## Parenting Innovations

*Editor's Note*

Like a parent who worries about the healthy development of her child, a constant preoccupation of the innovator is the healthy development of the innovation. From the earliest stages to the later stages of development, the innovator's responsibility is very demanding. Is this new product really solving a pain or problem that is important? Does it provide a solution that is easy to use? Is the benefit large enough to make the associated costs worth it? Can we make it work and fit? Like a parent raising a child, the innovator has to focus on the developmental needs of the innovation.

Unfortunately, concerns about the innovation itself cannot be viewed in isolation of competitive awareness. Depending upon the context, many of our customers have alternatives to the solution we may be offering or contemplating. As a result, not only do we have to worry about the healthy development of our own innovation, we also have to worry about the alternatives competitors are developing. While focus and dedication are required, they can't be at the expense of a peripheral awareness of competitors.

Patents, those society-sanctioned and government-maintained rights of exclusion, can provide strategic logic to help innovators think about both the development strategy and competitive strategy for their innovations. David Feldmeier, with Gazelle Technologies, Inc., has done some solid thinking about patents in general, and about patent strategy in particular. We devote this entire issue of *Innovating Perspectives* to his insights for those of us actively engaged in parenting innovations. Thank you, David, for your contribution.

# What Patents Can Teach Us About Innovating

*By David Feldmeier, Gazelle Technologies, Inc.*

Patents are a rich source of innovation history because their potential economic value gives inventors an incentive to disclose rather than conceal their inventions, and because the cost of creating a patent tends to screen out inventions with little economic value.

As a rule of thumb, about 5% of patents have a non-trivial value, and approximately 1% of patents are very valuable. This 5% is for patents actually granted by a patent office; the chance of a patent application being granted as a patent varies between 40% and 50% at some of the major patent offices. As a result, just over 2% of patent applications eventually become patents with non-trivial value.

Although 2% already is low, remember that this is 2% of the inventions that were deemed sufficiently valuable to justify the cost of a patent. The patent cost threshold undoubtedly causes many ideas to be discarded before they reach the stage of being patented. The patent statistics show that successful innovation is difficult, but there ways to improve the odds.

### Exceeding a value threshold

Adapting a product to an innovation (i.e., a new feature to an existing product) has an associated cost. The innovation must provide enough value to overcome this cost, or it is not worth doing. The innovation must increase the profits of a product enough to impact the structure of a market; otherwise competitors can remain competitive with incremental changes in selling price or manufacturing cost.

For example, a 1% reduction in the cost of manufacturing a semiconductor chip may add to the bottom line of a company, but it's not enough to cause problems for competitors. Competitors usually can adjust their cost structure to compensate. However, a 10% reduction in the cost of manufacturing potentially could allow for a shift in market share, either by a lower selling price or by reinvesting the savings into new products at a faster rate than competitors.

Innovations that are capable of altering market dynamics are few and far between.

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*"We can't say 'new and improved' until we come up with a product."*

# What Patents Can Teach Us About Innovating

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Patents provide an interesting example. For example, company with a product that was generating over $200M per year in revenue wanted to start a patent infringement lawsuit against a competitor to prevent the competitor from depressing the selling price of the product. However, after examining over 100 patents, only a few would have enough impact on the competitor's selling price or manufacturing costs to justify the cost of a patent lawsuit. The vast majority of patents covered innovations that had negligible impact on the product performance or manufacturing cost, and as such they added little incremental value to the company's patent portfolio.

If the customer can't notice an improvement in product performance, or the manufacturing cost difference is not enough to change the product pricing dynamic, then the innovation may not be worth implementing.

## Zig when others zag

Reading competitive patents can tell us where the herd is moving. For the smaller player especially, taking a technically sound opposite tack may prove to be a viable competitive innovation strategy.

Shuji Nakamura of Nichia Chemical Industries developed the first commercial blue LED (light emitting diode) in 1993. There was great interest in blue lasers, because a DVD player with a blue laser is able to store quadruple the amount of data as compared with a conventional DVD player that uses a red laser. Consequently, many well-funded research teams at corporations and universities were attempting to develop blue lasers.

Nakamura succeeded before the others, despite being a lone researcher in a small company that sold phosphors for cathode ray tubes with a budget that was so small that he had to build his own research equipment. How was it possible for him to outrun all of the well-funded innovators who were focused on the same goal?

Nakamura had a competitive insight that led him to explore a direction that was ignored by the others. According to Nakamura, "In 1989, there were two materials for making blue LED's: zinc selenide and gallium nitride. These had the right band gap energy for blue lasers. But everybody was working on zinc selenide because that was supposed to be much better. I thought about my past experience: if there's a lot of competition, I cannot win. Only a small number of people at a few universities were working with gallium nitride so I figured I'd better work with that. Even if I succeeded in a making a blue LED using zinc selenide, I would lose out to the competition when it came to selling it."

I have seen a similar thing done by other R&D organizations. In one case, an R&D organization selected an area to explore based on patent density. The idea is that if new discoveries are made, the company was more likely to obtain valuable patents in technology areas in which relatively few patents existed rather than in areas that already were heavily patented.

## Incumbents will respond

Any innovation should not be viewed only in the current context of existing solutions. It should be expected that others will continue to innovate. Sometimes a series of incremental innovations is better than a radical innovation.

An example of this is a technology called "bubble memory." Bubble memory was developed by Bell Labs in the 1970s. It was commercialized by several companies, including Intel, as a potential replacement for hard disk drives. Although bubble memory initially was more expensive, it was expected that the cost per bit would decline sharply as the technology matured.

Although bubble memory did increase in density and decrease in price, it never became a commercial success. A series of incremental innovations in hard disk drives dramatically lowered the cost per bit of bulk memory in the 1980s and bubble memory never was able to catch up. The lesson here is that competing technologies do not sit still.

## Trends matter

Yet sometimes a bold innovation wins, particularly if the existing solution already is highly optimized. For example, precision electronics have become a cheaper way to do things than precision mechanics. The cheapest quartz watch keeps time better than the most expensive mechanical watch. Complex mechanical gear trains have been replaced by electric motors with position sensors driven by microprocessors. Even the engine compartment of a car uses electronics for tasks that previously had been done mechanically, such as controlling the amount of fuel that is fed to the engine. Investing in precision mechanics innovations, in this case, just may not make sense, in light of the overwhelming tide of precision electronics.

## Timing can be everything

What was an interesting invention in the past can become an attractive innovation in the present. A couple of years ago, some inventors showed me a great idea for improving computer processor performance that previously had been used in a computer built by IBM in 1961!

Why wasn't the innovation in continuous use since 1961? Implementation technology had an impact on the price/performance ratio. In 1961, the circuitry was quite expensive, but IBM could justify the cost because performance was everything. Now, however, chip technology has reached cost points that have, among other factors, changed the playing field and the price/performance ratio along with it.

The value of an innovation can dramatically change when the means available to implement it comes within reach, technically, economically, or both. As a result, an innovator not only must look forward, but also must look backward to see whether something done in the past can be applicable to the present.

## Potential Lessons

What can patents teach innovators? Perhaps the following:

- Aim for innovations big enough to alter the dynamics of a market.
- Match your innovation strategy to your comparative size and position.
- Anticipate that your target for innovation will keep moving.
- Learn from past inventions in light of new and present conditions.

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