Managing Innovation and Change: Case of Pharmaceutical Industry

In contemporary context, the pharmaceutical and biotechnology sectors are characterised by a high level of competition and innovation. Some fifteen or twenty years ago biotechnology, which was heavily depended on advances in molecular biology, and pharmaceuticals, which was predominantly based on microbiology and chemistry, were widely recognized as separate industries. However, now biotechnology and pharmaceutical companies are significantly interconnected and are evolving into complex systems, representing particular innovation networks.

The transformation from an old to a new biotechnology industry has been attained through the support of financial investors at the end of the 1970s. Business vision of biotech industry has been changed. Investors expected that alike antibiotics that provided treatment for infections, genetic methods would be able to cure genetic diseases. For instance, in 1979 Syntex Corporation provided serious financial support for some academic researches. However, most of the pharmaceutical firms adopted a narrow-front strategy, first building capabilities associated with specific products that they had in market or had targeted for research and development. A few companies bypassed this stage and attempted to acquire general biotech capabilities very quickly, usually through acquisition. Whichever strategy they implemented, the pharmaceutical companies had to manage their way through a transition that was sometimes painful for their existing personnel in R&D and in other parts of the organization. There were "transition costs" (Williams, 1993). These costs help explain the preference for an incremental transition, as do the relationships between biotech and the pharmaceutical firms' existing product lines and capabilities.

However, according to Ostro and Esposito the role of investment in biotechnology was continuously shifting from financing scientific ventures towards funding young and ambitious companies pursuing their stock potential (Ostro and Esposito, 1999). During 1990s pharmaceutical and biotech industry were characterized with multidisciplinary knowledge

development and innovation that has been derived from robotics, mechanics, computer industry, and of course biology and chemistry. Logically, large pharmaceutical companies started developing extensive collaborations in research and innovations.

Achilladelis and Antonakis (2001) conducted a historical study of the dynamics and tendencies of technological innovation in the pharmaceutical industry. As pharmaceutical companies developed subsequent generations of drugs, some large multinational corporations concentrated on product innovation and designed strategies based on high levels of R&D expenditures, horizontal diversification and vertical concentration. As pointed out by the researchers, all the major technological advancements of the last century have been attained via in-house capabilities. This trend significantly contributes to the continuous concentration effect experienced by large pharmaceutical firms. From this standpoint, pursuing increase in market share, major pharma companies undertake mergers and acquisitions. As the majority of specialists points out, particularly mergers and acquisitions are considered to be essential ways to obtain innovation capabilities and assuming control levers of any major technological changes within biotech industry. For instance, in the beginning of 90s, Swiss pharmaceutical giant Hoffmann-La Roche after creating a complex network of licensing and research agreements, embraced a new strategy that quickly moved the firm more deeply into the biotech field (Gambardella, 1884). In effect, Roche decided to transplant a generalized biotech capability through acquisition. It began by buying equity stakes in the biotechs with which it was collaborating, a relatively common element in the large firm/small firm alliances in this industry. But next, it broke the mold by purchasing a controlling (60%) share of the most successful of the biotech startups, Genentech. Meanwhile, the Swiss firm was spending between $130 and $140 million a year on its in-house capabilities in the new field. By the mid-1990s, it was becoming apparent that various kinds of collaborative arrangements between biotechs and pharmaceutical companies would continue to be an important feature of

the current long cycle of innovation in this industry. As Glaxo's director of corporate development explained, "No emerging or established pharmaceutical company is large enough, or smart enough to meet all of its knowledge needs in isolation." The front across which change was taking place in the biomedical sciences was so broad that even the largest pharmaceutical firms could no longer bring in-house all of the research capabilities they needed. Indeed, the "knowledge needs" were so pressing that they had given rise to a new subdiscipline, "bioinformatics," that combined genomic information with computer technology in order to make data more widely available to scientists (Saracevic & Kesselman, 1993).

One of the peculiar trends regarding innovation in pharmaceutical industry is that R&D represents a major determinant of company's competitiveness (McKelvey and Orsenigo, 2001). Simultaneously, large pharmaceutical firms transfer their R&D activities to so-called dedicated biotechnology firms, because they usually have higher innovative capabilities. Typical in several regards of the new pattern of R&D was the experience of the Merck Research Laboratories (MRL). While pursuing in-house research, the firm also worked with two biotech companies on alternative approaches to HIV prevention with a vaccine or treatment. One of the biotechs was Repligen, a Cambridge, Massachusetts, firm (founded in 1981) that specialized in efforts to develop treatments for cancer and inflammation, as well as AIDS. Later, Merck collaborated with MedImmune, Inc., a Maryland biotech, in an attempt to use that firm's monoclonal antibodies as a means of preventing HIV infection. The Merck/Repligen combination at first produced some promising results, but neither the vaccine research nor the explorations of monoclonal antibodies proved fruitful. Meanwhile, MRL's in-house research was successful in developing a novel antiretroviral therapy, Crixivan (indinavir). However, some researchers remained unconvinced with the results from such collaborations, because as Galambos and

Sturchio assert, “large pharma has no real absorptive capacity to completely benefit from a strategy of merging with dedicated biotechnology firms” (Galambos and Sturchio, 1998).

