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Regional Strategies of Multinational Pharmaceutical Firms

Abstract

Recent research on the world's 500 largest companies has established that the majority of international business occurs within regional clusters in the three largest economic regions of North America, Europe, and Asia (the triad). This finding extends to the 18 companies in the chemicals and pharmaceuticals sector, which is the most innovative in the world.

Key Results

This paper examines the R&D and strategies of the world's largest firms in the pharmaceuticals sector and finds a high degree of intra-regional sales. R&D and sales are more concentrated within North America and Europe than in Asia. In addition, the relative size of the U.S. market, compared to other parts of the triad, creates imbalances with respect to R&D, sales and international strategy.

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Abbreviated Heading: Regional Strategies in Chemicals

Introduction

A new research stream has demonstrated that the vast majority of international business activity is conducted on a regional basis, rather than globally. By regional is meant the large "triad" markets of the European Union (E.U.), the United States (or, more broadly, NAFTA), and Japan (or, more broadly, all of Asia). This research is illustrated in Rugman (2000) (2003), Rugman and Brain (2003), and Rugman and Verbeke (2004).

Of the world's 500 largest multinational enterprises (MNEs), the sector which is consistently one of the most innovative is chemicals and pharmaceuticals. In this paper we examine the R&D of the 18 MNEs in this sector and relate this to the regional nature of their sales. Of the 500 largest companies in the world, it is possible to find data on their geographic sales in the "broad" triad regions of Europe, North America, and Asia. These data exist for 380 of the 500 firms. Of these 380, 200 are in services, leaving 180 in manufacturing, see Table 1. Of the 180 manufacturing MNEs, there are 18 in the chemicals and pharmaceuticals sector.

Table 1 here

Of these 18 MNEs in the chemicals sector, data are available for all 18 (one company, Pharmacia, was acquired by Pfizer in 2002) and these can be classified as shown in Table 2:-

Global	0
Bi-regional	5
Host bi-regional	2
Home region	11

The regional sales of these 18 MNEs, across the triad, are also reported in Table 2. Their average home-region sales are 54.5%, while for all 180 MNEs in manufacturing it is 62%.

Table 2 here

Table 3 examines the R&D of these MNEs. The average R&D to sales percent for these chemical and pharmaceutical MNEs is 9.9%. Eli Lilly had the highest R&D to sales expenditures at 19.4%, followed by other pharmaceutical companies such as:- AstraZeneca at 17.2%; Aventis at 16.6%, and Pfizer at 16%. In contrast, there were relatively low R&D expenditures by chemical firms:- BASF at 3.5%; Dow Chemicals at 3.9%; and DuPont at 5.3%. These data suggest that pharmaceutical companies conduct greater R&D than chemical MNEs.

Table 3 here

In this paper we analyze such innovation differences in the chemicals sector, especially in pharmaceuticals which records consistently higher R&D expenditures than pure chemical MNEs. Once a drug has been developed and patented, few substitutes if any, can compete with it over a prescribed period of time. Patients suffering from disease, especially those that are terminal or which produce discomfort, have a significantly inelastic demand for drugs as do the doctors working with health insurance schemes. Since the cost of manufacturing a drug is often marginal, pharmaceutical firms depend on national patent protection for their discovery to generate profits. Over the last decade, the development of drugs has become more and more expensive and produced lower profits than in previous decades. Yet, as a pharmaceutical's survival is dependent on new drug

development, R&D expenditures are the only way of assuring the long-term survival of the company.

The products of chemical companies, on the other hand, are often not necessities and have many substitutes. Marketing a differentiated product to the consumer is often the only way to obtain a premium price. R&D investment might produce a better paint, textile, pesticide, or plastic but many chemical products are now commodities, with low returns to R&D.

It is often difficult to disentangle chemical companies and pharmaceutical companies as they tend to engage in similar businesses. For instance, companies in both sectors engage in biotechnology, and some chemical companies have pharmaceutical operations. It is no surprise that Bayer, which has a large pharmaceutical arm, is the chemical company with the highest R&D to sales ratio. In Table 4, the R&D to sales ratios of the six chemical and twelve pharmaceutical MNEs are reported. On average, pharmaceutical companies spend 12% of revenues on R&D, more than twice that spent by chemical companies.

Table 4 here

Pharmaceutical companies also tend to be slightly more intra-regionally oriented with regards to revenue. This might reflect a relatively tougher set of regulations for pharmaceutical companies. At nearly twice the size of the European market, the United States is the largest world market for pharmaceuticals. It is also the fastest growing, and not surprisingly, where most large pharmaceutical companies prefer to operate.

The Boston Consulting Group estimates that 40% of all research facilities of large pharmaceutical companies in the world are located in the United States. While a major

reason for this is the large size of the U.S. market, most importantly, on average U.S. residents pay more than twice as much as Europeans for pharmaceutical products. Price controls in European countries can influence upwards the extra-regional percentage of sales for European pharmaceutical MNEs while decreasing the extra-regional percentage sales of U.S. pharmaceutical MNEs.

