



The Half-Truth of First-Mover Advantage

by Fernando Suarez and Gianvito Lanzolla

First-mover advantage is more than a myth but far less than a sure thing. Here's how to tell when it's likely to occur – and when it's not.

SOME MANAGEMENT CONCEPTS have such intuitive appeal that their validity is almost taken for granted. First-mover advantage is one such concept. Although the fate of its most-convinced adherents, the dot-coms, offers a cautionary lesson, managers' faith that first-mover status brings important competitive advantages, even when network effects are not available to accelerate and entrench it, remains undiminished. Business executives from every kind of company maintain, almost without exception, that early entry into a new industry or product category gives any firm an almost insuperable head start.

But for every academic study proving that first-mover advantages exist, there is a study proving they do not. While some well-known first movers, such as Gillette in safety razors and Sony in personal stereos, have enjoyed consider-

able success, others, such as Xerox in fax machines and eToys in Internet retailing, have failed. We have found that the differences in outcome are not random—that first-mover status can confer advantages, but it does not do so categorically. Much depends on the circumstances in which it is sought.

One possible explanation for Sony's success is that its strong brand name, substantial financial resources, and excellent marketing skills allowed it to make the most of its first-mover status. But Xerox, too, had a great brand name, deep pockets, and many valuable skills. And Sony, despite its brand and marketing muscle, could not translate being the first mover in home VCRs into anything approaching its success with the Walkman. Yes, a firm's resources – and luck – are important, but certain other factors and conditions can be decisive as well.

Our research, based on a thorough examination of the literature on first-mover advantage, as well as an analysis of more than 30 cases of early entry into new product spaces, has enabled us to identify situations in which companies are likely to gain first-mover advantages and those in which such advantages are less likely. Specifically, we identified two factors that powerfully influence a first mover's fate: the pace at which the technology of the product in question is evolving and the pace at which the market for that product is expanding. Knowing how fast or slow the technology and the market are moving will allow you to understand your odds of succeeding with the resources you possess.

What Kind of First-Mover Advantage?

A first-mover advantage can be simply defined as a firm's ability to be better off than its competitors as a result of being first to market in a new product category. We find it useful to distinguish between durable first-mover advantages, which improve a firm's market share or profitability over a long period, and those that are short-lived. Although no advantage lasts forever, firms that succeed in building durable first-mover advantages tend to dominate their product categories for many years, from a market's infancy until well into its maturity. Coca-Cola in soft drinks and Hoover in vacuum cleaners unmistakably demonstrate both the value and longevity of early success.

But even when a company cannot build a durable first-mover advantage, it may obtain some benefits from early entry. The pioneering efforts of Netscape, the first to market an Internet browser, briefly produced enormous



First-mover status can confer advantages, but it does not do so categorically. Much depends on the circumstances.

gains for shareholders until the stock price plummeted in 1997 following the rise of Microsoft's browser, Explorer. Apple declined more gradually—it was profitable for several years before pressure from Microsoft and Intel took a toll, forcing it to restructure in the early 1990s. Whether the end comes suddenly or slowly, profits can be great enough to make a short-lived first entry a worthwhile investment—and perhaps to make it a strategic objective. Of course, a business is free to choose not to enter a new market at all. But even a runner-up's margins may look good compared to the opportunity cost of staying out of a new market.

Industry Dynamics Are Crucial

Most students of first-mover advantages have concentrated on *how* firms achieve them. One of the three main ways is by creating a technological edge over competitors. By starting earliest, first movers have more time than later entrants to accumulate and master

technical knowledge. The second way is by preempting later arrivals' access to scarce assets—for example, a location on a city's main street, talented employees, or key suppliers. The third is by building an early base of customers who would find it inconvenient or costly to switch to the offerings of later entrants.

