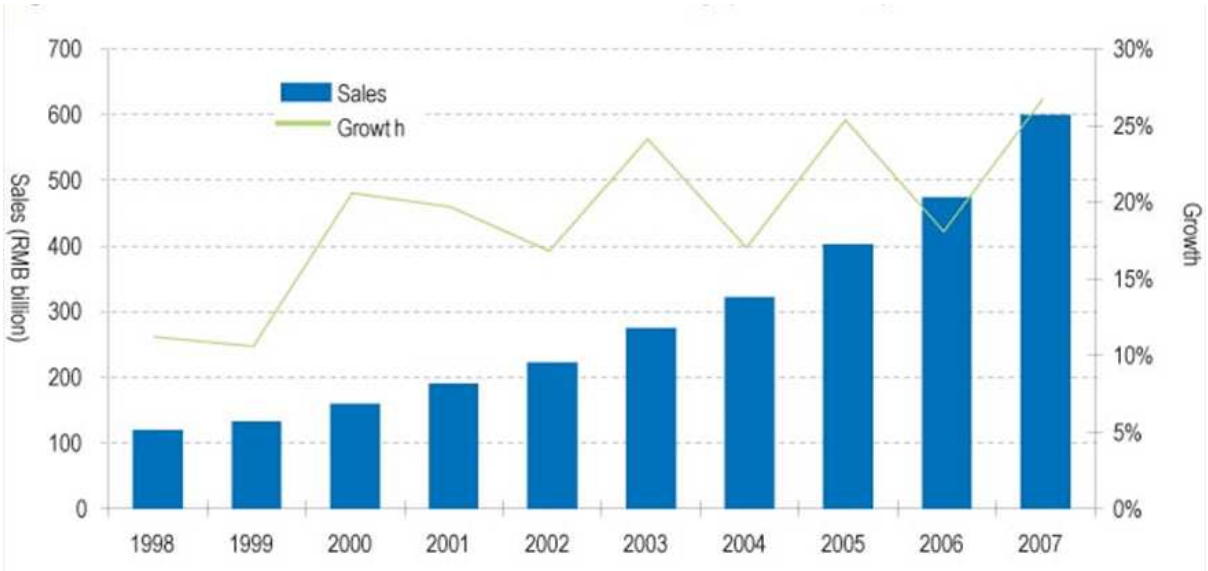

Figure 5: Sales of China's Pharmaceutical Industry (1998 – 2007)

(**Source**: China Knowledge, 2008)

The large population size and rising middle income households in China has created one huge market which is larger than India's own as the latter grapples with several significant social-income problems in India's society. Pharmaceutical companies in China therefore have opportunities to gain market share in the domestic healthcare sector rather than focus solely on the market abroad for survival.

Like its closest Asian competitor- India, China's pharmaceutical industry has now become one of the largest medical drug producers in the global market. The industry is predicted to become the 3rd largest pharmaceutical market in the world by 2011, a big improvement from its 8th position in 2006 (China BioToday, 2010). IMS Health classifies China's market as part of the select few 'high-growth' areas by 2013 with China creating the most significant potential with at Tier 1 as the report suggesting China as being in a 'league of its own' (Campbell & Chui, 2010). A fact not surprising as the country's absolute GDP is valued at US$7.9 trillion in 2008 with its pharmaceutical sector expected to provide US$ 40 billion in growth by 2013 (Campbell & Chui, 2010) as pointed out in Table 1. With a very significant population of 1.3 billion people, heavy public spending on healthcare and an increasing demand of medical drugs for treatment, the market has grown by 26% in 2008 alone (Campbell & Chui, 2010).