Most firms tend to have a larger portion of their R&D facilities in their home region of the triad. Indeed, looking at Table 7.5, which shows the distribution of R&D facilities across the triad for a selected number of pharmaceuticals, all of the firms show over 50% of their R&D facilities to be in their home region. This, however, understates the significance of home-region based R&D. The number of facilities tells us little about the particular importance, or of the resources devoted to research, in a given geographic region. A more telling statistic would be the amount of R&D expenditure in each region. This information is generally not available. R&D is highly centralized in the home region of the firm, even when sales are spread more across regions. For instance, host-region oriented European-based firms, like AstraZeneca and GSK, continue to have over 50% of their R&D facilities in Europe. Bayer, the bi-regional chemical company, allocates over 70% of its R&D budget to Europe even though this region accounts for only 41.3% of total revenues.

Table 5 Here

Barriers to Global Strategy in the Pharmaceutical Industry

A set of stringent local and regional regulations prevent pharmaceutical companies from adopting a global strategy. R&D and sales are more concentrated within North America and Europe than in Asia. In addition, the relative size of the U.S. market for pharmaceuticals creates a significant imbalance that shapes the industry and defines international strategy. In chemicals, a lower dependency on patents, the existence of multiple substitutes, and the commodity nature of products results in lower R&D spending and more geographically spread sales.

The pharmaceutical industry is heavily regulated by national and regional governments. The first set of regulations that pharmaceutical firms must overcome is the drug approval process. Presently, this approval is attained at a national level, so pharmaceuticals must test their products and follow the procedures in each jurisdiction. The E.U., however, is moving towards a regional approval process to take effect in 2004 or later (FDA News, 2003). The liability for damage caused by drugs also varies across nations and must be taken into account when introducing a new drug.

Another set of regulations is price controls. Some countries have price controls for pharmaceuticals in the form of fixed pricing, reference price lists, or volunteer agreements with the pharmaceutical sector. The United States, the largest pharmaceutical market in the world accounting for nearly half of the world's market for pharmaceuticals, takes a more *laissez faire* approach to pharmaceutical pricing; thus there is more R&D in the United States than in Europe.

In Germany, the government has adopted regulations to decrease the overall expenditure on pharmaceuticals. A reference price system forces patients to pay the difference between the reference price and the market price. Since most patients are not willing to pay this difference for many drugs, pharmaceutical companies are forced to bring their prices down to the reference price or face a huge decrease in sales of prescription drugs. The French government encourages the use of generics and directly regulates prices of prescription drugs. In 2003, the Italian government implemented a pharmaceutical-reimbursement policy that would only offer refund to a level set by the Health Ministry. The Department of Health of the U.K. has the power to regulate prices for pharmaceutical products and control the profits of pharmaceutical companies. As a result, a voluntary agreement was reached in which manufacturers can set initial prices for their drugs, but price increases are regulated.

Marketing is done at a national level. This is because governments not only approve a drug and might set prices, but they also regulate distribution and advertising. The type of packaging and labeling that is permitted and whether a drug is sold only with a prescription is the decision of each government. Governments may even force pharmaceuticals to license the rights to produce their patented drugs. Some governments allow pharmaceuticals to market directly to consumers; others restrict this practice while others ban it altogether.

Many pharmaceutical (and chemical) companies are also in the crop-science business and must plan their strategies to conform to individual government regulations and customer perceptions about genetically modified crops.

Despite such barriers to trade, pharmaceutical products have some of the lowest percentage of intra-regional sales among manufacturing industries. A number of factors explain this. (1) Most pharmaceutical products need not be heavily adapted (in some cases only the packaging and labeling is different) for each geographic market. (2) Large pharmaceutical companies own the rights to brand-name drugs that are essential for healthcare across the world. (3) Once research and development costs are sunk, pharmaceutical companies will continue to sell the drug despite government price control as long as a profit on production costs is made. What governments are doing is basically regulating monopolies on patented drugs which may have very inelastic demand curves.

Case Studies

We now examine the strategies of six pharmaceutical MNEs in a set of case studies. In these case studies we analyze the strategy and structure of the MNE, especially in relation to its R&D. We use frameworks from international business strategy, such as Rugman and Verbeke (1990) with their focus on firm-specific advantages (FSAs) and country-specific advantages (CSAs). The MNEs to be examined are:-

Bi-Regionals:	Aventis GlaxoSmithKline AstraZeneca
Home Region:	Merck Pfizer-Pharmacia Eli Lilly

<u>Aventis</u>

In 1999, Hoechst of Germany and Rhône-Poulenc of France combined their businesses to create Aventis—a bi-regional pharmaceutical company that researches, develops,

manufactures, and markets branded prescription drugs. In 2002, Aventis employed 71,000 people in 100 countries around the world. Although 91.2% of its revenues are derived from sales in foreign markets, the European region accounts for 36.4% of revenues. The most important market for Aventis is North America, where it derives 44.8% of its revenues. Asia-Pacific accounts for approximately 6.4% of sales.

