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<td>Author(s)</td>
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<td>Citation</td>
<td>長崎大学東南アジア研究年報. vol.47, p.1-19; 2006</td>
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<td>Issue Date</td>
<td>2006-03-24</td>
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Firm Strategy and the Asian Advantage: The Case of the Emerging Biotech Industry

Celia L. Umali

Abstract:
Asia is considered by many to be the next biotech hub of the world as countries in the region are striving to develop the sector to be the next engine of growth of their respective economies. Recently many pharmaceutical firms derive new products from the biotech sector. This paper on one hand examines the strategies pharmaceutical firms adopt to compete in the domestic and global market place and on the other hand evaluates the Asian advantages in terms of market and globalization drivers. Furthermore, we analyze how pharmaceutical firms exploit these Asian advantages as part of their global strategy in pursuit of their profit maximization goal.

Keywords: biotech industry, firm strategy, Asian advantage

Introduction

Biotechnology is revolutionizing the health care industry as more pharmaceutical companies are deriving novel products from the biotech sector. The biotech industry in Asia as compared to that in the US and Europe is still in the emerging stage and relatively small but governments hope that this sector would be the next engine of growth. In terms of capitalization for example Japanese drug makers are smaller compared to their US counterparts. As of 2005, Japan's number one drug maker, Takeda had a capitalization of US$ 41 B while Pfizer and GlaxoSmithKline (GSK) had capitalizations of US$ 174 B and US$ 128 B, respectively. The leading 10 Japanese pharmaceutical companies had R&D budgets in 2001 which were only 20% of what the top 10 pharmaceutical companies in the West spent on R&D (Halliday, 2001). The biotech sector however performed remarkably well in Asia in 2002-2003, better than its European counterpart. Revenues grew by 9% (Europe -12%, US 22.5%); R&D expenditures increased by 10% (Europe -17%, US -13.3%); and the number of companies grew by 11% (Europe -1%, US 0.1%) (Louet, 2004). The industry is growing in the Asia
Pacific and many see the region as the next biotech hub. Biotech companies in Asia are trying to have niche markets in drug screening and manufacturing, bioinformatics and genomics (Economist, 2004). New medicines for the treatment of diseases common in Asia such as respiratory and infectious diseases, and cardiovascular ailments are the focus of many biotech firms in Asia. Pharmaceutical companies are pursuing multiple sources of competitive advantage in an industry that has become more global and where competition has become more fierce and pressure for cost, time and novel drugs are high and the risk exist. Having said this, this paper studies the bio-pharmaceutical industry in the Asian region. Using case studies, we analyze how pharmaceutical firms exploit the Asian advantages as part of their global strategy in pursuit of their goal to maximize profits.

**Firm Global Strategy**

Firms implement strategies to compete in the domestic and global markets to maximize profit. With advanced information and communication technologies (ICT), more and more firms are becoming global in their operations to achieve this objective. Return on sales (or profit) can be maximized in two ways: increasing revenues or reducing costs. The former can be attained by not limiting themselves in the domestic market but more importantly by selling in the international market. The latter can be achieved by firms locating their operations in optimal places where they can get cheap and quality factor inputs and services. According to Charles Hill (2004), firms can perform value creation in the most favorable locations worldwide thus enabling the firms to lower cost (location economies). Firms can reduce costs (cost economies) brought about by the experience curve. The more products are produced and sold in the domestic and global markets, economies of scale and scope can be achieved. This will lead not only to a decline in costs but also an increase in sales. Firms can likewise leverage on their core competences. Some firms have the skills to engage in value creation activities more efficiently than others leading to less costs and firms can capitalize on these core competences by offering products or services which others cannot match thus leading to more revenues (Hill, C., 2004). In other words, the firm can exploit the opportunities that its value creation competence can bring and the resulting product or service can be vended in the domestic, regional and global markets. The value creation for instance in the case of the biotech industry covering activities from research, product development, pre-clinical testing, clinical trials and manufacturing and marketing is a long, risky and costly process (see Figure I). Supporting this value creation are the pool of manpower, logistics, information systems and company infrastructure (e.g. organizational struc-
Support activities
Manpower
Logistics
Company infrastructure
Information system


ture, corporate culture) without which it cannot proceed effectively (Hill, C., 2004.)
Moreover, strategic alliances are likewise important to support the firms' globalization efforts (Hill, C., 2004). In industries which are technologically complex and where risks and costs are high, collaboration in any of the value chain activities is an option. Recent breakthroughs and innovations have become interdisciplinary and inter-industry such that capabilities and resources do not come from a single firm (Bartlett and Ghoshal, 1992). Hence it is more practical to form synergies with firms having complementary skills to avoid duplication of any capital intensive and time consuming value creation activities.

