

From SixDegrees.com to Facebook: The Rise of Social Networking Sites

In the 1960s, Stanley Milgram addressed a number of letters to a friend of his, a stockbroker in Boston. Milgram then distributed these letters to a random selection of people in Nebraska. He instructed the individuals to pass the letters to the addressee by sending them to a person they knew on a first-name basis who seemed in some way closer (socially, geographically, etc.) to the stockbroker. This person would then do the same, until the letters reached their final destination. Many of the letters did eventually reach the stockbroker, and Milgram found that on average, the letters had passed through six individuals en route. Milgram had demonstrated that the world was indeed small, and dubbed this finding "six degrees of separation."^a This finding, which inspired both the John Guare play "Six Degrees of Separation" and the 1993 film by the same name, also inspired one of the very first social networking sites. Started in 1997 by Andrew Weinreich, SixDegrees.com sought to leverage both the growing popularity of the Internet and people's curiosity about to whom they might be connected—or connectable. The site enabled users to create profiles and invite their friends to join.^b SixDegrees attracted three million members, but many users felt that not enough of their friends were members to make it an interesting destination, and there was little to do on the site beyond inviting and accepting friend requests.^c The company soon ran out of money, and it shut down in 2000.

Friendster was launched in March of 2003 by former Netscape engineer Jonathan Abrams with \$400,000 in seed money and a similar concept to SixDegrees.com. In fact, Friendster would even show you a network map of you and your acquaintances, lending imagery to the "six degrees of separation" concept. It also used this map to determine who had permission to view which pages—dramatically increasing the computer time required for users to access pages. In its first six months Friendster attracted about 1.5 million users and Google offered to acquire it for \$30 million. Abrams declined the offer, and instead raised \$13 million in venture capital.^d Later that year *Time* magazine declared Friendster was one of the "coolest inventions of 2003." Like Six Degrees, though the site was very popular, the infrastructure for social networking (and the knowledge about what was required to efficiently manage a social

networking site) was in its infancy. The number of members rapidly grew to seven million, but the company did not have sufficient servers to support the traffic, causing severe page load delays. The company began to receive thousands of customer service complaints, and soon members (and would-be members) were fleeing to other sites that had learned from Friendster's mistakes. One of those sites was MySpace.

Also founded in 2003 (by Brad Greenspan, Chris DeWolfe, and Tom Anderson of community website conglomerate eUniverse), MySpace mimicked some of the more popular features of Friendster, but also leveraged the 20 million subscribers and e-mail users of eUniverse to jumpstart its membership. Unlike Friendster, MySpace made all members' profiles viewable by any user, which reduced the computational burden of figuring out who was able to look at which profile. MySpace also made user profiles very customizable, and offered spaces for blogs, places to display photos, and the ability to play music. MySpace was acquired in July of 2005 by media conglomerate News Corporation for \$580 million, and from 2005 to 2008 was the most popular social networking site in the world. A three-year advertising deal with Google for \$900 million was a cash windfall, but it also led to heavy amounts of advertising on the site, which annoyed many users.

Meanwhile, in 2004, college students Mark Zuckerberg, Eduardo Saverin, Dustin Moskovitz, and Chris Hughes had launched Facebook, initially as a service available only to Harvard University students, but later as a service for the general public in 2006. A growing awareness of social networking (and the large News Corp. acquisition of MySpace) made it relatively easy to find investors for the company, and Facebook quickly raised nearly \$50 million in venture capital. This enabled the company to avoid advertising sales in its early years, helping the site to retain a cleaner looking design. Facebook also had a reputation for better security than MySpace, and had a platform that allowed outside developers to create features for the site. While MySpace was being run by corporate managers who attempted to develop all of its applications in-house, Facebook was letting the marketplace determine what it would become, leading to a huge proliferation of social games, product reviews, and self-created groups. Facebook also made it easy for users to restrict who could see their information, which (according to Zuckerberg) made them more likely to share more personal information on the site. Whereas MySpace had been the social networking site of choice for teenagers, Facebook began to dominate the 18–30 year old crowd, rapidly becoming the number one site in the world for exchanging photos and information. Corporations began setting up their own Facebook pages, and the site began to be an important vehicle for developing brands. In 2007, Facebook began offering advertising sales, which it could closely target to users based on demographics, geographical location, and other preferences. In the spring of 2008, Facebook overtook MySpace in terms of overall number of users. From that point on, MySpace suffered a rapid decline in users. By 2010, MySpace had all but conceded defeat and announced that it would focus on the niche of "social entertainment." After losing a reported \$350 million in 2010, it laid off half its staff in early 2011.^e Facebook, on the other hand, continued to grow at a staggering pace, accumulating 901 million users by 2012.^f