TABLE 1: GROWING PHARMACEUTICAL MARKETS 2008 - 2013

TIERS	COUNTRIES		2008 GDP[1] ($ TRILLION)	INCREMENTAL PHARMA MARKET VALUE GROWTH[2] FROM 2008-13 ($ BILLION)
TIER 1	1 CHINA		8	40B+
TIER 2	2 BRAZIL 3 RUSSIA 4 INDIA		2-4	5-15B
TIER 3	5 VENEZUELA* 6 POLAND 7 ARGENTINA 8 TURKEY 9 MEXICO 10 VIETNAM 11 S. AFRICA	12 THAILAND 13 INDONESIA 14 ROMANIA 15 EGYPT 16 PAKISTAN 17 UKRAINE	<2	1-5B

(**Source**: Campbell & Chui, 2010)

At the heart of this health care boom, reforms instituted by the Chinese government (Shern, 2008) where new policies introduced in April 2009 (JianQiang et al, 2010). a landmark US$125 billion incremental government funding, upgrading of the nation's healthcare infrastructure and the provision of near universal health coverage has become the drivers toward doubling China's pharmaceutical market size through 2013 (Campbell & Chui, 2010). In addition to servicing the

needs of a large domestic market, being a global supplier of various active pharmaceutical ingredients (APIs) and intermediates (Shen, 2008) has allowed locally owned companies to invest heavily into pharmaceutical R&D activities that encourages innovation for Chinese modern drugs.

The medical reforms introduced by Beijing in 2009 acts as a stimulus for Chinese companies to improve and upgrade its business practices towards meeting the US and EU export standards and retain steady growth. As it becomes part of China's plan in moving the economy past purely manufacturing towards a higher economic value chain, many of the old barriers to entry were removed with production decisions previously made through the regional governments entrusted directly to management in line with the market economy embraced by China's central government (Fry, 2005).

At the same time the Chinese government made major regulatory changes to the industry as part of the reforms package. It simplified the complex, fragmented and multilayered pharmaceutical supply chain and expanded its state healthcare insurance plan to fund costs; both urban and rural regions should be able to afford more prescriptions (D'Altorio, 2010). "Western price" were authorised for innovative drugs, encouraging foreign pharmaceutical companies to enter Chinese market. Set on stimulating technology transfer from foreign firms, the central government is encouraging companies to match commercial expansion with local manufacturing while putting more effort internally through research and development ('R&D') expansion.

Traditionally, the large pool of science graduates has marked one of the strength for the industry but it has rarely been expected for the industry to spend much on R&D which therefore, restricted China's ability to make an impact on the global pharmaceutical market like India. Government policies has served to address this shortfall in recent years.

Since China was seen as the world's largest technocracy in 2007 (Wilsdon & Keeley, 2007), the industry has been experiencing a rapid mobilization of resources in order to gain the technological edge with the developed counterparts. This belief is derived from the Chinese government's drive to have the power of new technologies to deliver social and economic progress (Wilsdon & Keeley, 2007) for the population. Wilsdon & Keeley (2007) has also described this as one of its most ambitious research investment program since 'US President, John F. Kennedy launched the moon race for the United States'.

Since 1999, China's spending on R&D has increased by more than 20 per cent each year (Wilsdon & Keeley, 2007) outpacing even Japan and the EU member states (which is struggling to maintain a similar growth rate in line with the Lisbon target). The country has gradually sought to train and retain many bright Chinese talents to explore revolutionary potential in medicines ranging from existing conventional based developments (i.e. chemicals) to new areas of biotechnology and

nanotechnology. The rise disclosed under Table2 has become a proof of the government's support for this improvement as it devotes up to 2.5% of GDP by the year 2020.

Year	R&D spending (all sources, US$ billions)	% of GDP	Central government (US$ billions)
2004	24.6	1.23	8.7
2010	45.0	2.00	18.0
2020	113.0	2.50	not known

TABLE 2: R&D SPENDING TARGETS FOR CHINA'S PLAN

(**Source**: Wilsdon & Keeley, 2007)

At this time, these reforms appeared to bearing fruit. For example, GSK invested $42 million in a joint venture with Jiangsu Walvax Biotech for pediatric vaccines, and nearly $33 million for flu vaccines with Shenzhen Neptunus (D'Altorio, 2010). Numerous big pharmaceutical firms have now firmly established their production facilities in various part of China (Refer Appendix 1) with plans to commit further investment in other associated activities such as R&D activities (refer Appendix 1).

CHINA PHARMACEUTICAL INDUSTRY FOR THE FUTURE

In the long term, China's pharmaceutical industry will need to continue to restructure itself to remain competitive in the global marketplace. The reform introduced by the government along with the sluggish global economy has made an impact on the sector in 2009 (Zhong, 2010). 2010 will be of no difference with the continuation of the reform measure as well as other developments and trends in the industry as global economy recovers.

