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Intelligence

Innovation Strategies Combined

A brief discussion of the pros and cons of four different approaches to innovation and how these strategies are likely to interact when used in tandem, by Frank T. Rothaermel and Andrew M. Hess



BMW Group is an example of a company that excels in leveraging R&D expenditures to achieve innovation.

[INNOVATION]

Innovation Strategies Combined

Some approaches to achieving innovation work well together — but some don't.

BY FRANK T. ROTHARMEL AND ANDREW M. HESS

Continuous innovation is the engine that drives highly successful companies such as Apple, General Electric, Google, Honda, Hewlett-Packard, Microsoft, Procter & Gamble, Sony, Tata group and many others. Innovation is an especially potent competitive weapon in tough economic times because it allows companies to redefine the marketplace in their favor and achieve much-needed growth. However, achieving continuous innovation is very hard, and most attempts fail.

One increasingly popular way to think about innovation is to conceive of it as an open rather than a closed system — a concept Henry Chesbrough and others have written about. To continue to be innovative in a world of widely distributed knowledge, many companies are recognizing that they must open their innovation process to combine internal with external R&D. That can be done by bringing in new human capital, engaging in strategic alliances or acquiring technology ventures. By the same token, internal inventions that a company decides not to pursue should not simply be shelved, but rather considered for commercialization through licenses, spin-offs or joint ventures.

If an open innovation system does in fact help drive growth and performance, managers need to answer two critical questions:

1. Which innovation strategies should the company pursue?
2. Which innovation strategies go well together?

To answer these important questions, we spent five years studying how global pharmaceutical companies have built innovative capabilities in biotechnology. We documented, in great detail, the annual R&D expenses of 81 global pharmaceutical companies over a 22-year period,

along with every biotech and non-biotech patent the companies filed, every scientist who worked for one of the companies, all alliances entered into and all acquisitions consummated during that period. In particular, we tracked approximately 900 acquisitions, 4,000 alliances, 13,200 biotechnology patents, 110,000 non-biotechnology patents and 135,000 scientists; we used U.S. biotechnology patents granted as a proxy for innovation in this industry. Although the global pharmaceutical industry is unique to some extent, we believe that our findings also hold for many other industries, because new knowledge, human capital, strategic alliances and acquisitions increasingly determine the success or failure of individual businesses across a large number of industries today.

Deciding Which Innovation Strategy to Pursue

The question of which innovation strategies to pursue is critical, because corporate executives have multiple strategies for achieving innovation at their disposal. They can decide to spend more on internal R&D, hire and retain the best human capital, ally with innovative companies or buy innovation through acquisitions. Each strategy has its distinct pros and cons, as captured in the figure below. (See “Four Approaches to Innovation.”)

In addition to examining those four fundamental innovation strategies, we also examined two different components of recruiting and retaining superior human capital; our study distinguished between exceptional “star” scientists and more typical “non-star” scientists. When considering the importance of human capital, most CEOs think about how to recruit and retain exceptional star performers. Non-star performers, however, often get overlooked. And yet, these rank-and-file knowledge workers are critical to innovative success. While star scientists can cue a company to shifts in the knowledge environment and direct the organization toward promising new areas, non-star scientists are the ones who integrate new knowledge into processes and routines — and thereby execute the organizational changes necessary to be innovative.

Which Innovation Strategies Go Well Together?

Although researchers have a fairly good understanding of innovation strategies *individually*, the effects of pursuing various innovation strategies simultaneously have not been known. That is a significant problem, because clearly, executives can decide to pursue multiple innovation levers simultaneously. They can, for example, combine internal R&D spending with acquisitions, or the recruitment of superior human capital with alliances. Many other permutations are possible, thereby significantly increasing the complexity that companies face when attempting to innovate. Moreover, the business world is complex and messy — and does not conform to the convenience found in most academic studies of keeping everything else equal while studying the effects of one single innovation strategy at a time.

What happens when different innovation strategies are pursued simultaneously? Which innovation strategies go well together, and which do not? In the matrix on the next page, we present a simplified version of some of the results from our study, which were reported in detail in an article in *Organization Science*. (See “The Effects of Simultaneous Innovation Strategies.”) Green arrows denote strategies that go well together, while red arrows show combinations that reduced the effectiveness of a company’s investment in innovation strategies. (Blue boxes indicate that there was neither a synergistic effect nor one that decreased expected innovative performance.)

As the matrix indicates, the combination of star and non-star performers enhances innovative performance: Our research highlights the complementary roles that star and non-star performers play. Moreover, our findings also show synergies between internal R&D expenditures and alliances — and suggest that a strong internal R&D capability allows a company to select and pursue the most promising strategic alliances. Finally, alliances and acquisitions frequently reinforce each other.

On the other hand, in some cases, pursuing multiple innovation strategies simultaneously can actually reduce the effectiveness of a

FOUR APPROACHES TO INNOVATION

Companies have a variety of innovation levers at their disposal, but each strategy has its pros and cons and each requires different competencies.