Aventis is organized across business lines. Its core businesses include: prescription drugs, human vaccines, and animal health. The company markets its products through its commercial subsidiaries. The most important of these are located in the United States, Japan, France and Germany, which together account for 64% of Aventis' core business sales. Presently, Aventis is aggressively seeking expansion in the U.S. market. The company currently derives just below 40% of its sales from this country, significantly less than other large European pharmaceuticals. Aventis' structure is centralized in terms of drug development and is decentralized in terms of marketing. The company is divided into three core businesses, and its commercial operations are nationally responsive units in major markets. Its North American marketing operations are just as important as the European ones.

Aventis' strategy is one of low levels of economic integration in terms of marketing and high levels of national responsiveness. Once a drug has been developed, it must be approved by each national government in which it operates. Marketing must also be done in accordance with local legislation, the structure of the healthcare system which influences the distribution of drugs, price controls, and individual cultures and preferences of clients. The locally-based structure of the pharmaceutical industry makes high levels of economic integration in distribution and marketing impossible and forces

firms to be nationally responsive. Even in terms of manufacturing, whether a drug will be produced locally or imported across national borders is highly dependent on the regulations of the nation and regional trade treaties.

R&D centers for Aventis are located across the triad. Two research centers are based in Europe; there is one in North America and one in Asia-Pacific. Thus R&D shows high levels of economic integration. Indeed, Aventis' development of a drug can take place in any of its R&D labs across the world and lead to a drug product that can be sold in all jurisdictions. Like all other pharmaceuticals, Aventis is faced with the increasing cost of production and marketing new drugs. The development of new and expensive R&D technology and the increasing layers of regulation in each national market increase the cost of bringing new drugs to market. On the revenue side, governments at all levels and other bulk clients are seeking to reduce healthcare expenditure. At the same time, a growing population with higher life expectancy is increasing the demand for pharmaceuticals. In industrialized countries the aging population seeks to live healthier lives by ensuring access to medication.

One major FSA that Aventis possesses is its drug portfolio and the R&D for its continued development. This is potentially a global advantage if a drug could be sold across the world. Unfortunately, individual national regulations prevent such global production and sales. Its pipeline of drugs in development and its researchers constitute FSAs that are potentially global but not in practice. The expertise of each individual marketing subsidiary is also an FSA. The CSAs are regional. The intellectual hubs that foster the ability of researchers have allowed Aventis to expand its R&D capabilities across the triad. There is one R&D facility in North America, one in Asia-Pacific, and

two in Europe. For the firm, each region has a set of regulations that it must adhere to. In the case of North America, its most important market, those regulations are dominated by those of the United States. The United States takes a more favorable stance on genetically modified foods than the E.U., and this is echoed by the population. Thus, Aventis would have a much easier time marketing GM products in the United States than in Europe.

GlaxoSmithKline

With £28.3 billion in revenues, and 100,000 employees, GlaxoSmithKline (GSK) is one of the largest pharmaceutical companies in the world. The company markets over 70 prescription drugs and a variety of consumer healthcare products. Although incorporated in the U.K., over half of its sales originate in the United States. It is a host-region, bi-regional company.

Approximately 30 years ago, British Glaxo was a small company in the dry milk, antibiotics, respiratory drugs, and nutritional businesses. The discovery of Zantac, a drug to treat stomach ulcers, catapulted the company into the mainstream pharmaceuticals market and financed its expansion into the U.S. market. As the patent for Zantac was about to expire, Glaxo found itself in a sticky situation. Up to that point, the company had relied on internal R&D, but this had failed to develop the R&D capabilities for sustainable long-term growth. In 1995, the company merged with Wellcome, a company known for its strength in R&D and its lack of marketing capabilities. The merger was successful in that the new company produced a stream of new drugs that could be marketed using Glaxo's expertise. In 2000, Glaxo Wellcome merged with SmithKline Beecham. According to Sir Richard Sykes, then chairman of Glaxo Wellcome, the deciphering of the human genome would transform the industry and only large

companies who can afford to invest to work with this new information would succeed. Together, these two companies are immune to the problem of losing a major blockbuster drug; no one drug accounts for more than 12% of the company's revenues.

Based on location of consumers, the United States is GSK's largest market, accounting for 50.9% of revenues. If we consider only pharmaceuticals, the U.S. market becomes even more significant accounting for 54.4% of revenues. With Canada, this number increases to 56.8%. GSK derives 28.6% of its sales from its home-market region of Europe. In the heavily-regulated pharmaceutical market alone, GSK derives an even lower portion of its sales from the region, at 26.1%. The European market accounts for 25% of the world market for pharmaceuticals.

GSK's strategy is one of low economic integration in terms of marketing and high levels of national responsiveness. Government regulations, the structure of the local healthcare system, and cultural differences do not allow pharmaceutical firms to adopt strategies of high economic integration in distribution and marketing. GSK must be significantly more responsive to its host region of North America as it is its primary market. Nonetheless, R&D shows high levels of economic integration. Indeed, GSK's development of a drug can take place in any of its R&D labs across the world and lead to a drug product that can be sold across all regions. It has developed a network where "best practice" in its R&D labs can be used anywhere in the network.