What has been largely ignored is the conditions under which those three tactics are most likely to succeed or fail. Just as a swimmer's ability to cross the English Channel depends as much on the water's roughness as on his or her own skill and experience, an early entrant's prospects depend as much on background factors as they do on the firm's resources and capabilities. The two most important factors—the pace of technology evolution and the pace of market evolution—are typically beyond the control of any single firm.

There can be enormous variation in the rates at which products' underlying technologies advance. For example, the first manufactured glass dates back to about 3500 BC, when Middle Eastern

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artisans heated crushed quartz to make glazes for ceramic vessels. But it took three millennia for the next important technological change, glassblowing, to arise, and 1,600 years more before Englishman George Ravenscroft invented lead glass. No other important technological change occurred until Alastair Pilkington invented the float-glass process in the twentieth century. By contrast, a computer today bears little resemblance to one made even ten years ago.

Some technologies, such as computer processors, evolve in a series of incremental improvements; others evolve

disruptively, creating a break from the norm, as was the case when digital photography began to displace film. The faster or more disruptive the evolution of technology, the greater the challenge for any one company to control it. Even in product markets dominated by firms with large R&D budgets, new entrants and other competitors tend to drive technological progress.

The pace of market evolution can vary as markedly as the pace of technological evolution. For example, the markets for automobiles and fixed telephones developed much more slowly

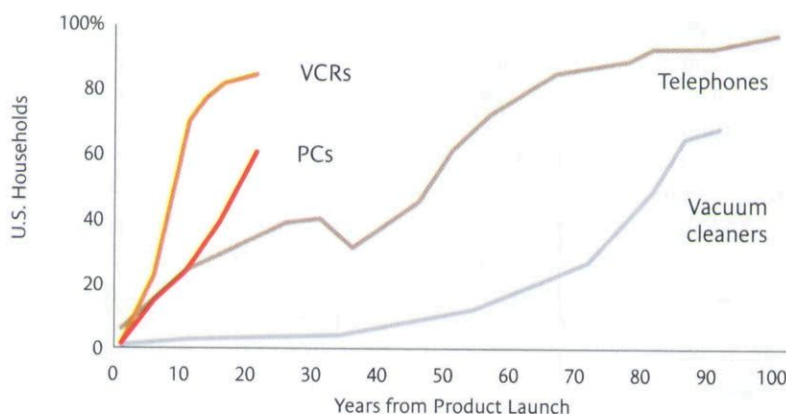
than, say, the markets for VCRs and cellular telephones. Fixed telephones needed more than 50 years to reach a household penetration of 70%; cellular telephones achieved the same level in less than two decades.

The greater a new product's or category's departure from existing products or categories, the more uncertain will be the pace of the market's growth and its eventual shape—how many segments the market will divide into, for example. Nokia launched the N-Gage, a gaming and music platform that includes a phone, in October 2003. Despite a

