

COVER STORY • Open Innovation: A Key to Achieving Socioeconomic Evolution • 3 How Smaller Companies Can Benefit from Open Innovation

Henry CHESBROUGH

1635 words

1 January 2010

[Economy, Culture & History JAPAN SPOTLIGHT Bimonthly](#)

JAPECO

169

English

Copyright 2010 Japan Economic Foundation (JEF) All Rights Reserved.

PART 1.

Growing Importance of SME Innovation

In recent times there has been a lot of research on the phenomenon of "open innovation." Open innovation is defined as "...the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively." The benefits of opening up the innovation process are widely accepted among large firms, e.g. Philips, Xerox, Eli Lilly, BASF, and Procter & Gamble (P&G). The benefits of open innovation are also widely accepted in the software development community. Despite these research streams, however, there has been little discussion about the benefits (and risks) of open innovation processes in small and medium enterprises (SMEs). And there are reasons to think that open innovation affects smaller firms differently from large firms since smaller firms lack the resources and often lack strong protection of their intellectual property. How can SMEs manage these constraints and participate in open innovation effectively?

This is not just an important theoretical question. SMEs are of growing importance for an economy's innovative capacity. SMEs have increased their R&D budget faster than the largest firms, and now play an increasingly important role in national innovation systems. Chart 1 shows the growing importance of small firms in industrial R&D spending during the last 25 years in the United States. Large firms with more than 25,000 employees were responsible for 70% of the industrial R&D spending in 1981. Their share shrank to 38% in 2005. In contrast, small firms with fewer than 1,000 employees increased their share from 4% to 24% during that period. As a result, large firms are still very important in industrial R&D because their share is still very big (38%) and the amount of R&D spending in large firms increased from \$21,168 million in 1981 to \$84,983 million in 2005, a factor of 4. However, the increase in R&D expenditures of small firms was even more impressive. Firms with fewer than 1,000 employees spent \$54,473 million in 2005 compared to \$1,317 million in 1981, a factor of 40 increase. So SME R&D spending overall has grown 10 times as fast as large-company spending over these 24 years.

Open Innovation Challenges for SMEs

Given their growing importance, how should SMEs address the opportunities and risks posed by open innovation? SMEs have some structural disadvantages when it comes to open innovation. They often lack many of the capabilities necessary to identify, transfer and absorb external ideas and technologies effectively from outside into their firms. The most important structural deficiencies of SMEs posed by open innovation are:

First, lower absorptive capacity: SMEs typically do not have the ability to support dedicated resources and personnel to build structures to identify useful external knowledge. These structures include technology outposts in innovation "hotbeds" (such as Hitachi's office in Dublin or Nokia's lab in Palo Alto); university liaison managers to access emerging university technologies such as IBM and Intel have created; and technology scouting groups that seek out promising technologies, such as P&G has created.

Second, SMEs frequently lack the ability to absorb external ideas and technologies, even when they are initially identified and transferred. Rarely are external ideas and technologies fully formed upon transfer. Instead, they require substantial modification in order to effectively address a commercial need. Many SMEs do not have personnel with the required scientific background to understand, absorb and exploit the

scientific discoveries and technologies that are developed at universities, research labs or inside large companies. They similarly lack established technical advisory boards that help firms incorporate useful ideas and technologies into their own processes. This limits their "absorptive capacity."

Third, smaller firms often are unattractive as partners to others: SMEs may not be deemed attractive partners to receive useful ideas and technologies, even when SMEs are able to initially identify them. University professors, for example, might prefer to work with larger, better known, and more prestigious companies, or alternatively might prefer to help start up a new company, rather than team up with an existing SME. Further, SMEs seldom have the available resources to provide research funding to support promising academic research that might form the basis for a cooperative innovation project. SMEs also often lack an institutionalized, well-structured innovation process. This results in many ad hoc exercises and fire-fighting activities that inhibit SME ability to plan and execute for the longer term.

Fourth, deficiencies in value capture: SMEs typically do not have the market power to capture the value of their externally sourced knowledge and innovation, if not protected by intellectual property rights (IPRs). If they cannot expect to benefit from external ideas and technologies, they cannot justify the investment in pursuing those sources.

In certain circumstances, where SMEs operate in environments with strong IP protection (David Teece, 1986), they have sufficient differentiation and negotiation leverage to access external ideas and technologies. As Teece points out, the more usual case is one in which IP protection is weak at best. So even if smaller companies can overcome the above challenges to identify, receive, and absorb external ideas and technologies, they may not be able to profit much from doing so.