The first step in the development of a drug is research and development. GSK spends over £2.6 billion in R&D and has over 15,000 researchers in 28 major R&D sites around the world. Of these, 14 are located in Europe, 10 in the U.K., and one in each of Belgium, France, Italy, and Spain. In North America, the United States houses five R&D

facilities and Canada one. In Japan, the company has R&D operations in the Tsukuba Science City in Takasaki.

GSK spreads R&D around the world to take advantage of CSAs in terms of human resources and institutional infrastructure that might help it develop a new drug. For instance, it links to an academic department in a major research university with a teaching medical center that is exploring a new drug treatment. Another reason is to monitor more closely the research progress of its competitors, most of which also have R&D facilities in all areas of the world. Finally, R&D facilities might be better able to respond to the particular needs of regional communities.

Once GSK has developed a new drug, it must obtain government approval. This must be done for each individual nation in which the company markets the product, and the process can be significantly different in each jurisdiction.

Production and marketing are the next steps for a new drug. GSK's supply chain is divided into a primary supply chain and a secondary supply chain. The primary supply chain manufactures active ingredients for its products and ships them to the secondary supply chain, which manufactures the end product. There are six primary supply chain sites: Australia, India, Ireland, Singapore, the United States, and the U.K. In Europe, there are 17 secondary supply chain sites. North America houses an additional six secondary supply chains. The rest of the world houses 32 secondary sites in 19 countries (the Middle East and Africa houses five sites, 22 sites are located in Asia-Pacific, and Latin America accounts for the remaining five sites).

Proximity and regional regulations prevent multinationals from segmenting national markets. As a result, GSK was not able to continue selling drugs to Spain under

a two-price system, one for local consumption and one for exports into the E.U. Similarly, the integration of the North American market under NAFTA makes preventing the importation of Canadian pharmaceuticals into the United States difficult despite the health section having been exempted from the national treatment provisions of NAFTA. Indeed, pharmaceutical companies are struggling with supplying drugs to the Canadian market that erode their profits in the U.S. market. Beneficiaries from this intra-regional trade of drugs are considering whether to challenge the U.S. government and GSK under NAFTA to continue to trade in pharmaceuticals.

Although the United States and Europe account for nearly 80% of GSK's sales, developing countries took center stage over AIDS medications. In 2000, Cipla of India offered to produce generic versions of AIDS drugs to underdeveloped countries at a 90% markdown. GSK and other pharmaceuticals sued the South African government to stop the drug from being imported, but this sparked a public relations nightmare. Oxfam, a development NGO, accused the pharmaceuticals of waging war on the world's poor. The companies had a difficult time explaining to their developed-country consumers how they could potentially let millions die of AIDS when a cure was readily available. Under a storm of criticism, the drug companies withdrew the suit and paid the South African government's legal costs.

AstraZeneca

In 1999, British Zeneca merged with Swedish Astra to create what at the time was the third largest pharmaceutical company in the world. The merger was considered a union of equals. Astra was a leader in the ulcer market, with Prilosec, at the time the world's best selling drug. Yet the dependency on this one drug made the company highly vulnerable as its patent was projected to expire in 2001. Today, 55.6% of European AstraZeneca's $17.8 billion in revenues is derived from North America. Its home region of Europe accounts for only 31.9% of revenues. Japan accounts for a mere 5.5%, and the remaining 7% is derived from other markets. It is a host-region oriented firm.

In 1999, Imperial Chemical Industries (ICI) divested its pharmaceutical business under the name Zeneca. ICI, the world's largest producer of paint, remained a chemical manufacturer. While Zeneca continued to prosper independently, the separation proved devastating for ICI. In the four years that followed, ICI's shares were significantly undervalued, and the company sought acquisitions, including companies it had divested to strengthen its position.

AstraZeneca is a good example of the marketing difficulties pharmaceuticals face even after they have cleared drug regulatory bodies. Each national jurisdiction has its own rules for marketing drugs, forcing companies to structure their marketing strategies to fit the local environment, and preventing the development of a global strategy.

Astra Zeneca's strategy is one of low levels of economic integration in terms of marketing and high levels of national responsiveness. In R&D, however, it has high levels of economic integration. Indeed, Aventis' development of a drug can take place in

any of its R&D labs across the world and lead to a drug product that can be sold in all jurisdictions.

The weight of the safety and marketing regulations in each national jurisdiction is too large relative to overall operations for AstraZeneca to develop a global strategy. The emergence of regional blocks means another set of regulations and barriers that AstraZeneca must take into account. Therefore, the company cannot have a uniform global strategy. Governments are nationally responsive to the demands of their citizens. Drugs are perceived differently across national borders. In addition, local communities may react differently to drugs. There is also an entire industry built around the approval process that governments have an interest in maintaining.

