Open Innovation:
Next Frontier In Global Biopharma Industry

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Introduction
Innovation has become more complex and costly in the global biopharmaceutical industry (Chesbrough, Vanhaverbeke and West 2006). The development of a new drug costs more than US$900 million and takes approximately 13 years. Biopharmaceutical companies apply quite different methods to the discovery and development of biopharmaceuticals from the traditional approach (Rasmussen 2007). There are a number of generic and second generation drugs in the present market. In addition, there is a huge market for personalized medicine.

Recently, more attention has been devoted to the concept of open innovation in the biopharmaceutical industry (Chesbrough and Garman 2009). Henry Chesbrough, who defined the term "open innovation", describes in his book “Open Innovation: The New Imperative for Creating and Profiting from Technology” (2003) how companies have shifted from so-called closed innovation processes towards a more open process of innovation.

A biotechnology or biopharmaceutical company should not restrict the knowledge that it uncovers in its research to its internal market pathways, nor should those internal pathways necessarily be constrained to bringing only the company’s internal knowledge to market (Rasmussen 2007). The new imperative for innovating companies is that they can and should use external as well as internal ideas and both internal and external paths to market when they seek to maximize returns from their innovation activities (Chesbrough and Garman 2009).

Biotechnology companies conduct research at the discovery phase of a new drug and biopharmaceutical companies take the new drug through Phases II-IV and market it globally. Since Henry Chesbrough introduced open innovation to the greater public in 2003, both biotechnology and biopharmaceutical companies have extensively investigated the possibilities of open innovation. Open innovation activities serve both biotechnology and biopharmaceutical companies in several ways:
1. It leads to new innovations.
2. It represents the company and its proposition to the outside world.
3. It empowers internal resources.
4. It increases the need for influence that consumers have on the products and services they pay for (Chesbrough and Garman 2009).

There is also a debate now on whether biotechnology as an industry is more oriented toward open innovation than the “regular” technology industry. For example, IBM and the PC industry arrived there far ahead of the biotechnology industry (Chesbrough, Vanhaverbeke and West 2006). What is happening today, though, is that the discovery phase for biotechnology is exploding in new discoveries especially in the biopharmaceutical sector, whilst the information technology sector is living off the research discoveries of the 1960s and 1970s (Chesbrough and Garman 2009).

Further, the biopharmaceutical industry is being preserved in the sense that only the biopharmaceutical industry...
can afford to negotiate the FDA regulatory processes (Chesbrough and Garman 2009). The FDA is currently demanding greater and greater safety, which translates into more regulatory oversight, longer trials, and higher costs. These are the advantages enjoyed by the multinational biopharmaceutical companies over the small biotechnology companies who conduct the discovery phase of new biopharmaceuticals (Chesbrough and Garman 2009).

Open innovation in the development of new biopharmaceuticals

Any successful innovation or invention needs a business model, and that model must do two things: first, it must create value in its innovation, and second, it must capture a portion of that value for the innovator, so that additional advancements will be forthcoming (Liberson and Andrew 2009).

Huge savings are possible when global biopharmaceutical companies jointly develop new technologies or drugs among themselves or biopartnering with biotechnology companies (Walsh 2006). At present, these savings can be realized in times of economic growth but the pressure to increase Research and Development (R&D) efficiency through cooperative agreements is stronger in times of downturn (Liberson and Andrew 2009). These biopharmaceutical companies aim for bilateral forms of R&D collaboration, but the most interesting and creative forms of open innovation are large scale, consortia-like initiatives (Walsh 2006).

Intellectual Property (IP) ownership is not always necessary to create a competitive advantage in biopharmaceutical industries however, ensuring the use of IP and access to IP is a key concept in the development of new entities in the biopharmaceutical industry (Chesbrough and Garman 2009). In joint R&D initiatives biopharmaceutical companies may gain even when they do not own the IP and pay royalties for the jointly developed technology with the biotechnology companies. Open innovation thus adds value to the biopharmaceutical companies (Liberson and Andrew 2009).

There is a fundamental shift in how biopharmaceutical companies generate new ideas and bring them to market (Chesbrough and Garman, 2009). Traditionally, new business development processes and the marketing of new biopharmaceutical products took place within the company’s boundaries which is defined as “closed innovation” (Figure 1) (Chesbrough 2003). In the old model of closed innovation, biopharmaceutical firms adhered to the following philosophy: Successful innovation requires control. In other words, companies must generate their own ideas that they would then develop, manufacture, market, distribute and service themselves (Chesbrough 2003).

For years, the logic of closed innovation was tacitly held to be self-evident as the “right way” to bring new ideas to market and successful companies played by certain implicit rules (Chesbrough and Rosenbloom 2002). Before the global financial crisis in 2008, biopharmaceutical companies could finance their innovation efforts with external money (Chesbrough and Garman 2009). They invested more heavily in internal R&D than their competitors and hired the best and the brightest talents (Liberson and Andrew, 2009). They were able to discover a number of ideas, which allowed them to get to market first protected by aggressively controlling their IP to prevent competitors from exploiting it (Chesbrough and Garman 2009).