Globalization Drivers

Yip (2002), on the other hand, presented the advantages, opportunities and potentials of countries which the multinational firms can exploit as part of their global expansion strategy. He analyzed what countries in Asia can offer in terms of market globalization drivers, cost globalization drivers, government globalization drivers and competitive globalization drivers which are important to firms to profit from as they engage in global business. Market globalizations would indicate which foreign market to enter and what product/service to sell. Cost globalization drivers show the country that can serve as the optimal location in terms of labor, raw materials, logistics, infrastructure, technology, etc. Government globalization drivers indicate what the firms are up against when they do business in a country considering the government's industrial policies. Lastly, the competitive globalization
drivers likewise indicate what the firms are up against, this time in terms of the existence of domestic and foreign competitors in the country. Given this theoretical background and using case studies, the following sections will analyze the biotechnology industry, particularly the bio-pharmaceutical firms and the strategies they adopt in Asia given the region's advantages as they pursue global business.

**Market potential**

The Asian market for biotech products is huge but highly variable. The biotech sector has huge market potentials in Asia led by Japan which accounts for more than half of the market share as well as by future powers such as India and China with market shares of 13.25% and 10.29%, respectively. The global pharmaceutical industry alone was worth U$ 550 B in 2004. In the same year, Japan, the second largest pharmaceutical market was worth around U$ 58 B hence not only Western but also Asian companies are targeting the lucrative Japanese market (Kato, 2004). Local industry experts forecast that the highly lucrative Singapore market for over-the-counter drugs is expected to grow by 11% to 15% a year. Singapore's drug market is relatively small, valued at U$ 500 M in 2002 but leading pharmaceutical companies (e.g., GSK (UK), Aventis (France), Schering-plough (US) locate their regional hubs for clinical trials and drug development in the city state, where the infrastructures and facilities are well put in place by the government. The pharmaceutical market in India was worth U$ 6 B in 2004; in China it amounted to U$ 5.9 B in 2004 and is growing at 13% annually (Chervenak, 2005); the South Korean and Malaysian markets amounted to U$ 4.8 B in 2003 and U$ 263 M in 2000, respectively. In the US, on average, one person spends U$ 500 on prescription drugs per year whereas in China one person spends only U$ 6 per year (Einhorn, Magnusson and Barrett, 2004). Expensive and novel medicines may still be unaffordable to the majority of the population in India and China where price is still important for consumers; hence generic drugs are in great demand. So it is left to Japan, South Korea and Taiwan, the more advanced countries in Asia that have advanced health care systems, to serve as important lead markets in Asia for new costly health medicines. India which has a strong bulk and generic manufacturing of vaccines, therapeutics, and diagnostics most of which are to meet the domestic health needs (such as hepatitis B, typhoid, diabetes, cancer, cardiovascular, malaria, cholera, encephalitis, HIV) of the 1 Billion population. The same is true in China where most of the drugs for sale are generic used for treatment of hepatitis, cancer, stunted growth, diabetes and cardiovascular diseases. Although China is intensifying its efforts in genomics and stem cells, they have also developed biomedical products for the
treatment of hepatitis B, SARS, cancer, anemia, cardiovascular ailments and hepatitis B, the more common diseases in the country. China has a large and many homogeneous subpopulations that are good for functional genomics (Zhenzhen, et. al., 2004).

Location Economies

Countries in Asia spearheaded by their respective governments hope to develop their biotechnology sectors. They strongly believe that with their competitive edge in terms of brain power, low cost clinical trials and drug manufacturing, public financing and public support, IT and nanotechnology knowhow and expertise, they could match the biotech sector in the West.