In most SMEs, the ability to profit from intellectual property is limited because of lack of enforcement power and the smaller firm's economic dependence on large firms. Enforcing a patent infringement case in the United States typically costs an average of \$500,000 if the value is below \$1 million. This is a higher cost than most SMEs can withstand. When Go Corp. determined that Microsoft had misappropriated its IP when Microsoft copied its PenPoint operating system by launching PenWindows, Go's Board of Directors chose not to pursue a lawsuit against Microsoft due to the high cost of litigation and the uncertainty of achieving a profitable outcome. Or consider an SME that chooses to outsource some of its activities to a low-cost nation such as China or India, and subsequently discovers that the outsourcing partner has launched its own offerings that illegally copy their own technology. Obtaining enforcement in overseas countries under different judicial rules and processes is both expensive and uncertain to be effective.

This IP enforcement problem for smaller firms is given greater impetus from "the platform paradox," which shows that when SMEs submit their patents to standard-setting organizations, they have a disproportionately higher probability of being sued than do large firms when they submit similar IP (as measured by citation counts) to standard-setting bodies. So utilizing standard-setting processes does not alleviate the problem for SMEs.

In addition to the high cost and risk of legal enforcement, SMEs are often economically dependent on large firms as their key customers or suppliers. This can further diminish the smaller firm's ability to profit from one of its innovations. For example, one Swiss automotive supplier with 500 employees has 30% of its annual revenue derive from a single customer, Volkswagen. When it discovered a patent infringement by VW, the Swiss firm decided that it could not act against VW, even though outside legal assessments indicated that they had a strong case. Going to court against your largest customer is not a viable option for most SMEs.

SMEs Have Structural Edges in Open Innovation World

While SMEs face many challenges, they also enjoy some structural advantages, relative to large organizations. We have already noted the vastly greater growth in smaller firms' R&D spending. This growth suggests that the structural advantages of SMEs have enabled them to play a more central role in an industrial economy's innovation system. As we shall see, these advantages also endow smaller firms with unique opportunities to prosper in an open innovation context. SMEs have at least five structural advantages in general over large firms:

1. Size: Their smaller size makes smaller markets attractive to SMEs while these markets would not be attractive for larger firms. As well, this advantage allows SMEs to exploit new trends sooner when entry costs are still quite low. Large firms cannot follow because their overhead costs are too high to be cost-effective in niche markets.
2. Focus: Their focus lets them execute very effectively against larger, diversified firms with more diffuse objectives. The sharp focus on a particular market, customer type, expertise or technology may generate a sustainable competitive advantage in industries where customers value the expertise, knowledge or service that this type of SME offers.
3. Business specialization: SMEs can specialize their business more deeply in narrow fields. One aspect of open innovation is the growing role that markets are playing in organizing and coordinating innovative activities. The growth of these innovation markets offers greater rewards for specialization since those specialized firms can often sell their capabilities to a wider range of customers and markets.
4. Entrepreneurial persons: SMEs attract more entrepreneurial R&D employees. Product and market orientation is higher than in larger research departments of large firms. This creates a bias to action in smaller firms and promotes extensive experimentation with alternative business models. In many innovative situations, identifying and executing an effective business model is as important as or more important than developing a new technology.
5. Speed: Smaller firms take decisions faster and implement them more rapidly. Smaller firms can react more quickly to input from customers or challenges from competitors, and evolve their business models more rapidly. In many cases they can learn faster than larger firms and they are faster in decision-making so they potentially have a competitive advantage in fast changing markets.

PART 2.

Advantages of Open Innovation for SMEs

Now that we've discussed the structural advantages of smaller firms, let's examine how these attributes can be harnessed to provide new opportunities for SMEs in an open innovation world:

1. Large companies increasingly are interested in collaborative innovation partnerships: Smaller firms with strong competences in focused specialties make attractive collaboration partners for larger firms. Indeed, the SMEs' expertise can accelerate the completion time for a larger firm's innovation initiative. Moreover, open innovation and open commercialization are characterized by a network of alliances and long-term deals between different organizations with complementary roles in the value chain. Interorganizational networks create in this way new business opportunities for specialized SMEs.
2. Large companies creating technology platforms and actively recruiting SMEs to develop products for these platforms: Platform leaders provide extensive technical information, co-marketing opportunities and even occasional subsidies for smaller firms' R&D costs.
3. User innovations: SMEs are active users of many new technologies and may develop important enhancements for these technologies that improve the quality or capability of a technology. Many large companies are eager to join these open innovation communities. It may even serve the purposes of large firms better to allow the smaller firms to be seen as the leaders of these communities.
4. Globally successful SMEs, which also are known as "hidden champions" because of their high profitability, have developed a niche strategy as the source of competitive advantage: They work in narrow market segments where large firms are not interested because of the limited market potential. But the smaller firms here have penetrated markets in many regions of the world, thus enabling the SMEs to achieve scale economies with common suppliers and in serving key customers.