A significant risk for pharmaceutical companies is the discovery of new or more dramatic side effects that were not discovered during clinical testing. In late 2002, the Japanese government restricted the use of Iressa, a drug aimed at patients with lung cancer, after over 100 deaths were reported linked to taking the drug. Clinical trials showed that lung-cancer patients showed significant improvement after taking the drug. The Japanese Ministry of Health did not ban the drug as it considered the benefits to late-stage cancer patients outweighed the risks. However, the discovery prompted AstraZeneca to change its labeling to reflect the risks and the Japanese Ministry of Health to require that patients taking the drug be hospitalized for four weeks to monitor side effects. In clinical trials, Japanese patients taking Iressa benefited significantly more from the drug than other patients. However, it turned out that they were also far more likely to suffer from interstitial lung disease (ILD), a side effect of the drug. ILD, the cause of all Iressa-related Japanese deaths, occurs in all cancer treatments. Yet, a media panic in

Japan made international news and threatened to jeopardize Iressa's approval in the United States and Europe.

In the case of Iressa, AstraZeneca made the decision to launch the drug in the Japanese market first. The panic that ensued compromised drug approval in its two largest markets of Europe and North America. Although a regional strategy is required for drug marketing, the strategic launching of pharmaceuticals must be thought of on a global basis. Panics in the media do not remain regional. AstraZeneca's mistake was to launch Iressa without examining or taking into consideration that the Japanese were more likely to suffer interstitial lung disease. Even though they were also more likely to benefit from the drug, the risks associated with it were far higher than for other regions.

In conclusion, while AstraZeneca has to be careful in its European domestic market, it also faces regulations in its large North American market and in the Asian market. These prevent the company from adopting a worldwide strategy. At the same time, it can be argued that regional effects might have worldwide repercussions. It needs to think regionally rather than globally, but continue to consider the intra-regional effects of its regional actions.

Merck

Merck is a U.S. based firm deriving 83.6% of its revenues from its home national market. That Merck derives most of its profits from the United States is no surprise. This is the case for most large pharmaceutical companies. After all, the United States is the largest market, and it has the least price regulation among all industrialized countries. Most of Merck's research is conducted in North America, where the company has six research facilities (five in the United States and one in Canada). Yet, despite the dominance of the

North American region, the company also has five R&D facilities in Europe and one in Japan.

Merck's strategy is one of high economic integration and low national responsiveness. Although the company is facing different market conditions in Europe which would require developing a nationally responsive strategy, this only accounts for a small fraction of its operations.

The company is organized on the basis of products and services. Merck's revenues are derived from prescription, therapeutic, and preventive products. Medco Health revenues are derived from the sale of prescription drugs in the United States through managed prescription drug programs. Merck has "global" product lines (i.e. run in a uniform manner from head office). The firm is basically divided across business lines. There is no significant geographic segmentation in terms of business units. A product/service based structure that includes nationally-based Medco Health gives Merck a competitive advantage against other competitors in the U.S. market, but it does nothing to help it compete in other regions of the world. Merck's strategy is based on centralized product/service lines, not regional ones. That is, there is no European SBU to integrate all European operations. In addition, the European market is fractured in terms of language, culture, and healthcare structure, making a regional strategy more difficult to achieve.

Ray Gilmartin, Chairman of Merck, stands by the motto, "Medicine is for the people. It is not for the profits. The profits follow." This is why the company stood aside while the pharmaceutical industry restructured through a wave of mergers in the late 1990s. At the time, Merck faced the same problems plaguing the entire industry: (1) the patent expiry of some of its most important drugs; (2) competition from generic

companies; (3) increased price regulation by national and sub-national governments; (4) increase costs of developing a drug; and most importantly (5) a slowdown in the number of successful new products that it develops. Yet, while competitors rushed to buy rivals to increase overall R&D expending, Merck chose to go at it alone relying on the strength of its research force. This strength is undisputed. Between 1996 and 2000, the company patented 1,933 new compounds, the highest in the industry. That this is done with a lower R&D budget than that of other large pharmaceuticals only increases the reputation of Merck as a research-oriented company. The benefit of such a vision is that the company can lure some of the best scientists, or, at the very least, some of the more dedicated to their research.

One of Merck's FSAs is the caliber of its researchers. Other FSAs include its patented compounds, its pipeline of drugs in progress, and its portfolio of current drugs in the market. Merck's reputation is also an FSA. Not only is the quality of its research well regarded by the public, but it is also well regarded in terms of corporate responsibility.

As a U.S. based firm, Merck is located in the largest pharmaceutical market in the world, where most R&D is performed, so it is a hub of innovation that Merck can use to improve its competitive position. R&D facilities are often built to take advantage of specific human resources in an area or region to take account of government incentives or institutional infrastructure, as well as to monitor competitors.

Merck has also had to take a different stance in poorer countries where the cost of medication is prohibitive for many patients. In 2001, Merck, in collaboration with other large pharmaceuticals, launched a lawsuit against the South African government. At the time, the country was switching to generic drugs to combat AIDS, which was affecting

10% of its population. Drug costs were often higher than salaries, and, like Brazil, the country had to decide to either honor the patents of large MNEs to produce its own or to import it from countries that already legalized generics and produced them at a fraction of the cost. Throughout the world, protestors rose up against the lawsuit, forcing pharmaceutical companies to justify letting 250,000 people die every year. Merck was the quickest to realize the public relations hole which it had dug, and it acted to broker an agreement between the industry and developing countries. Merck no longer makes a profit from selling HIV drugs in the poorest of countries. Others in the industry complain that this inhibits future research, but Merck was quick to point out that as long as pharmaceuticals can continue to make significant profits in the developed world, research will continue at the same pace.