Cost competitiveness

Firms perform value creation in optimal locations to achieve location economies. According to Charles Hill (2004), one advantage of this is lower cost of value creation. Thus firms will locate in areas where there are relatively cheap and high quality factor inputs. Another advantage of Asia aside from the highly skilled pool of scientists and researchers is cost. It costs around U$ 800 M to develop a drug (CDSS 2002). The innovation and manufacturing costs as well as biotech services in India are less costly by international standards. For example, the price of Shanvac B, a hepatitis B vaccine produced by a local company, Shantha Biotechnics costs only 50 cents /dose while the imported vaccine costs U$ 16 /dose. Biotech services are being outsourced to biotech companies such as Syngene and SIRO Clinpharm in India which can offer cheap and yet highly skilled labor force. Clinical test in the US costs U$ 300-350 M whereas in India it will amount to only US 25 M (Sandhya, 2004). Costs in R&D in India for Streptokinase is U$ 1 M whereas in the US it is over U$ 20 M; clinical trials (Phase 1-11) for Rotavirus cost U$ 5 M in India and over U$ 150 M in the US; development and production of 3-Gmp tablets of new molecule-malaria costs U$1 M in India and more than U$ 20 M in the US (Bharat, 2004). Chinese scientists with doctoral degrees get a yearly salary of U$ 25,000, a mere 10 percent of what scientists earn in the West. Hence complicated R&D such as biological testing can be performed less expensively in China since salaries account for 80% of total R&D costs. The savings then can be used to expand their pipeline of potential blockbusters. The screening process of compounds with medical application to novel drugs which has to be verified many times over is very labor intensive. Roche has inaugurated an U$ 11 M laboratory in Shanghai to screen different compounds that have potential use in anti virus and cancer drugs, to save on cost, and to have access to
the big Chinese market. For labor intensive services and yet requiring high level skills, China can offer low cost bioservices such as nucleotide sequencing and synthesis, protein expression and library construction (Chervenak, 2005). Multinational pharmaceutical companies conduct clinical tests in China where recruitment of patients is not difficult and the related hospital fees are cheaper. For these reasons, Germany’s Mologen Inc. is having Starvax Inc. of Beijing test the efficacy of a certain compound for a colon cancer drug now undergoing clinical trials in Europe for the treatment of other forms of cancer. WuXi Pharma Tech Co. (China) was approached by TargeGen, a US pharmaceutical company, that is developing small-molecule drugs for cardiovascular ailments to perform chemical screening of various compounds that can be used for further development (Santini, 2004).

**Innovation Capacity**

Many Asian drug companies in India, China, South Korea and Japan have depended on and generated much of their revenues in the manufacture and distribution of “me-to” drugs or bulk manufacturing or what is commonly called generics. This has given them increased revenues upfront. However some Asian pharma firms in spite of their size have exhibited innovative capabilities. Some companies have come out with innovative drugs that are marketed by the more well-known western pharmaceutical companies such as those conceived in Japan: PRAVASTATIN: cholesterol (Bristol-Myers Squibb’s Pravachol) developed by Sankyo; LANSOPRAZOLE: anti-ulcer (TAP’s Prevacid) developed by Takeda; RESUVASTATIN CALCIUM: lipid lowering (Astra Zeneca’s Crestor) developed by Shionogi: ARIPIPRAZOLE: schizophrenia (Bristol-Myers Squibb’s Abilify) developed together with Otsuka: DONEPEZIL HYDROCHLORIDE (Pfizer’s Aricept) developed by Esai. (Kermani, White and Gooch, 2001 and Nakamoto and Pilling, 2000. In 2001, two new drugs, RADICUT (Edavarone) for acute stage cerebral infration and CLEANAL (Fudosteine) for chronic obstructive pulmonary ailments (Kermani, White and Gooch, 2001) were developed by Mitsubishi PHarma Corporation. The company raked success in these two drugs used to cure ailments where there are not that many alternate medicines available. Japanese companies for a long have not developed blockbuster innovative drugs. Japan lags behind the West in terms of drug development. In the US drug companies take an average of 10 years to develop and commercialize an innovative drug while in Japan it takes 15–17 years (Hill, R., 2005). In South Korea where majority of the drug companies manufacture generics, some have developed the top selling drugs in the country such as Easyef for diabetic foot ulcers (Daewoong Pharmaceuticals) and Balofloxacin, oral active fluoroquinolone antibiotic (Chongwae Pharma Corp) (Kermani and Gittins, 2004). Macro-
gen which is a spin-off business venture of a Seoul National University laboratory in 1997 designs DNA sequencing and is mapping the "Korean" genome structure. It has mapped 100,000 bacterial artificial chromosomes of Koreans containing the whole genome of a Korean person which it utilizes to develop DNA genome arrays (Wong, et. al., 2004). LG Life Sciences is one pharmaceutical company in Korea that is trying to develop and distribute novel drugs for diabetes, obesity, dyslipidemia, Alzheimers, anti bacterial and anti virus drugs, cancer, angiogenesis and vascular diseases.