5. Open-source development provides benefits for the innovation efforts of all firms independent of their size: The main benefits are based on higher reuse of code in comparison to proprietary software, greater robustness of the system due to strict peer review and thus the application of the Darwinist selection principle "the best code survives."

6. Open innovation fundamentally is about the greater intrusion of markets into the processes of R&D: SMEs have a greater ability to specialize than larger firms, and this specialization is more helpful precisely when markets are more available for innovative activities. Internally organized activities are restricted to a single captive customer in a single market. Open innovation activities seek to cultivate multiple customers in multiple markets for that innovative activity, spreading costs and risks of adoption more widely.

As an SME, Where Is Your Business?

Given the advantages and disadvantages for SMEs in open innovation, how and when should they proceed? When should they be open, and when should they be more closed? We find it helpful to frame these questions into two dimensions that will help characterize the opportunities available in an industry. One important dimension to consider is the "scale of R&D" required to develop technologies in an industry. Some industries feature quite substantial economies of scale, such as petrochemical refining, semiconductor manufacturing, pharmaceutical development and mass-market retailing. Other industries, however, do not exhibit these economic requirements, such as the toy industry, the medical device industry, and the fashion industry.

A second dimension to be considered is the "size of market opportunity." Technology markets typically evolve through a life cycle, starting very small, progressing rapidly in a growth phase, plateauing in a mature phase and then declining in the end of life phase. So, in the beginning and end of the cycle, markets are relatively small in size. Conversely, in the middle phases, market size has become quite large.

Combining these two dimensions yields the 2-by-2 matrix shown in Chart 2. For a correct understanding, industries should not be considered as a homogeneous set of companies. In line with the concept of strategic groups, we assume that an industry is populated with different strategic groups that compete in different ways. SMEs may represent a strategic group in an industry that competes differently from other larger firms.

This means that an SME in an industry may occupy a different quadrant in Chart 2 than is occupied by a large firm in that same industry. In the beer industry, for example, Ambev, Heineken, Budweiser, Miller and Coors are dominant players, while hundreds of microbreweries occupy various niche positions in that industry.

The growth opportunities available to SMEs, and the preferred response for open innovation for those firms, will be determined by the position of the firm in this matrix. Instead of considering the prospects of SMEs for open innovation in the abstract, it is better to evaluate them in these different quadrants.

Conclusions

Innovation often happens first at the edge of markets, rather than at the center of existing markets. This is the great source of opportunity for SMEs in the open innovation landscape. SMEs can participate sooner, move faster, and adapt more readily to opportunities that emerge from the periphery of a market, relative to large firms. Which path makes the most sense for which SMEs requires a careful assessment of R&D requirements and market opportunities. Clearly, there is no single answer; one size will not fit all SMEs.

There are many different, important roles for SMEs to play in the open innovation world. They can be explorers pursuing markets that are too small (at least for now) to be of interest to large firms. They can be specialists providing technological expertise to a variety of firms in a market that cannot support large firms. They can break out into large and growing markets, especially when R&D investment is not overwhelming at the outset and their business model is truly innovative. They can partner with and support the dominant businesses and platforms of large firms. And of course, they can remain in a niche where large companies have no interest.

SMEs face many challenges in trying to compete in markets with large firms. Yet they enjoy some unique advantages over those large firms and should not fear that competition. So long as SMEs remain alert, adaptive and focused they will do well as a group. Large firms, in turn, would do well to orient themselves more externally to work with SMEs. SMEs are potential suppliers, partners or customers for large firms. Importantly, SMEs often embody important innovation experiments in technologies or business models, experiments that could teach a great deal to observant large firms. And, as the NSF data in Chart 1 show, there is too much R&D activity in SMEs for even the largest, most successful companies to ignore. We predict a healthy future for SMEs in the innovation systems of advanced economies. Our understanding of innovation must make room for these firms in our conceptions of how to advance our technology and our standard of living in those economies.

Henry Chesbrough is adjunct professor, Haas School of Business, University of California, Berkeley, and executive director, Center for Open Innovation, Haas.