From the Chinese government, the authorities must step up the enforcement of IPR to re-assure foreign pharmaceutical investors. This measure will help address the counterfeit medicine issue in the long run as dubious pharmaceutical companies operating in the past can be eliminated in the long run. M&A of the smaller companies should be encouraged in order to eliminate repetitive sub-industries while improving efficiency as a whole.

Quality control is another critical factor for China's pharmaceutical industry. Greater emphasis must be place by both the industry and the Chinese authorities in order to improve the industry's image as well as consumer confidence. Quality provisions, such as the Good Manufacturing Practice and Good Supply Practice are widely applied in China but implementation and enforcement of these provisions have varied in different regions with standards introduced by the regional governments differing at times (JianQiang et al,2010). This has also impacted the

Chinese pharmaceutical exportation and indirectly curbed the growth rate in this area. As China is one of the largest and fastest growing API producer in the world (with API being the main export product), ensuring customer confidence on its product is critical towards maintaining a sustainable market. Customers receiving Chinese API exports however continue to be sceptical about China's quality currently. As an immediate measure, the industry itself must work together with the government in introducing the highest possible standards acceptable to international bodies (such as the WHO[7] and the US FDA[8] requirements) that all participants must commit to establish confidence.

Innovation and research into new drugs will have to be the priority of the Chinese pharmaceutical companies rather than focussing on producing generic medicine if it is to develop a sustainable industry in the global market. Given that its industry is not as advanced as India, Chinese companies will have to focus on developing relationships with big pharmaceutical firms through outsourcing / joint ventures in the immediate short term to build up the capabilities it lacks. The measure will prove to be useful in the long run as it allows Chinese companies to familiarise themselves with the global market standards and consumer expectation which India gained through years of collaboration with international companies. For example, the difference between China and India lies in these factors is largely due to the each country's history in general. The standard of English in Indian companies is better than that of their Chinese counterparts. In addition, India's business operation style and philosophy are closer to those of western countries which foreign pharmaceuticals are more familiar with (Zhang, 2009). Hence, the need for China's pharmaceutical companies to build that working relations and persuading foreign counterparts to utilise local workforce in as many strategic areas as possible.

From there, the skilled Chinese workforce would be exposed to latest technological trends in medicine and gradually given the necessary language, creativity and knowledge skills to perform R&D that can be discussed with global peers if needed. With an ever increasingly globalised and competitive marketplace for medical drugs, it would be unwise for China to pursue an independent path as it does with several of its industry sectors (defence, energy etc).

Once the knowledge set and required level of expertise is build, a new level of value chain should be considered that cements the industrial relationship between Chinese companies and the foreign companies investing in China. As observed under Figure 8, the evolution for foreign investors should go beyond cost savings, penetrating new markets, innovation and greater efficiency. A 4th and 5th generation strategy suggested by Houdard (2010) in Figure 9 that focuses creating shared cost centres through contract outsourcing and partnership of new medical

[7] World Health Organisation
[8] Food and Drug Administration - US

engineering fields (i.e. biotechnology, nanotechnology and genomics) alongside R&D would make retain foreign investments in the industry in the long term.