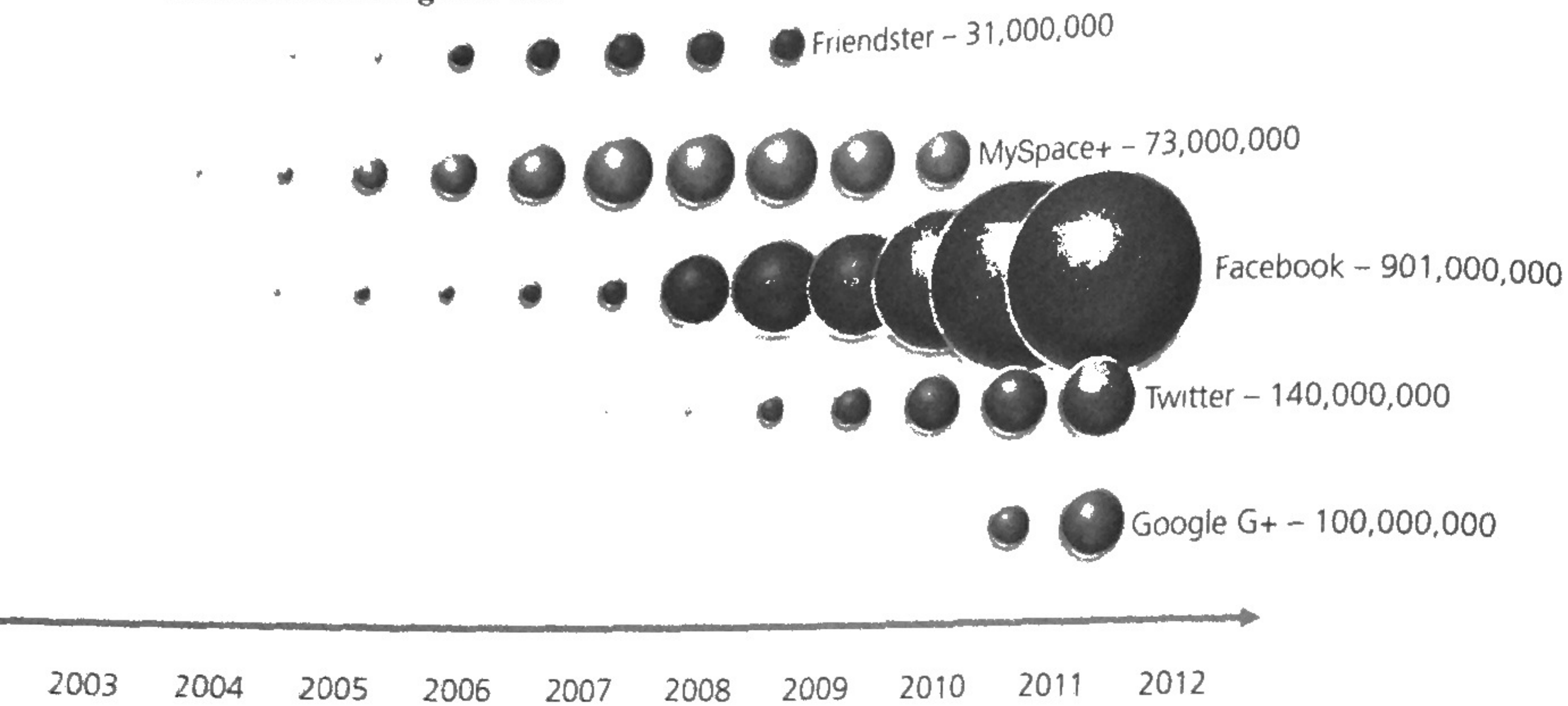
Twitter was launched in 2006 in Jack Dorsey with a somewhat different angle—it was a "microblogging" site where users were restricted to posting short messages (known as "tweets") of up to 140 characters. Users could then subscribe to view other users' messages (this is known as "following"). The messages were visible to the public by default, but users could restrict the messages to only their followers if they chose. According to popular lore, Twitter's tipping point in adoption came at the 2007 South by Southwest Interactive Conference (an important film, interactive media, and music conference held in Austin, Texas, every Spring) where two large plasma screens had been placed in the hallways to stream twitter messages exclusively. The tweets were captivating, and soon the entire conference was buzzing about this new social medium. Twitter's revenue model was based on paid advertising by organizations that wanted to purchase "promoted tweets" based on search terms (similar to Google's Adwords). By 2012, Twitter had 112 million active users.^g Though Twitter's growth had been impressive, many observers did not believe it posed a serious threat to Facebook as its reliance on the "tweeting" model meant that it appealed only to a subset of Facebook users (other Facebook users were more motivated to maintain pages with photos, group memberships, etc.), and Facebook had countered the Twitter threat by incorporating similar features (such as status updates with real-time updating) in its "news feed" application.