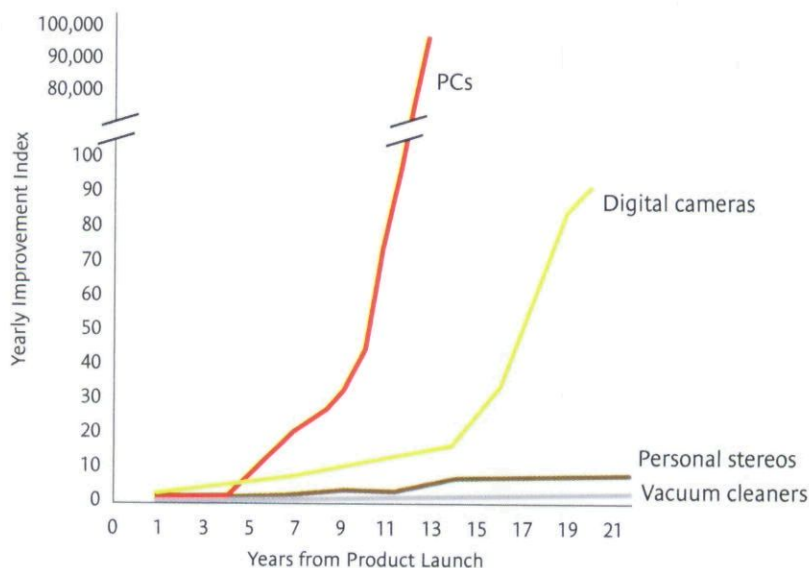
The Pace of Change

The market penetration and performance improvement of most new product categories follow similar trajectories—they progress slowly at first, pick up speed, then level off. But the rate at which they change varies dramatically. Telephones and vacuum cleaners became widespread slowly, but VCRs caught on almost overnight. PCs improved rapidly, while personal stereos remained little changed for years.

Market Penetration



Performance Improvement



The yearly performance improvement index shows the factor by which each product's technical performance has multiplied each year.

massive marketing campaign, positive comment from experts and the public, a superb brand, and market dominance in the related category of mobile phones, the company shipped in 2004 only a fraction of the “several million” devices it said it would.

The exhibit “The Pace of Change” shows how the rate of technology and market evolution can vary across product categories. The trajectories of both technological improvement within a product category and that category’s expansion in the market are roughly S-shaped – slow progress at the beginning yields to rapid progress and then a flattening in the growth rate. But the precise shape of the S varies from one category to the next.

The Likelihood of a First-Mover Advantage

Think about a new product category your company recently entered. Are innovations continually popping up? Or do they appear infrequently enough that you can stay current? Now consider the market for that product. Is it growing so fast that you can hardly keep up with demand, or is it expanding only gradually, giving you and others in the industry plenty of time to plan and reach new customers?

The exhibit “The Combined Effects of Market and Technological Change” illustrates the four possible combinations of slow and rapid technology and market evolution. We use the term “calm waters” for the upper left cell of the matrix, where the technology and the market are evolving gradually. In the upper right, technological change is modest while the market grows rapidly – thus the market expands faster than the technology evolves. In the lower left, the technology leads – performance improvement is rapid compared with the evolution of the market. The lower right is the “rough waters” area, where both the technology and the market evolve quickly.

When the Waters Are Calm

Gradual evolution in both technology and markets provides first movers with the best conditions for creating a dominant position that is long lasting. The vacuum cleaner industry protected its first mover by evolving slowly and smoothly. In 1908, in Ohio, William Henry Hoover produced the first commercial bag-on-a-stick upright vacuum cleaner, but it made little headway. As late as 1930, fewer than 5% of households had purchased one. The technology changed as slowly as the market.

When innovation did occur, the change was enduring. In 1935, Hoover designer Henry Dreyfuss encased the vacuum cleaner’s components in a streamlined canister, creating a technological blueprint that more or less persists to this day. In such a benign environment, Hoover had little trouble keeping up-to-date technologically and meeting demand. The company’s machines became the reference point within the category. The British even turned the brand into a verb – “to Hoover.”

A gradual pace of change in the technology makes it hard for later entrants to differentiate their products from those of the first entrant. Even if competitors discover some means of doing so, the differences are not rapid enough or drastic enough to prevent the first mover from mastering them and folding them into its product line in a timely fashion, as Hoover did with the relatively few minor innovations introduced by competitors Electrolux and Eureka. (With globalization, however, the vacuum cleaner market has fragmented, creating niches for European makers, such as Miele, that Hoover and other mass-market manufacturers are now trying to occupy as well.)

An initially slow pace of market growth also tends to favor the first mover by giving it time to cultivate and satisfy new market segments. Though devastating to most businesses, the Great Depression was kind to Scotch Tape, which was invented by 3M’s Richard Drew in 1930. At first, Drew thought the product would be used in industrial settings – perhaps to seal cellophane wrapped around baked goods. Instead, it was taken up by ordinary people, who were looking to repair items that in more affluent times they might have discarded. The gradual growth of Scotch Tape’s appeal gave 3M time to organize production and distribution. Technological change was similarly modest, enabling 3M to keep up-to-date and preventing later entrants from both introducing superior versions and “inventing around” 3M’s patent. Indeed, the product remained basically unchanged until 3M released the

The Combined Effects of Market and Technological Change

The pace of change in a technology and a market can have a profound effect on a company’s chances of achieving a first-mover advantage. Four possible scenarios face a would-be first mover.



almost-invisible Magic Transparent Tape in 1961. As with Hoover, Scotch Tape so dominated its category it became synonymous with it.