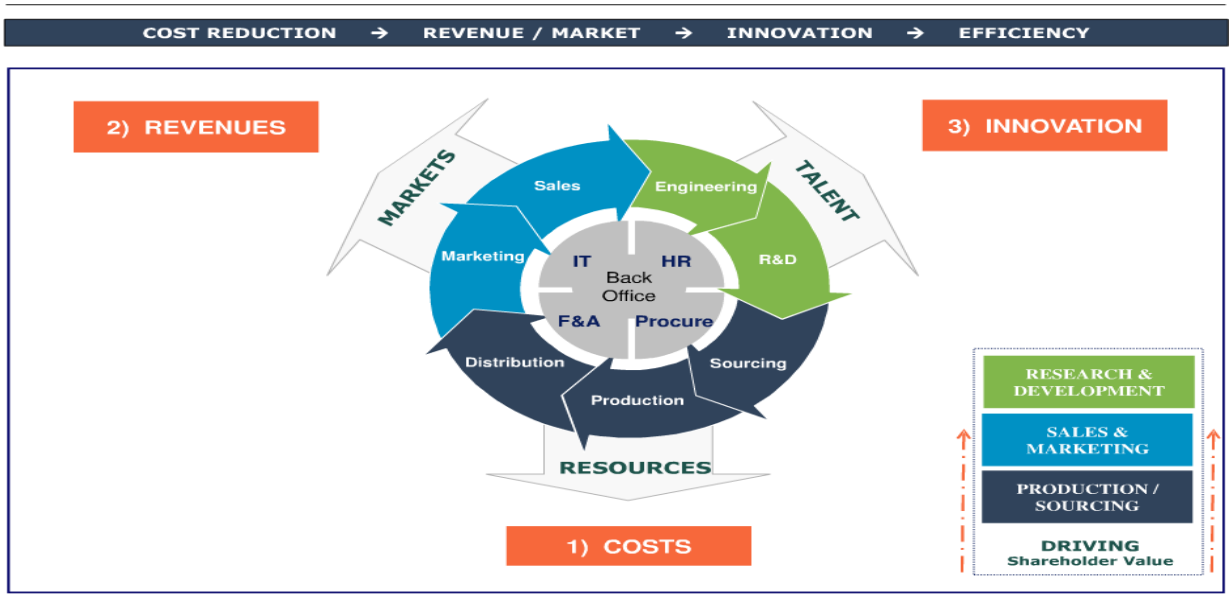

Figure 8: Evolution of foreign investment in the Chinese Pharmaceutical Industry

(**Source**: Houdard, 2010)

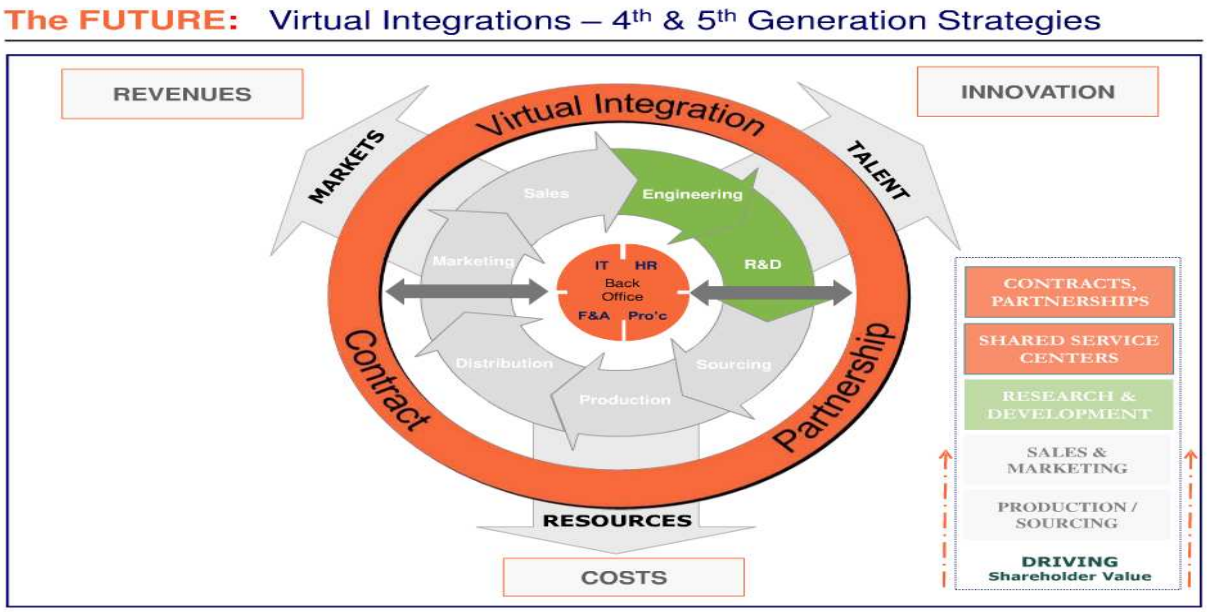

Figure 9: Suggested Strategies for Chinese Pharmaceutical Industry

(**Source**: Houdard, 2010)

With the significant number of science graduates entering the work force each year, Chinese pharmaceutical companies can aim to harness the talent that builds on the innovation for the industry in the long term.