**Niche for Genomics and Stem Cell Research**

Genomics and stem cell research are areas where Asia, with its a heterogeneous gene resources is trying to find a niche. Stem cell research has received a lot of attention lately due to its potentials in the treatment of diabetes, Parkinson's diseases and spinal cord injuries. Stem cells have the healing potentials by forming cells which replace cells that do not function due to disease or accident. (Stem Cell Research Foundation, 2005). For stem-cell researchers, Singapore offers one of the world's most liberal legal environment. The law permits stem cells to be taken from aborted fetuses, and human embryos to be cloned and kept for up to 14 days to produce stem cells. This is one field the Biomedical Research Council (BMRC) wants the city state to have a niche market. The government thus provided U$ 600 M to fund startups in stem cell and life science researches, U$ 22 M of which have been put into ES Cell International. Its chief scientist is the world famous English scientist, Alan Coleman. Stem cell research in Singapore was pioneered by Prof. Ariff Bongso. He was the first to successfully isolate stem cells from a five day old embryo in 1994. Eight years later, again he was the first to culture human embryonic stem cell lines without the assistance of mouse feeder cells (International Stem Cell Forum, 2005). ES Cell International is a spin-off of this work of Bongso. The company now owns 6 of the human embryonic cell lines that are supplied worldwide. Currently the research focus of ES Cell International, is on the use of stem cells as cure for diabetes. According to the Stem Cell Research Foundation, embryos are the source of the most versatile stems cells. Due to ethical consideration, research has been directed on cord blood as the source of stem cells. In this regard, Cell Research Corporation in Singapore has successfully differentiated the outer amniotic lining of the umbilical cord into specific cells such as skin bone and fat. Stem cell research results are now being tested for their applicability in Singapore. Leukemia patients at the Singapore General Hospital are being treated with haematopoietic stems cells taken from the umbilical cord blood (International Stem Cell Forum, 2005). Cognizant of the market potentials of the stem cell research results, CyGenics was established in 2004 in Singapore (Shanley, 2005). The
company markets adult stem cell related products, services and technology with the assurance that they will make the technology safe for human use. The company has a blood bank that stores the frozen umbilical cord blood for possible use for lymphoma, anemia and bone marrow cancer (Shanley, 2005).

After the series of political and economic reforms in China, the country has started to develop its health biotech industry only in the 1980s. One sector where China is making a mark globally is in the area of Genomics. It is the only developing country to join the Human Genome Project and thereby paved to the establishment of the Beijing Genomics Institute and the Chinese National Genome Center. In no time was 1% of the human genome sequenced with a 99% accuracy (Zhenzhen, et. al., 2004). The country is also gaining headway in gene therapy. At as cost of U$ 9.6 M, Shenzhen Sibono GenTech was able to develop Gendicine, a recombinant ad-p53 gene therapy type for the treatment of head and neck cell carcinoma. Moreover, Chinese researchers were the first to research on adult stem cells, from blood and umbilical cord. One advantage China has is its many homogenous subpopulations which are important for clinical trials and good for functional genomics and disease gene identification (Zhenzhen, et. al., 2004). Scientists at these Centers have also successfully decoded the genome of rice and sequenced the genomes of chickens and swine.

**Interindustry convergence: Bioinformatics and Nanomedicine**

Various high tech industries are converging and intersecting and have diverse applications (Barlett and Ghoshal, 2002). The technology and skill demands of many high tech firms at the present time go beyond the firm’s capability. The better option they pursue amid the fast changing demands of the times and global business environment in the biotechnology industry is to collaborate and exchange technology. Biotechnology has become so advanced that it has become an interdisciplinary industry. The convergence of complementary industries are warranted due to the pressure of time, risk, and costs. Bioinformatics is one case in point. The levels of information technology and expertise in Japan, Singapore, Korea, Taiwan, and India are very high. These countries have world class and highly competitive IT companies. This gives them leverage in areas where IT and biotechnology converges, e.g., bioinformatics which is the interface between experimentation and computation (BioSino, 2003) specially in the field of gene sequencing and stem cell research. Prof. Wooley of the University of California-San Diego mentioned the important role of bioinformatics from now on due to the complex computations needed in basic research and experimentation as more R&D results are applied. Japanese IT firms are forming partnerships on their own with domestic and in-
ternational biotech firms to combine their complementary expertise. Hitachi formed a synergy with Yamanouchi Pharmaceuticals in genomic research. Itochu using its discovery platform for high level protein research has allied with US Proteomics, a bioinformatics firm (BioSino 2003). Japan's advanced development of nanotechnology could always give it competitive edge in the application of nanotechnology in pharmaceutical research. Unlike in Japan where the highly competitive IT firms seek their partners at home and abroad, in Singapore where the biotechnology sector is still in its nascent stage, the government leads the initiative to develop bioinformatics in the country by creating the Center of Systems Biology and together with Eli Lilly will apply bioinformatics in the study of biological systems (BioSino, 2003). Japanese companies are now gaining headway in putting into practical use nanotechnology as a new drug delivery system targeting cancer cells. The simple concept involves the cancer drug, Paclitaxel, being encapsuled in ultrafine special polymers. The minute capsule is injected into the blood vessels which then moves through the veins, passes through the openings in the blood vessels and attaches to the cancerous cells (Kawa and Goda, 2005). The procedure is still in the Phase I clinical trial in Japan. This new drug delivery system was developed by NanoCarrier Co, a biotech start-up and Nippon Kayaku, a chemical and pharmaceutical company. Japan is making a lot of progress in nanotechnology and it functionality in terms of nanomedicine and bioimaging. A group of researchers from Kyoto University, Terumo Corporation and Nippon Shinyaku Co. are developing a technology to treat malignant tumors by injecting patients with peptides (an amino acid compound). The peptide that dissolves when there is oxygen, has nano biological probe with particles that send out lights attached to it (Kato, K., 2005). Cancer cells develop and metastase in areas where oxygen is scarce. The peptide dissolves only in healthy cells and not in cancerous cells hence the peptide accumulates where the cancerous tumor is. The scientists were able to attach light emitting particles for identification and cancer cell killing therapy for cure, to the peptide (Kato, K., 2005).