The combination of a slowly changing market and a slowly changing technology makes company resources less critical than they would be in the other technology-and-market environments. By "resources" we mean the skills or capabilities and the assets that organizations develop over time. Among the most important capabilities are product development, production, and marketing. One important asset is brand recognition. Others are physical assets, such as strategic locations, and financial resources. Of course, having the most abundant resources and the most valuable skills is always desirable, but in calm waters, a first entrant lacking those advantages may still have the latitude and the means to defend its product against later competitors.

When the Market Leads and Technology Follows

Consider the Walkman, the first product in a clever new category—the personal stereo. The Walkman, pioneered by Sony in 1979, used mature technologies readily available at the time, and its basic technical design remained unchanged for a decade. By contrast, its market grew abruptly, with sales reaching some 40 million units in less than ten years. Indeed, the personal stereo is often cited among the most successful consumer-electronics innovations of our time. Given the market's enormous expansion rate and potential size, one might think that only a short-term advantage should have been available to the first mover. Yet Sony's market share was close to 48% even ten years after the Walkman's launch, thanks to its superior resources—in particular its design skills, marketing muscle, and strong brand.

A first entrant with limited resources and skills would probably have to settle for a short-term first-mover advantage, however. Boston's Elias Howe introduced the first commercial sewing machine in the late 1840s, but the machines



made by Isaac Singer, a later entrant with greater resources, were soon able to find more customers than Howe's. The basic sewing machine changed little over the next half-dozen years, but demand increased to such an extent that Singer began expanding into Europe. (Although Howe could not achieve a durable first-mover advantage in the product category, the patents he owned on competitors' products allowed him to extract substantial rents for some time.)

When Technology Leads and the Market Follows

What happens in the reverse situation, in which technology changes abruptly but the market is slow to accept the new product category? A short-lived first-mover advantage is very unlikely here. Early entrants face many years of flat sales and operating losses and, consequently, the skepticism of stock market analysts. At the same time, the furious pace of technological change brings in new competitors, who think their improvements will draw customers away from the incumbent and its dated products. A durable advantage, for most early entrants as well as most later arrivals, is also unlikely.

Only a company with very deep pockets could enter such a market first, survive in its hostile environment, and withstand a considerable delay before

obtaining durable first-mover advantages. Deep pockets allow a firm to wait until the pace of technological change slows, or the fundamentally new technology its product line embodies becomes the new standard, and the market takes off. Of course, the company also needs a superb R&D capability to keep it at the technological forefront in the meantime.

In 1981, Sony launched the first digital camera, the Mavica. Sales of digital cameras did not begin to gather momentum for at least ten years, and sales continued to be modest for another decade, during which

the relentless pace of technological improvement rendered products obsolete within a year. A key area of improvement was the density of information a digital image could handle. In the early 1980s, a high-end camera could produce images with up to 60,000 pixels. By 2000, the pixel count had reached 5 million. Sony's considerable financial resources and world-famous technological capabilities allowed it to stay on top of the category and grab a commanding share of the slowly evolving market. In 2003, Sony was still the leader in the U.S. market, with about a 22% market share.

When the Waters Get Rough

Sometimes, both technological innovation and consumer acceptance advance rapidly, leaving first movers highly vulnerable. AT&T and Netscape are examples of companies capsized by the rapid churning of technology and markets. AT&T was the first company to deploy a cellular telephone system in the United States. It built a prototype in 1977 and a year later held the system's first public trial, involving 2,000 customers in Chicago. However, in 1983, Ameritech, not AT&T, offered commercial analog cellular operations after they were authorized by the FCC. As for Netscape, Marc Andreessen, a co-developer of Mosaic, teamed up with Jim Clark in 1994 to invent Netscape's

IS THIS WHAT IS
HAPPENING WITH TESLA?