From the analysis of both the strength and weaknesses of the Chinese pharmaceutical sector, it would be unwise for China to compete directly like a 'full-frontal attack' with countries like India in the global generics market. An in-depth study revealed that both India and China possess similar capabilities in process R&D and contract manufacturing with the former being more skilled in manufacturing small molecular drugs (Zhang & Jiawen, 2009). Competing directly would only serve to strain the resources of both countries that could have been utilised to improve their entire value chain of drug R&D and manufacturing instead.

While India's industries are relatively well ahead in certain segments of the pharmaceutical industry, it does possess some advantages over their close Asian rival. Chinese pharmaceutical industry has a longer experience in fermentation products and greater knowledge in process chemistry. This capability allows room for more creativity and lower costs that global companies can be attracted to (Greene, 2006). Rather than competing with emerging countries like India (which it lack expertise), it is suggested that Chinese pharmaceutical businesses look towards focusing on its low cost API and intermediates capacity for drugs. In other words, Chinese pharmaceutical industry could consider specialising on certain pharmaceutical segments where it has both the capacity and ready market for these products. As suggested by Cynthia Dowd Green (2006), China's API and intermediates are in demand by the global generics market given the pressure for cheaper drugs in many countries around the world today. It could consider supporting partnership with Indian API and dose companies that could mutually benefit both economy's pharmaceutical sector in competing for a share of the global generic drugs market. The Chinese would not need to focus on replicating the expertise that India has for several segments but concentrate on improving quality and foreign approvals for the APIs it produces instead.

As the conventional pharmaceutical industry has been deemed to reach its peaked, new areas in medicine should be examined. In recent years, biopharmaceutical industry has been the fastest growing sector in the global pharmaceutical industry. The compound annual growth rate of biopharmaceutical industry reached 18.6%, far higher in the last 10 years than 8.5% of the global pharmaceutical market (Liao Yan, 2010). Not to be left behind, China has more than 700 companies involved in this field at present. With an annual growth rate of about 30% for the last 4 years, this has also become one of the fastest growing fields in the Chinese pharmaceutical industry today. This sub-sector only consist of a small proportion in China's pharmaceutical industry and a mere 10% contribution towards total revenue in 2009, the potential for China to

gain a lead over other global companies here its biotechnology industry is considered more advanced than India's at the moment (Zhang & Jiawen, 2010).

Heading into the future, the area of TCM could be an area which Chinese pharmaceutical industry can consider expanding. TCM has had a long and widespread influence on the Asian population particularly those of Chinese origin. There has been many positive results reported by scientist combining both the use of western medicine with TCM in treating certain chronic illness such as cancer, diabetes, renal diseases and coronary artery (Yu Ren Chu, 2009). Using this knowledge, Chinese companies can leverage on its continued efforts in the advancement of biotechnology to provide scientific credence in using TCM that can, as Prof Yu Ren Chu states "contribute greatly towards global medicine' (Yu Ren Chu, 2009, p.2).

CONCLUSION

China's pharmaceutical industry is still considered a relatively young entry into the global market as compared to the Western pharmaceutical sector. Despite that, the industry has progressed significantly over the past decades in line with China's economic performance over other developed economies. Like many other industries, foreign investors have wasted no time in taking advantage of China's low labour cost and mass production capability to produce medical drugs that caters to the growing healthcare demand of patients in the developed economies. As the global pharmaceutical market gradually becomes more competitive with the entry of generic drugs, Chinese companies must now aim to upgrade itself as more competitors enter into the same industry from around the world especially India. While the Chinese government has introduced healthcare reforms to restructure the pharmaceutical industry in China, the industry must examine its own strengths and weaknesses to develop new strategies that can serve to not only fulfil the growing demands of cheaper medicine in the global healthcare today but also to create value that sustains the Chinese pharmaceutical industry towards a higher level.

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Figure 6: Big Pharmaceutical production facilities in China 2010

Figure 7: Major pharmaceutical existing and planned R&D facilities in China as of 2010

(**Source**: Houdard, 2010)