Opposing to the view of Galambos and Sturchio, other experts present several reasons to why large corporations successfully collaborate in innovation areas within one industry. According to some, the science base represents a magnet for information technology and biotechnology business. Colleges and universities with a high rate of generating significant innovations like University of California Medical School, San Francisco in medical research and Stanford in IT and biotechnology, can be considered as bases upon which commercialization of new knowledge is built. Logically, because scientific output represents an economic value it attracts both venture capital and pharmaceutical companies who have an interest in both utilizing the knowledge but also protecting their investment by placing their managers in the start-ups or acquired firms. In addition, small companies, especially in highly knowledge-driven industries, depend heavily on social capital (Cooke and Wills 1999). Therefore, small innovative firms benefit from intellectual, technological and social "spillovers" based on network collaborations with other entrepreneurs, other scientists, financiers and companies in the same industry and with comparable mindsets to themselves. According to Zucker et al (1998) in biotech and pharmaceutical industry proximity to potential knowledge-assets and opportunities for commercialization constitutes s a great stimulus to entrepreneurship, especially around “star” scientists or entrepreneurs.

Unlike Galambos and Sturchio or other opposing specialists, Teece (1989) in regard to biochemical industry offered a term of “strategic alliances” or alliances in which both parties, in this case large pharmaceutical company and start-up research laboratory share their complementary assets. In his interdisciplinary study Brewer et al. (1995) provides evidence that mentioned inter-organizational alliances differ from traditional hierarchical relationships, because exchanges are external to the companies, and simultaneously those exchanges

constitute not only market relationships. Practically, legal contracting constitutes only a part of such processes: reciprocity, shared norms of trustworthy behavior, honesty in research appear and respect for individual property rights to be relevant components of these alliances, enhancing their flexibility, enabling companies to gain access to unique resources and reduce costs. According to Teece (1989) such alliances of innovation in pharmaceutical and biotech industry represent both explicit and implicit contractual activity. Furthermore, such networks are seen as a more powerful incentive for specialized companies to share their knowledge than integration through acquisition by established firms. In the latter case, it is likely that skilled employees, the key assets of the company, won't accept the new vertical organisation, and they may leave away; if the organisation has not already designed specific internal knowledge, such acquisition strategies may result in competence destruction.

Teece (1989) observations were largely based on the practical activities of SmithKline corporation as well as Eli Lilly in 80s. SmithKline-a firm some analysts had considered one of the weaker research organizations in the industry-used part of the profits from its blockbuster ulcer treatment, Tagamet, to push into new areas of immunology and into the field of recombinant DNA vaccines. SmithKline was able to bring out a recombinant hepatitis B vaccine in 1986 and was meanwhile working with Damon and Amgen on other biotech therapies. Johnson & Johnson used research contracts (with Immunomedics) and joint projects (with Amgen) as its bridge into genetic research, and by 1988, Pfizer was collaborating with four different biotech enterprises through licensing agreements, research contracts, and joint projects. After consolidating and expanding its in-house programs, the Upjohn Company also began to develop external links to biotechnology in the 1980s.

Many of the strongest European pharmaceutical firms adopted this strategy, seeking to develop their own capabilities across a relatively narrow front while working with biotech startups. The small, university-linked biotechs were at first almost entirely an American

phenomenon, and this gave the large U.S. pharmaceutical companies an initial advantage, as did the federal government's support for basic research in molecular genetics. But soon, European governments were attempting to close the widening biotech gap, hoping that government support would make up for the venture capital that was not available to their potential innovators. One of the interesting international hybrids was Biogen, a startup that was built on American science and that quickly expanded through licensing arrangements with several leading pharmaceutical firms. Biogen soon had operations in Germany, Switzerland, and Belgium. Schering-Plough, an American pharmaceutical company, collaborated with Biogen in the race to capture the anticipated global markets for interferon. To enhance and protect its access to Biogen's products and processes, Schering-Plough in the end bought a substantial equity position in Biogen, a practice that became increasingly popular in pharmaceuticals. The situation with Biogen and Schering-Plough illustrates the finding of study conducted by Lerner and Merger (1998), which identified 25 critical control rights in biotechnology innovation alliances, in particular those regarding alliance management (manufacturing, clinical trials), the control of intellectual property, determination of alliance scope, equity in R&D companies, seats in companies' boards.

From standpoint of human resource management, innovation in pharmaceutical industry in the light of all accompanied trends inevitably leads to outsourcing of labor (not associated with acquisitions or mergers). During 1999-2004, pharmaceutical firms increased the extent to which they outsourced R&D significantly. Developing economies of India, China and Singapore now play active roles in the industry, creating not only lower-cost sources of assistance but also potential future rivals for the large pharmaceutical companies. From the strategic point of view, any company's planning effort must answer the question of how this trend toward outsourcing will impact the industry in future.

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