Since the global financial crisis most biopharmaceutical companies have strategically employed cost cutting to become cash-positive. Innovation through internal R&D, external technology acquisition and long term growth are no longer management priorities (Liberson and Andrew 2009). Because many of their competitors are crippled by the global financial crisis, cash-rich biotechnology and biopharmaceutical companies

![Figure 1. Closed innovation (Chesbrough 2003)](image-url)
enjoyed a competitive advantage when they continued their R&D projects (Liberson and Andrew 2009).

Further, the global financial crisis drastically reduced the availability of seed and venture capital money for biotechnology companies especially to SMEs. As investments in high-tech ventures become cheaper they may invest in these small firms in order to acquire new top technologies (Liberson and Andrew 2009). The most innovative leaders take a portfolio view of innovation projects. The venture capitalist will invest in a basket of different start-up biotechnology companies, fully cognizant that most will fail. A few might break even and one or two might be successes. Biopharmaceutical companies in the supply chain (instance suppliers) play an increasingly important role in the innovation process (Liberson and Andrew 2009).

As a result, global biopharmaceutical companies have started to look for other mechanisms to increase the efficiency and effectiveness of their innovation processes. They are actively engaged in searching for new technologies including RNAi, bioinformatics, adaptive clinical trials etc. and ideas outside of the company, but also through cooperation with suppliers and competitors, in order to create customer value. In addition, they are aiming at the further development or out-licensing of ideas and technologies that do not fit the strategy of the company (Chesbrough and Garman 2009).

Therefore, the open innovation concept (Figure 2) in the global biopharmaceutical industry can be described as: combining internal and external ideas as well as internal and external paths to market to advance the development of new technologies (Chesbrough and Garman 2009).

Now, the shift described above means that global biopharmaceutical companies have to become aware of the increasing importance of open innovation (Liberson and Andrew 2009). Not all good ideas are developed within the company, and not all ideas should necessarily be further developed within the company’s boundaries. This means that within the company a shift should take place in the way people look at the company and its environment. Involving other parties when developing new products and technologies can be of great added value by cooperating with other companies in biotechnology and biopharmaceutical sector, suppliers, universities, and end-users (Chesbrough, Vanhaverbeke and West 2006).

In this new model of open innovation (Figure 2), biotechnology and biopharmaceutical companies commercialize external (as well as internal) ideas by deploying outside (as well as in-house) pathways to the market (Chesbrough, Vanhaverbeke and West 2006). Both biotechnology and biopharmaceutical companies can commercialize internal ideas through channels outside of their current businesses in order to generate value for the organization (Rasmussen 2007). Some avenues for achieving this include start-up companies (which might be financed and staffed with some of the company’s own personnel) and licensing agreements. Further, ideas can also originate outside the company’s own laboratories and be brought inside for commercialization (Liberson and Andrew 2009).

One major difference between closed and open innovation lies in how biopharmaceutical companies screen their ideas (Liberson and Andrew 2009). In any R&D process, researchers and their managers must separate the bad proposals from the blockbusters. Therefore they can discard the former while pursuing and commercializing the latter (Chesbrough and Garman 2009). Both the closed and open models are now applied to eliminating “false positives” (bad ideas that initially look promising), but open innovation also has the ability to rescue “false negatives” (projects that initially seem to lack promise but turn out to be surprisingly valuable) (Liberson and Andrew 2009). A company that is focused too internally (closed innovation approach) is prone to missing a
number of these opportunities because many will fall outside the company’s current businesses or will need to be combined with external technologies to unlock their potential (Chesbrough, Vanhaverbeke and West 2006). This would result in bad losses for small biotechnology companies that have made substantial long term investments in R&D, only to discover later that some of their abandoned projects had excellent commercial potential and value adding proposition to their companies (Walsh 2006).

**Conclusion**

The problem of generating innovative biopharmaceutical products to feed the market, while achieving appropriate profits, is not unique to the life sciences industry; it affects virtually every IP rich industry. True innovation is expensive, time-consuming and risky in the biopharmaceutical industry at present. During the blockbuster years the biopharmaceutical industry could afford to ignore the challenge to be truly innovative focusing on known drug targets and me-too products for common conditions.

Following the global financial crisis, the biopharmaceutical industry is now experiencing innovation competition. Global biopharmaceutical companies can generate extra licensing income, nurture partner relationship, develop and expand ecosystems, earn extra income through licensing deals, and share costs and risks of major innovation projects with external partners. No longer should a company lock up its IP; instead it should find ways to profit from others’ use of that technology through licensing agreements, joint ventures and other commercial arrangements. Biopharmaceutical companies are trying to enter growing markets in Asia because the US and Europe markets are matured and saturated. Further, China and India are becoming leaders in the global financial markets. Therefore, we are likely to see open innovation widely embraced by the global biopharmaceutical industry in the near future.

**References**


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