There were dozens of other social networking sites that emerged over this time period, including several that gained wide popularity within more narrowly defined markets. Hi5, for example, was founded in 2003, growing out of a matchmaking site for South Asian singles. This would become a very popular social networking site in Asia, attracting nearly 5 million users by 2007. LinkedIn took a more serious approach and positioned itself more as a professional networking site. Though never gaining popularity among the young people that drove the huge traffic on sites such as Myspace and Facebook, it grew steadily and reached 101 million users by 2012.

Analysts speculated that a bigger threat could be posed by Google. From 2007 to 2012, Google introduced a number of would-be competing social network platforms, including a Friendster-like site called Orkut, a social networking site development platform called OpenSocial, and a tool for social networking sites called Friend Connect. None of these gained much traction, however. Google then developed a product to compete more directly with Twitter, called Google Buzz. However, by default this program made users' e-mail addresses publicly visible, leading a scandal in which the Electronic Privacy Information Center filed a complaint with the Federal Trade Commission claiming that that Buzz "violated user expectations, diminished user privacy, contradicted Google's privacy policy, and may have violated federal wiretap laws."^h Google's settlement with the FTC subjected Google to privacy audits for the next twenty years.

Undeterred, in 2011, Google launched a product to compete directly against Facebook called Google+. Google+ enabled users to share photos and status updates like Facebook; however, it also offered video chatting

Timeline of Social Networking Site Growth



and stronger functionality to enable users to organize their contacts into groups—a move that was considered important to enhance users’ privacy. By 2012, Google+ had already accumulated over 100 million users, but there was still speculation about whether it would be able to overtake Facebook’s commanding lead. Figure 5.1 provides a timeline of the growth of social networking sites.

Discussion Questions

1. Why did the first social networking sites fail? Is there anything they could have done to survive?
2. What factors made MySpace more successful than Friendster and SixDegrees.com? What factors enabled Facebook to overtake MySpace?
3. Are there significant switching costs that lock users into a particular social networking site?
4. What will determine if Google+ can overtake Facebook?