**Government enabling policy**

The model of development commonly adopted in Asia involves government leadership, guidance and support to foster an emerging industry. Japan, India, Korea, China and Singapore are each striving to become the biotech hub in Asia. The governments of these countries are determined to make the biotechnology industry the source of growth of their economies by developing and strengthening the industrial infrastructure, providing financial support and incentives to do R&D on biotechnology, encouraging the transfer of technology from public institutions to the private sector and stimulating startups in the sector.
This part presents the concept of bioclusters which form part of national initiatives to develop the biotech sector in Asia. In recent years, biotech companies have outsourced to and collaborated with other companies to do some aspects of the value creation activities to locations/countries where there are sufficient and specialized laboratories and testing facilities. To meet these demands and have critical mass of infrastructures, the bioclusters have evolved (Biospectralm, 2003). Bioclusters provide the networking platform based on physical proximity (clustering) of different facilities in one area. It is a strategy of cluster development involving development of infrastructures that would give industries economies of scale by sharing of infrastructures and services. Bioclusters provide the environment which would integrate and synergize capabilities and resources as well as serve as an interface among the private sector, the universities and public research institutions involved in biotechnology. Examples of bioclusters in Asia which serve as incubators for biotech firms are listed below:

**Malaysia:** Biovalley  
**Singapore:** Biopolis, Taus Biomedical Park  
**Korea:** Daeduk Science Town  
**India:** Genome Valley, Maharashtra  
**China:** Shanghai Biotech Park, Beijing

The Malaysian government for instance opened its first U$ 26 M biotech hub, Biovalley in 2003. Singapore has its own version, the U$ 300 M Biopolis, a world class biomedical science research campus, situated near the National University of Singapore inaugurated in 2004. It houses government agencies, nationally funded research institutions and R&D laboratories of many pharmaceutical and biotech firms. Even before the Biopolis, the Taus Biomedical Park which was constructed in 1988 at a cost of U$ 550 M had been operational already. In view of this, Singapore is now becoming the regional biomedical centre of companies such as GSK, Schering-Plough, Rhone Poulenc, Merck and Pfizer and is also the manufacturing base for Novartis, GSK and Pfizer and R&C center for GSK, Novartis and Eli Lilly. The Daeduk Science Park in Taejon was constructed in the late 1970s and has played an important role in the development of science and technology in South Korea. Its initial mission when it was founded 25 years ago was primarily R&D and education but now the focus has shifted to commercialization of this science and technology knowledge by start-up ventures. Currently the Science Town has 16 startups which were spin offs from national BioVenture Center researches.
The government likewise provides financing which is very dear for this sector either through direct grants or venture capital funds to bring the results of research in biotechnology to the commercial stage. As we have said earlier, R&D in biotechnology is very costly and time consuming and success rates are not that high, so investments in this sector are relatively risky. Venture capitalist in Asia unlike in the US is not a popular source of funding. To this effect, US$ 700 million has been provided by the Singapore government as biotech funds broken down was follows: Biomedical Sciences Investment Fund, US$ 568 million, and Bio Innovation Fund, the Pharm Bio Growth Fund and Life Sciences Investments, US$ 120 million. The Biomedical Science Investment Fund was set up by the government to finance joint ventures between the university and companies and to encourage the transfer of technology from the university and public laboratory to biotech companies. Moreover, through the Technopreneur Investment Fund initiative, the government granted US$ 30 million to Bioveda Capital, a biotechnology fund management firm and has allotted US$ 1.2 B more to develop the R&D infrastructure in biotechnology and health in leading research organizations. In total, the city state has invested more than US$ 2 B into biotech research to attract leading scientists from all over the world in therapeutic cloning, drug discovery, and cancer research. Compared to Singapore, India and Korea so far have made modest commitments. The Indian national government and the state governments of Karnataka state, for example, have created funds valued at US$ 24 million for investment in biotech ventures, while Korea in 2003 established a Won 1 billion fund called the MAF Muhan Agro Bio Venture Fund No 1. The Japanese government has the Millenium project to promote genomic research with a budget amounting to US$ 561 M roughly 17% of the total budget of US$ 3.3 T for biotechnology and biomedicine in 2001 (Treindl, 2000).