Pfizer Pharmacia

In 2000, Pfizer offered $90 billion to Warner-Lambert shareholders to win a hostile takeover and snatch the company from American Home Products, which was already negotiating a friendly merger with Warner-Lambert. Only two years later the company offered $60 billion for Pharmacia. These acquisitions turned Pfizer into the largest pharmaceutical company in the world with an estimated $37.5 billion in revenues and a $7 billion R&D budget.

Pfizer is a home-region oriented company with 64.1% of its sales in the United States. Its R&D is headquartered in its home region of the United States. Excluding Pharmacia, six of the pre-merger company's R&D facilities are in the North American

region (one in Canada and five in the United States). Europe hosts three Pfizer R&D facilities and Japan two labs.

The company operates in two business segments: pharmaceuticals and consumer products. The pharmaceutical segment is the largest, accounting for 92% of Pfizer's business and includes human and health pharmaceuticals and capsugel, a capsule-making sub-segment. Pfizer's Consumer Healthcare business manufactures over the counter healthcare products, including Listerine, Rolaids, Vizine, and BenGay. International operations include both the pharmaceutical and consumer product segments. Marketing is conducted through subsidiaries and through distributors.

In an industry where constant innovation is the most valuable long-term predictor of wealth creation, Pfizer is better known for the capabilities of its sales force. To date, its competitive advantage has been marketing. Pfizer's 11% world market can be attributed to the company's sales force of 35,000 representatives.

Even if Pfizer cannot compete as an innovator, it is well positioned to profit from the innovations of others. This might be the company's saving grace since a large R&D budget has produced very little relative to the industry. It costs Pfizer more than three times as much to discover a compound that can be patented than it costs its largest U.S. competitor, Merck. Between 1996 and 2001, Pfizer patented 1,217 compounds at a cost of $17.5 million each. For the same period, Merck patented 1,933 compounds at a cost of $6 million each. One of the most compelling reasons given for mergers and acquisitions, a large R&D budget, has not yet proven fruitful. For a discussion of the international expansion of Pfizer, see Fina and Rugman (1996).

Small pharmaceuticals that can produce a prize drug are willing to partner up with Pfizer to have the product pitched through their marketing machine. Lipitor was produced by Warner-Lambert and marketed through a joint venture with Pfizer. This drug alone justified Pfizer's hostile takeover. Celebrex and Aricept, two other best selling drugs in Pfizer's portfolio, were also discovered by smaller players, Searly and Eisai of Japan.

Eli Lilly

Eli Lilly, the Indiana-based pharmaceutical company, is a home-region oriented company with 59% of its sales derived from within the United States. Western Europe accounts for an additional 19.5% of sales. The remaining 21.5% of sales originate in non-specified foreign countries. In terms of assets Eli Lilly is even more intra-regional. Nearly 74% of all long-lived assets are located in the United States. Western Europe accounts for an additional 15.6%. One main explanation for the relative importance of the U.S. market is that prices in the United States are significantly higher than in the rest of the industrialized countries. As a result, revenues in Eli Lilly's home region tend to be higher regardless of similar unit sales in other regions.

Eli Lilly only operates in one industry segment, pharmaceuticals. Its business units are divided according to product lines which are defined by the type of ailment they target. In the United States, Lilly markets its products through 35 wholesale distributors, three of which account for nearly 50% of domestic sales. Although the government and managed care institutions account for a large portion of sales, direct sales by Lilly are not material; it is the wholesalers who process these orders. Lilly takes a more direct role in marketing its drugs. This is done through sales representatives who contact physicians,

wholesalers, hospitals, managed-care organizations, and governments. These representatives are divided in terms of product lines, neurosciences, endocrinology, cardiovascular, etc. A special group is dedicated to marketing to managed care organizations and to the government. The efforts of sales representatives are complemented with advertising in medical journals, distribution of pamphlets, and samples to physicians; and, in the United States and Canada, advertising targeted directly to customers.

Eli Lilly's products are sold internationally despite different regulatory environments because it is to the benefit of each country to approve a new medicine. Internationally, promotion, distribution and marketing are highly dependent on national regulation. Most products are marketed through sales representatives. In the majority of foreign countries, Lilly has its own sales force, but in others, it uses independent distributors. In 2002, Lilly's R&D budget was $2.1 billion, or 19.4% of total revenue. In the United States, R&D facilities are located in Indiana and Greenfield. There are also four European based R&D facilities and three Asia-Pacific based R&D facilities.