Is a First-Mover Advantage Likely?

Your company's odds of succeeding with the resources it possesses depend on how well you understand the market and the technology. Use this chart to match your company's skills and resources with the environment you face in a particular situation.

The Situation Your Company Faces	First-Mover Advantage		Key Resources Required
	Short-Lived	Durable	
Calm Waters	Unlikely Even if attainable, advantage is not large.	Very likely Moving first will almost certainly pay off.	Brand awareness helpful, but resources less crucial here
The Market Leads	Very likely Even if you can't dominate the category, you should be able to hold onto your customer base.	Likely Make sure you have the resources to address all market segments as they emerge.	Large-scale marketing, distribution, and production capacity
The Technology Leads	Very unlikely A fast-changing technology in a slow-growing market is the enemy of short-term gains.	Unlikely Fast technological change will give later entrants lots of weapons for attacking you.	Strong R&D and new product development, deep pockets
Rough Waters	Likely A quick-in, quick-out strategy may make good sense here, unless your resources are awesome.	Very unlikely There's little chance of long-term success, even if you are a good swimmer. These conditions are the worst.	Large-scale marketing, distribution, production, and strong R&D (all at once)

browser, which kicked off the era of widespread Internet access. Yet Netscape today survives only as a small unit of Time Warner.

Neither AT&T nor Netscape was able to make a profit in the new product spaces due to the strength of later entrants' offerings. Our research suggests that a good part of the reason was the type of waters both had stepped into. Cellular telephones and Internet browsers would fall in the lower right cell of the matrix, with both the technology and the market evolving rapidly (irregularly for cell phones, smoothly for browsers). In such conditions, it is very difficult for companies to gain durable first-mover advantages.

If a product's underlying technology changes very rapidly, the item quickly becomes obsolete. More often than not, such products are overtaken by versions from new entrants, which aren't burdened by maintaining and servicing older product lines and can innovate

without fear of cannibalizing prior investments. Some researchers have used the term "vintage effects" to characterize the tendency of new generations of technology to usher in winning entrants. One can observe vintage effects in many product categories. In the gaming console market, which Magnavox Odyssey entered in 1972, at least six generations of technology emerged in rapid succession, each pushing forward a new winner. The same thing happened in hard drives and laptop computers. The Osborne 1, generally considered to be the first commercially available, truly portable computer, weighed 24 pounds and was soon superseded by lighter models. But laptop technology evolved so quickly that each successor, after briefly achieving dominance, was soon supplanted itself.

A fast-growing market adds to a first mover's challenges by opening attractive new competitive spaces for later entrants to exploit. The incumbent tends

to be at a disadvantage, since it often lacks the production capacity or marketing reach to serve a rapidly expanding customer base.

A rapid pace of market evolution makes long-term dominance unlikely, but it does not necessarily bar a first mover from achieving worthwhile short-term gains – provided it has an acute sense of when to exit. Consider once more the Internet browser market. In 1994, the Internet started growing extremely quickly. Within two years, the number of Web sites had increased 50-fold. This frantic pace enabled later entrants, chief among them Microsoft, with its enormous resources, to find plenty of space in which to grow. But before competitors could destroy Netscape's business, Netscape arranged to be acquired by AOL in an amazing \$10 billion deal.