**Public-Private alliance**

In Asia, public research institutions, laboratories and universities are known for their leading roles in R&D in biotechnology usually in line with the government’s overarching goal of safeguarding the basic needs and health of the local people. Some of the research centers are arms of the government ministries and some small biotech companies are spin offs from these public and university laboratories. The main purpose of the collaboration between the public institutions and the biotech companies is to find solution to diseases prevalent in the country/region. An example of this public-private alliance is the Novartis Institute for Tropical Diseases (NTD) situated in Singapore which Novartis is pursuing in partnership with the Singapore Economic Development Board with a US$ 122 M budget to discover medicines for
the treatment of tropical diseases like malaria, dengue and tuberculosis. Merlion Pharma, Singapore’s first homegrown enterprise, was founded in 2002 with the privatization of the Center for Natural Product Research (CNPR) in partnership with Fujisawa Pharmaceutical Co. Ltd (Japan), John Hopkins Pte. Ltd (Singapore) and the National Cancer Center to discover and develop new therapeutic drugs from natural sources. Merlion boasts of the following assets and capabilities of CNPR which it is capitalizing on: advanced drug discovery techniques, efficient screening of natural product samples in search of various new bioactive compounds, and the biggest and most diverse collection of natural product samples in the world. (Biomed, 2002). In China meanwhile, Novartis recently formed a partnership in 2004 with the national Shanghai Institute for Materia Medica which has the expertise to identify compounds derived from traditional Chinese medicine that Novartis may be able to develop into new drugs. (Santini, 2004). SINOVAC Biotech Ltd. of China is also actively engaged in the research and development of vaccines for the Avian flu which is a recent phenomenon in Asia together with the Center for Disease Control of China (Business Wire, 2005).

Firms form strategic alliances to achieve the following objectives: bring together complementary skills and assets which each of the company lacks and gain location specific assets; facilitate entry into a foreign market and increase market presence; and spread and reduce costs and risks in the costly development of new drugs (Hill, C., 2005, Daniels and Radebaugh, 2001). In the next section, case studies of how pharmaceutical companies in Asia build strategic alliances to fulfill these objectives will be presented.

Experience effect

The experience effect theory states that the more the firm produces it can exploit the benefits of the accumulated knowledge as it moves down the experience curve resulting to more efficiency and cost reduction. There will be more specialization and creation of dedicated assets and systems giving the firm competitive advantage (Bartlett and Ghoshal, 1992). Hence firms specially small biotech firms who are at doldrums but want to develop global scale medicines, can share and leverage on their unique strengths and capabilities or core competences with other firms by forming alliances. Merlion Pharmaceutical Pte. Ltd is a small home-grown pharmaceutical company in Singapore which was a spin off from a public institution, Centre for Natural Product Research (CNPR) a unit of Singapore’s Institute of Molecular Biology. The core assets of Merlion include the world’s largest and most
diverse natural product samples library with potential pharmaceutical applications not to mention the high throughput (HTP) screening of natural product samples to discover an array of new bioactive compounds and natural product chemistry skills for which reasons many biotech foreign companies would like to collaborate with Merlion. Banking on these prime competences Merlion has formed strategic alliances with the following big international pharmaceutical firms capitalizing on its collection of natural compounds: (i) Sankyo (Japan) 2005: Discovery, clinical development and commercialization of new therapeutic drugs from the natural product chemistry (Biospace c, 2005); (ii) British Biotech (Plc) 2003: Discovery and development of anti-bacterial ribosomal inhibitors from natural sources (Merlionpharma b, 2003); (iii) NovImmune S.A. (Switzerland) 2003: Discovery and development of drugs for immunosuppression and immunomodulation using natural products (Merlionpharma c, 2003); (iv) Athelas (Switzerland) 2003: Discovery and pre-clinical research of a new class of anti virus and anti infection drugs from natural product samples (Merlionpharma a, 2003); (v) Genome Therapeutics (US) 2003: Discovery of anti infectives using natural occurring compounds (Biospace b, 2003); (vi) Abbott laboratories (US) 2002: Drug discovery for therapeutics in the fields of oncology, antivirus, immunology and neuroscience using natural compounds (Biospace a, 2003).

With limited R&D budgets, firms capitalize on their novel capabilities and technology and tie up with big well-established international pharmaceutical companies. Toyama Chemical Co., a Japanese mid-sized drug company and GSK formed a partnership to do R&D on new antibacterial agents. Although Toyama has a comparatively small library of chemical compounds by international standards that can become new health drugs, its leverage is its core competence in 'optimization', a 'high throughput processing' (HTS) used in the identification of chemical compounds (Kato, T., 2005). Similarly, Kyorin Pharmaceutical, another mid sized Japanese company has become a licensee of the third biggest pharmaceutical company in the world, Merck and Co. (US) to research together and synthesize antibacterial agents banking on Kyorin's competence in looking for new chemical compounds. These firms collaborate with international drug companies for two reasons: to hasten the speed and improve efficiency of the application of specific assets in the development of novel drugs and to have access to the global market.