INNOVATION STRATEGY	UPSIDES	DOWNSIDES	SOME EXEMPLAR COMPANIES	REQUIREMENTS
Recruiting and Retaining Superior Human Capital	<ul style="list-style-type: none"> Better control of IP Long-term growth focus Difficult for competitors to imitate 	<ul style="list-style-type: none"> Organic growth is slower Challenge of identifying and valuing superior human capital 	<ul style="list-style-type: none"> Goldman Sachs Google Merck Research In Motion Southwest Airlines W.L. Gore 	<ul style="list-style-type: none"> Astute strategic human resource management Organizational flexibility
Internal R&D Spending	<ul style="list-style-type: none"> Internalization of skills and capabilities Full capture of returns 	<ul style="list-style-type: none"> Full risk exposure Long time horizon Uncertain returns 	<ul style="list-style-type: none"> Apple BMW Hewlett-Packard 	<ul style="list-style-type: none"> Culture of risk tolerance Organizational flexibility Long-term commitment
Strategic Alliances	<ul style="list-style-type: none"> Shared risk Multiple, small-scale investments provide strategic options Faster than internal development 	<ul style="list-style-type: none"> Potential loss of IP control Challenge of alignment of goals Shared returns 	<ul style="list-style-type: none"> IBM Eli Lilly Oracle Procter & Gamble 	<ul style="list-style-type: none"> Dedicated function for the management of partnerships
Acquisitions	<ul style="list-style-type: none"> Faster than growing organically Acquire innovative technologies before startups become competitors 	<ul style="list-style-type: none"> Risk of overpaying Cultural integration concerns Involves relying on others for innovation 	<ul style="list-style-type: none"> Cisco General Electric Pfizer Microsoft 	<ul style="list-style-type: none"> Capability to identify and assimilate acquisition targets

THE EFFECTS OF SIMULTANEOUS INNOVATION STRATEGIES

Our detailed study of large pharmaceutical companies' innovation strategies in biotechnology found that combining some strategies tended to result in synergies that improved innovation performance, but other strategy combinations interacted negatively. Green arrows denote strategies that go well together, while red arrows show combinations that can reduce the effectiveness of a company's investments in innovation. Blue boxes indicate that there was neither a synergistic effect nor one that decreased expected innovative performance.

	NON-STARS	STARS	R&D	ALLIANCES	ACQUISITIONS
NON-STARS	—	↑	■	↓	■
STARS	↑	—	↓	■	■
R&D	■	↓	—	↑	■
ALLIANCES	↓	■	↑	—	↑
ACQUISITIONS	■	■	■	↑	—

company's investments in innovation strategies. For example, our findings suggest that the type of knowledge obtained through alliances and through rank-and-file knowledge workers is often redundant. Similarly, investments in star performers and R&D spending can also apparently lead to redundant outcomes when both strategies are pursued simultaneously.

Understanding These Findings

To foster successful innovation, managers must be able not only to weigh the strengths and weaknesses of each innovation mechanism but also to understand and predict how these mechanisms are likely to interact when used in tandem. The resources and capabilities required to pull any one innovation lever are not independent of those needed to pull a different lever. Due to mounting performance pressures, managers often choose a grab-bag approach to innovating, by employing a variety of available mechanisms simultaneously — without knowing the possible deleterious interaction effects.

In contrast, our research points to important, yet frequently overlooked interdependencies across different innovation strategies. When pursued in tandem, some innovation levers positively reinforce one another, while others compensate for one another. Our study empirically validates the conclusion that just because executives *can* pull a certain innovation lever, does not mean they *should*. Using more innovation strategies at once is not always better!

Although the results from our study are intriguing and valuable to managers, an important caution is in order. Our research is focused on understanding the innovation efforts of established, and, for the most part, large companies (e.g., average, inflation-adjusted annual R&D expenditures of more than \$850 million). Given their size, many of the companies studied have already developed competencies in specific innovation levers. For example, one pharmaceutical company may have traditionally focused on internally developing its research capabilities, while several others may have more often chosen to build their innovation capabilities through acquisitions and alliances. What's more, there is no clear overlap between the capabilities needed for developing a company's human capital and those needed for successfully managing alliances. Consequently, for the companies we studied, the negative effects on innovation associated with combining certain innovation strategies may reflect the opportunity costs of not focusing more on an innovation approach that hones the company's existing, underlying competencies and harnesses its prior experience. The results could be different for biotechnology startup companies. For example, given

the endemic resource constraints of technology startups, we speculate that the negative consequences of combining noncompatible innovation strategies may be even more pronounced. On the other hand, biotech startups tend to be more nimble than large companies and are less burdened with red tape. Our findings suggest that startups that have a keen understanding of the effectiveness of their different innovation levers and how to combine them can execute a winning innovation strategy.

Overall, our study found that the strategy that appears to have the greatest impact on innovative performance is developing and fostering human capital. One potential reason for the importance of this innovation strategy is related to the notion of time horizons. For established companies, alliances and acquisitions are often executed for the purposes of filling a specific need or anticipated gap in the innovation pipeline. Indeed, some acquisitions are consummated out of panic, rather than from any long-term vision for a future

stream of innovations. In contrast, sustainable innovation is a long-term strategy that requires an equally long-term strategic commitment by the business — such as a strategy of developing superior human capital.

Our goal is not to offer managers a one-size-fits-all recipe for successful innovation. Such a fool's errand would miss one of the points of our study, which is that the utilization of an innovation lever is itself a significant investment that carries the burden of all

path-dependent activities. Rather than pulling every lever possible, managers should carefully weigh the unforeseen costs — often opportunity costs — associated with interdependencies between different innovative mechanisms. Maximizing scale of inputs does not equal maximizing innovative outputs. Recognizing this, managers should resist the siren song of the innovation grab bag in favor of a more deliberate approach to innovation that weighs not only where the organization is today, but where it was yesterday and where it hopes to be tomorrow.

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