Achieving a durable advantage under such conditions is not, however, impossible. Here is where a firm's resources

can make a big difference. Only a first mover with mighty resources, far superior to those of competitors, has any chance of achieving longer-term first-mover advantages when both technology and markets are moving rapidly. For instance, all else being equal, a first entrant with a very strong brand name will tend to be more successful in locking in customers than one without a recognized brand name. A good example of a firm today that makes the best of its endowments in the most difficult of circumstances is Intel. By putting all its technical and marketing muscle behind its product development process and being "paranoid" about competition,


ever, the iPod mini has already improved upon its predecessor, and Dell is offering price cuts and a 12-hour battery for its 20-gigabyte player. Even though the mini is Apple's own invention, Apple will be hard-pressed to stay the leader for long.

To Be or Not to Be First?

The four scenarios in the matrix place premiums on very different sets of assets and capabilities. Large-scale marketing, distribution, and production capacity is key in situations where the market leads; R&D, new product development, and deep pockets are key in situations where the technology

band. Symbian's total revenues for 2003 were slightly more than \$100 million, whereas Microsoft spent \$7 billion just on R&D. Although the leaders in the handset market, including Nokia and Siemens, organized Symbian to keep Microsoft at bay, margins are so thin in their industry that they could very well choose Microsoft's operating system over Symbian's if Microsoft were to provide it for free or very little. Already Motorola, a Symbian founder, has chosen Microsoft's OS. It remains to be seen whether Symbian and its backers will be able to stand up to Microsoft's superior resources in a fast-growing market for a fast-moving technology.

New product categories are constantly emerging around us. In most instances, companies struggle not with whether to enter a new product category altogether but with whether to enter early or later. Sometimes executives wonder if it would be wise, for example, to wait until the companies in the first wave have been weakened by competition and seen their technological edge dulled. But by that point, there might not be enough time left to master the technology in question. Still, in some situations, it may not make a lot of sense to try to be the first mover. In environments where a first mover's advantage is likely to occur only after years of losses, and then to be short-lived, discretion would probably be the better part of valor. After all, first-mover advantage occurs not when you enter a market, but when you start making real money in it.

To make real money in an evolving market, you need to analyze the kind of environment that surrounds the new category; to assess the character and depth of your resources, comparatively speaking; and then to decide on the type of first-mover advantage – short-term or durable, immediate or delayed – that is most achievable, if indeed any is. Remember, once you've gone into the water, you have no choice but to swim. 

A rapid pace of market evolution does not necessarily bar an incumbent first mover from achieving worthwhile short-term gains – provided it has an acute sense of when to exit.

Intel has been able to dominate a product category in which markets keep expanding and technology keeps changing at a furious pace.

But do not take the possession of substantial resources as a guarantee of winning. When IBM, for example, introduced the hard drive in the late 1950s, it was the largest computer maker in the world. Since then, a sequence of fast-growing markets for minicomputers, personal computers, and laptops has generated relentless demand for new versions of the device. Despite a superb brand name and plenty of resources, IBM could not stay atop the hard-drive industry for long. Neither could opportunistic later entrants.

We expect Apple's iPod to face similar rigors. Famously strong in marketing, R&D, and design, Apple launched the iPod in October 2001 and by 2003 had around 70% of the market for digital music players containing hard drives. In the first quarter of 2004 alone, the company sold more than 800,000 units; by the third quarter, it had increased its share of the retail market to 82%. How-

ever, if you step into a given environment with the wrong type of resources, you can expect a rough time (see the exhibit "Is a First-Mover Advantage Likely?"). Polaroid, for instance, had a great brand name in photography and excellent access to distribution channels in the early 1990s, but it was relatively weak in R&D and new product development. Indeed, its leading product back then, the instant camera, embodied a 15-year-old design. After almost two decades of fruitless diversification, the company had to file for bankruptcy protection. Even if Polaroid had been the first mover into digital cameras, a category it wanted to dominate, our analysis suggests its fate would have been the same. It didn't have the wherewithal to triumph over or even survive furious technological change, rapid and frequent product obsolescence, and a slow market takeoff.

Right now, Symbian is contending with Microsoft to establish the operating system for the new product category of "smart phones" ^{LMFAO} cellular phones capable of multimedia and wireless broad-

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