**Fast access to local and global market**

Many domestic and multinational drug companies have sales and distribution tie-ups. The
reason behind the formation of across the border horizontal alliances among pharmaceutical firms is to secure fast and reliable access to the global market or previously closed markets. With the aim of increasing their share in the Japanese pharmaceutical market many multinational drug companies have strategic alliances with Takeda to market their products in Japan such as such as: Wyeth (2003) to co-promote Etanercept for rheumatoid arthritis; Kissesi Pharmaceuticals (2002) to co-market short acting postprandial hyperglycemia suppressant (Glufast); Novo Nordisk Pharma (1999) to co-promote Pioglitazone (actos) and Eli Lilly (1998) to co-promote Pioglitazone (actos). Takeda is now strengthening its marketing power in Japan by having 1,450 medical representatives, organizing them into teams to service medical institutions and is trying to improve the quality of MRE performance by sharing medical information updates and sales knowhow. LG Life Sciences of South Korea, an affiliate of the Chaebol, LG develops and commercializes new anti infection drugs, medicines for cancer, diabetes, etc. Some of its well-known drug are Euvax-B for the treatment of Hepatitis B, LG HCD 3.0 for Hepatitis C and Factive (Gemifloxacin), an antibiotic of the quinolone family which LG Life Sciences jointly developed with GSK In 2005, Sinovac Biotech Ltd. of China and LG Life Sciences of Korea have agreed on a sales and distribution alliance. LG Science’s known prowess is its knowledge in overseas marketing development and its international marketing network. It already has well-developed global sales and distribution networks for its HepB vaccine, including UNICEF programs and distribution to 67 countries (Business Wire, 2005). Given this, LG Science will sell Sinovac’s Hepatitis A vaccine (Healive(TM)) and for its part of the deal Sinovac will introduce LG’s HepB vaccines in the Chinese market. They will also work together on Sinovac’s influenza vaccine (Anflu(TM)). Sinovac and LG believe that there is tremendous potential for selling LG’s HepB vaccine in China. LG will register its HepB vaccine in China through Sinovac. Sinovac Biotech Ltd. specializes in the research, development, commercialization, and sale of human vaccines for infectious illnesses such as hepatitis A and hepatitis B, influenza, “SARS”, and avian flu. The two vaccines of SINOVAC approved for commercialization are : Healive (tm) for Hepatitis A and Bilive (tm) for Hepatitis A and B combined; both seen to have big market potentials in China. SINOVAC is the global forerunner in the research and development of SARS vaccine which is already awaiting approval. LG thus seeks to collaborate with SINOVAC in the development of the vaccine cognizant that it is a novel drug with worldwide medical application.

New Economies of Scale and Scope

Strategic alliance also refers to the cooperative agreement between actual competitors, com-
panies in the same line of business. Companies resort to this strategy to have more market power and new economies of scale and scope which are very evident in the Japanese pharmaceutical sector. Bartlett and Ghoshal (1992) outlined the benefits of forming alliances: 1. The partners can bring together their resources (production equipment, financial resources, R&D, distribution channels) and concentrate their activities to raising the level of the activity or rate of learning rather than doing these tasks separately; 2. The partners can share and leverage on their specific core competence; 3. Exchange of complementary core competences or resources which can save on costs due to duplication of costly activities. Having said this, partners are deemed to benefit from the alliance with reduced cost as well as risks, which are shared by all the partners.