Lilly's strategy is one of high economic integration and low national responsiveness. Although the company faces different market conditions in Western Europe that require developing a nationally responsive marketing strategy, this only accounts for about 20% of its operations. In its home region, Lilly requires a high degree of economic integration. Eli Lilly's FSAs include its portfolio of patented drugs, its pipeline of new drugs, its biotechnology competencies, and its R&D centers. In terms of marketing, FSAs are its distribution routes and its sales representatives, both in the U.S. market and internationally. Changes in patent legislation that allow generic firms and

large pharmaceuticals to produce a competing drug reduce Lilly's FSAs. Its biotechnology competencies and its R&D centers all contribute to developing drugs that can one day be patented drugs that can be sold across borders. FSAs relating to marketing, however, are not transferable to other countries or regions. This is because of differences in regulations not only in each country, but also because of cultural differences, including language.

Conclusion

Innovation in the chemicals and pharmaceuticals industry occurs largely within the home region bases of the large MNEs. There are two distinctive markets in North America and Europe for pharmaceuticals; these markets are segmented by strong regulations and different institutional frameworks for distribution and marketing. Even within the E.U., there are strong national differences in regulatory regimes. These segmented national and regional markets deny MNEs the potential R&D and marketing global scale economies in production that they might otherwise wish to achieve. Pharmaceutical MNEs, in particular, are not global. Chemical MNEs can be more global, but such MNEs are much less innovative than pharmaceutical ones. Both sets of MNEs have regional, rather than global, strategies.

Table 1: The Top 500 MNEs, by Industry

	Industry Category	No of Firms in the Fortune 500	No. of Firms in the RNGMA	% of total
	Manufacturing	206	180	87.4
1	Aerospace and Defense	11	11	100.0
2	Chemicals and Pharmaceuticals	19	18	94.7
3	Computer, Office & Electronics	39	36	92.3
4	Construction, Building Materials and Glass	12	11	91.7
5	Energy, Petroleum & Refining	43	31	72.1
6	Food, Drug & Tobacco	18	14	77.8
7	Motor Vehicle and Parts	31	29	93.5
8	Other Manufacturing	13	13	100.0
9	Natural Resource Manufacturing	20	17	85.0
	Services	294	200	68.0
1	Banks	62	40	64.5
2	Entertainment, Printing & Publishing	9	9	100.0
3	Merchandisers	77	63	81.8
4	Other Financial Services	58	27	46.6
5	Other Services	25	21	84.0
6	Telecommunications & Utilities	43	27	62.8
7	Transportation Services	20	13	65.0
	Total	500	380	76.0

Source: Braintrust Research Group, The Regional Nature of Global Multinational Activity, 2003.
(www.braintrustresearch.com)
Data are for 2001

Table 2: The Regional Nature of the Chemical and Pharmaceutical MNEs

	Company	Region	Revenues in bn US$	F/T Sales	% intra regional	North America (%)		Europe (%)		Asia Pacific (%)	
Bi-Regional											
1	Bayer	Europe	27.5	na	41.3	30.6		41.3		16.6	
2	Aventis (q)	Europe	21.6	91.2	36.4	44.8		36.4		6.4	
3	Novartis	Europe	20.9	98.0	47.0	47.0		33.0		17.0	f
4	Roche Group	Europe	19.2	98.2	37.1	38.0	z	37.1		13.6	
Host-region oriented											
1	GlaxoSmithKline	Europe	42.6	95.7	28.6	50.9	z	28.6		na	
2	AstraZeneca	Europe	17.8	na	31.9	55.6		31.9		5.5	j
Home-region oriented											
1	Merck	North America	51.8	16.0	84.0	84.0	z	na		na	
2	Johnson & Johnson	North America	36.3	38.1	61.9	61.9	z	21.0		11.5	f
3	Pfizer	North America	32.4	35.9	64.1	64.1	z	na		29.8	j
4	BASF	Europe	30.6	78.4	58.9	24.2		58.9		15.7	f
5	DuPont de Nemours (E.I.)	North America	24.0	52.4	53.4	53.4		26.3	m	7.3	
6	Bristol-Myers Squibb	North America	18.2	37.6	62.4	62.4		22.2	m	na	
7	Abbott Laboratories	North America	17.7	37.8	65.1	65.1	a	na		na	
8	Wyeth	North America	14.6	36.7	63.3	63.3		5.1	u	na	
9	Mitsubishi Chemical	Asia-Pacific	13.4	16.0	85.5	na		na		85.5	
10	Akzo Nobel	Europe	13.3	94.0	52.0	27.0	a	52.0		11.0	
11	Eli Lilly	North America	11.1	41.0	59.0	59.0	z	19.5	w	na	
Insufficient Information											
1	Dow Chemical	North America	27.6	59.2	40.8	40.8	z	33.4		na	
Other											
1	Pharmacia	(Acquired by Pfizer July 2002)									
Weighted Average*			24.47		54.5						
Total			440.5								

Data are for 2002
Note: z. refers to the U.S. only; a. refers to Canada and the U.S.; m. refers to Europe, the Middle East and Africa; j. refers to Japan only; f. includes figures for Africa. q. Regional data on Aventis are calculated using data for its core business, which represents 85% of revenues. To calculate revenues in US dollars, where the company did not provide a figure, the following exchange rates were used: euro (0.9495); Swiss Franc (0.64505) and Pound (1.50377). *Weighted intra-regional sales average is weighted according to revenues.
Numbers might not add up due to rounding.