Japan is the second biggest drug market in the world worth US$ 58 B hence is an attractive market for the big and well-established pharmaceutical companies in the West such as Pfizer, Novartis-Pharma KK and AstraZeneca. In Japan survival of the pharmaceutical sector depends on its financial strength and global reach which most Japanese firms lack. During the time when the Japanese market was protected from multinational drug makers, domestic pharmaceutical firms enjoyed high profitability mostly from licensing deals with foreign companies. But the government cuts drug prices and non-Japanese pharmaceutical companies can easily get drug approvals. Hence GSK and Pfizer, Novartis and AstraZeneca just market their products using their own sales force. These companies are offering their local rivals in Japan tough competition by capturing 10% of the market share since 2000 with the adoption of aggressive marketing strategies and more importantly the continuous introduction of novel drugs that these international drug companies have sold successfully in other overseas markets (like cholesterol lowering drug, Lipitor) (Nikkei Weekly, 2004.) Many of the foreign drug manufacturers are now entering the Japanese market with their own new drugs rather than license their products to Japanese pharmaceutical companies. The Japanese drug companies are now faced with two dilemmas: no new drugs in the pipeline and no resources to have international reach. Hence the Japanese companies have to come up with their own innovative drugs that require high R&D costs. To counter the size of these big pharmaceutical firms in the US and Europe and the cut in drug prices in the domestic front which impacts on their profits, pharmaceutical firms in Japan are consolidating their operations through mergers: Yamanouchi Pharmaceuticals Co. and Fujisawa Pharmaceuticals (April 2005), Sankyo Co. and Daiichi Pharmaceuticals (October 2005) and Dainippon Pharmaceutical Co. and Sumitomo Pharmaceuticals (October 2005). In April 2005 Yamanouchi Pharmaceuticals Co., the third largest pharmaceutical company in Japan
and Fujisawa Pharmaceuticals, the fifth largest pharmaceutical company, have merged under a new name Astellas Pharma Inc. with a combined sales of Yen 820 B in 2004. The symbiotic alliances between companies will broaden their product offering by forming a synergy. Each of these companies offer complementary products: Harnal, a urinary disorder drug and Gaster, a peptic ulcer drug of Yamanouchi Pharmaceuticals and Prograf, an immunosuppressant sold by Fujisawa. Sankyo Co. and Daiichi Pharmaceuticals also integrated their operations in October 2005, the second and sixth biggest drug companies in Japan, respectively, making the merged company the second biggest pharmaceutical company in Japan with combined sales of Yen 911 B. The business integration of Sankyo Co. and Daiichi Pharmaceutical Co. will bring together the drugs for the treatment of Alzheimers, urology and infectious diseases which Daiichi is well-known for and Sankyo’s drugs for cardiovascular diseases (e.g. Mevalotin). This merger will complement each alliance partner's strength not only in the manufacturing but also in R&D and strengthen their global business presence because using both companies’ sales force abroad will maximize scope of their drugs for inflammation and immune disorder, arthritis, cardiovascular and infectious diseases (Bioprtfolio, 2005). As such, duplication of functions will be avoided in this highly competitive and costly industry.

With the merger of Sankyo Co. and Daiichi Pharmaceuticals, the distribution network in the US of Sankyo will give them an edge in the US market. Since Japanese drug makers are in a disadvantage in launching novel drugs, they are now integrating to strengthen their R&D. As a wake up call strategy, Sankyo has drugs in the pipeline for myocardial infraction and arteriosclerosis. R&D in Japan for the discovery of new drugs costs Yen 100 billion yen. The US drug makers dwarfs the sales and R&D expenditures of Japanese drug companies. Around Yen 800 B is spent on R&D by Pfizer alone. Hence with consolidation the R&D spending of Sankyo and Daiichi Pharmaceutical companies will be around Yen 150 B.

**Conclusion**

Asia is seen to be the next biotech hub led by pharmaceutical firms, both domestic and international, that can do or outsource value creation activities such as drug R&D, clinical testing, manufacturing and distribution in the region. Biotech companies in Asia are small in size and capitalization compared to their Western counterparts and are still in the nascent stage. The Asian advantage are in terms of market and location and cost economies which biopharmaceutical firms can exploit to increase returns to sales or profits. The Asian market for pharmaceutical products and services has big potentials specially for novel drugs for the treatment of diseases common in Asia such as respiratory and infectious disease and
cardiovascular ailments which have been the focus of many biotech firms in Asia, aside of course from the other therapeutical medicines that have already been tested in the West for common ailments and licensed to drug companies in Asia. In terms of location economies for the biotech sector, the Asian region has these to offer: pool of highly skilled scientists and technicians and cost competitiveness. Singapore, South Korea and China hope to have important niches in genomics and stem cells research as well as their applications. Japan, India and South Korea meanwhile can leverage on their strengths in IT and emerge as strong in bioinformatics. Japan now puts its know-how in nanotechnology into practical use (nanomedicine) as the next generation drug delivery system. Moreover, government initiatives (such as the bioclusters) and public financing are enabling policies that give support to the rapid development of the biotech industry in Asia. Amid the ever increasing global competition in the biotech sector and in spite of the fact that after the costly R&D only 15% of the drugs developed reach the commercialization stage (CDSS, 2002), there is the need for pharmaceutical companies in the region to innovate rather than count on generics and to pursue global medicines for the maintenance of the company. Hence to survive the competition and takeover from the more powerful Western pharmaceutical companies, they form synergies using each partner’s strengths and share in the expensive R&D costs. Alliances can also lead to increased market (international) presence that will bring about economies of scale and scope.

References:


Firm Strategy and the Asian Advantage: The Case of the Emerging Biotech Industry