Table 3: Research and Development in the Chemical and Pharmaceutical Industries

	Company	Industry	Region	Revenues in bn US$	R&D in bn US$	R&D % of Sales
1	Merck	Pharmaceutical	North America	51.8	2.7	5.2
2	GlaxoSmithKline	Pharmaceutical	Europe	42.6	4.4	10.2
3	Johnson & Johnson	Pharmaceutical	North America	36.3	4.0	10.9
4	Pfizer	Pharmaceutical	North America	32.4	5.2	16.0
5	BASF	Chemical	Europe	30.6	1.1	3.5
6	Dow Chemical	Chemical	North America	27.6	1.1	3.9
7	Bayer	Chemical	Europe	27.5	2.4	8.7
8	DuPont de Nemours (E.I.)	Chemical	North America	24.0	1.3	5.3
9	Aventis	Pharmaceutical	Europe	21.6	3.6	16.6
10	Novartis	Pharmaceutical	Europe	20.9	2.8	13.4
11	Roche Group	Pharmaceutical	Europe	19.2	2.7	14.3
12	Bristol-Myers Squibb	Pharmaceutical	North America	18.2	2.2	12.2
13	AstraZeneca	Pharmaceutical	Europe	17.8	3.1	17.2
14	Abbott Laboratories	Pharmaceutical	North America	17.7	1.6	8.8
15	Wyeth	Pharmaceutical	North America	14.6	2.1	14.3
16	Mitsubishi Chemical	Chemical	Asia-Pacific	13.4	0.6	4.8
17	Akzo Nobel	Chemical	Europe	13.3	0.9	6.5
18	Eli Lilly	Pharmaceutical	North America	11.1	2.1	19.4
19	Pharmacia	(Acquired by Pfizer July 2002)				
Average				24.5	2.4	9.9
Total				440.5	43.7	

Data are for 2002
Source: Braintrust Research Group (www.braintrustresearch.com)

Table 4: The Chemical and Pharmaceutical Industries, a Comparison

	Company	Region	Revenues in bn US$	F/T Sales	% intra regional		R&D % of Sales
Chemical Industry							
1	BASF	Europe	30.6	78.4	58.9		3.5
2	Dow Chemical	North America	27.6	59.2	40.8	z	3.9
3	Bayer	Europe	27.5	na	41.3		8.7
4	DuPont de Nemours (E.I.)	North America	24.0	52.4	53.4		5.3
5	Mitsubishi Chemical	Asia-Pacific	13.4	16.0	85.5	f	4.8
6	Akzo Nobel	Europe	13.3	94.0	52.0		6.5
Average*			22.7	62.4	52.7		5.4
Total			136.4				
Pharmaceutical Industry							
1	Merck	North America	51.8	16.0	84.0	z	5.2
2	GlaxoSmithKline	Europe	42.6	95.7	28.6		10.2
3	Johnson & Johnson	North America	36.3	38.1	61.9	z	10.9
4	Pfizer	North America	32.4	35.9	64.1	z	16.0
5	Aventis*	Europe	21.6	91.2	36.4		16.6
6	Novartis	Europe	20.9	98.0	47.0		13.4
7	Roche Group	Europe	19.2	98.2	37.1		14.3
8	Bristol-Myers Squibb	North America	18.2	37.6	62.4		12.2
9	AstraZeneca	Europe	17.8	na	31.9		17.2
10	Abbott Laboratories	North America	17.7	37.8	65.1	a	8.8
11	Wyeth	North America	14.6	36.7	63.3		14.3
12	Eli Lilly	North America	11.1	41.0	59.0	z	19.4
Average			25.3	54.8	55.3		12.0
Total			304.17				

Note: Averages for F/T Sales exclude companies for which data is not available. If the same companies were excluded from the % intra-regional column, the averages would be 55.5% for chemicals and 56.7% for pharmaceuticals. If the same companies are excluded from R&D as % of sales, the averages are 4.5% for chemicals and 11.6% for pharmaceuticals

Data are for 2002

Source: Braintrust Research Group (www.braintrustresearch.com)

Table 5: Chemical Multinationals' Distribution of R&D Facilities Across the Triad

	Company	Country	Region	North America % of total		Europe % of total	Asia Pacific % of total
1	AstraZeneca	Sweden	Europe	33.3		55.6	11.1
2	Merck	United States	North America	50.0		41.7	8.3
3	Pfizer	United States	North America	54.5		27.3	18.2
4	DuPont	United States	North America	53.3	z	na	na
5	Aventis	France	Europe	25.0		50.0	25.0
6	GlaxoSmithKline	United Kingdom	Europe	25.0		70.0	5.0
7	Roche Group	Switzerland	Europe	36.8		52.6	10.5

Source: Individual Annual Reports, 2002

Notes: z. United States only

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