¹ Schilling, M. A. and Phelps, C. 2007. Interfirm collaboration networks: The impact of large-scale network structure on firm innovation. *Management Science*, 53: 1113–26.
² Anonymous. 2008. The social networking story. In *Technology Review*, July/August, p. 40.
³ Piskorski, M. K., Eisenmann, T. R., Crien, D., and Ferstein, B. 2011. Facebook. Harvard Business School case 9-806-128.
⁴ Anonymous. 2008. The social networking story. In *Technology Review*, July/August, p. 40.
⁵ Hartung, A. 2011. How Facebook beat MySpace. *Forbes*, January 14.
 Data from Technorati.com and Comscore.
⁶ Piskorski, M. K., Eisenmann, T. R., Crien, D., and Ferstein, B. 2011. Facebook. Harvard Business School case 9-806-128.

OVERVIEW

The previous chapter pointed out that some industries are characterized by increasing returns to adoption, meaning that the more a technology is adopted, the more valuable it becomes. In such industries, timing can be crucial—a technology that is adopted earlier than others may reap self-reinforcing advantages such as greater funds to invest in improving the technology, greater availability of complementary goods, and less customer uncertainty. On the other hand, the same factors that cause increasing returns to adoption may make very early technologies unattractive: if there are few users of the technology or availability of complementary goods is poor, the technology may fail to attract customers. A number of other first-mover advantages, and disadvantages, can shape how timing of entry is related to likelihood of success.

first movers

The first entrants to sell in a new product or service category.

early followers

Entrants that are early to market, but not first.

late entrants

Entrants that do not enter the market until the time the product begins to penetrate the mass market or later.

Entrants are often divided into three categories: **first movers** (or pioneers), which are the first to sell in a new product or service category; **early followers** (also called early leaders), which are early to the market *but not first*; and **late entrants**, which enter the market when or after the product begins to penetrate the mass market. The research on whether it is better to be a first mover, early follower, or late entrant yields conflicting conclusions. Some studies that contrast early entrants (lumping first movers and early followers together) with late entrants find that early entrants have higher returns and survival rates, consistent with the notion of first-mover (or at least early-mover) advantage.¹ However, other research has suggested the first firm to market is often the first to fail, causing early followers to outperform first movers.² Still other research contends the higher returns of being a first mover typically offset the survival risk.³ A number of factors influence how timing of entry affects firm survival and profits. In this chapter, we will first examine first-mover advantages and disadvantages. We will then look more closely at what factors determine the optimal timing of entry, and its implications for a firm’s entry strategy.

FIRST-MOVER ADVANTAGES

Being a first mover may confer the advantages of brand loyalty and technological leadership, preemption of scarce assets, and exploitation of buyer switching costs.⁴ Furthermore, in industries characterized by increasing returns, early entrants may accrue learning and network externality advantages that are self-reinforcing over time.⁵

Brand Loyalty and Technological Leadership

The company that introduces a new technology may earn a long-lasting reputation as a leader in that technology domain. Such a reputation can help sustain the company’s image, brand loyalty, and market share even after competitors have introduced comparable products. The organization’s position as technology leader also enables it to shape customer expectations about the technology’s form, features, pricing, and other characteristics. By the time later entrants come to market, customer requirements may be well established. If aspects that customers have come to expect in a technology are difficult for competitors to imitate (e.g., if they are protected by patent or copyright, or arise from the first mover’s unique capabilities), being the technology leader can yield sustained

monopoly rents

The additional returns (either higher revenues or lower costs) a firm can make from being a monopolist, such as the ability to set high prices, or the ability to lower costs through greater bargaining power over suppliers.

monopoly rents. Even if the technology characteristics are imitable, the first mover has an opportunity to build brand loyalty before the entry of other competitors.

Preemption of Scarce Assets

Firms that enter the market early can preemptively capture scarce resources such as key locations, government permits, access to distribution channels, and relationships with suppliers.

For example, companies that wish to provide any wireless communication service must license the rights to broadcast over particular radio frequencies from the government. In the United States, the Federal Communications Commission (FCC) is primarily responsible for allotting rights to use bands of radio frequencies (known as the spectrum) for any wireless broadcasting. The FCC first allocates different portions of the spectrum for different purposes (digital television broadcasting, third-generation wireless telecommunication, etc.) and different geographic areas. It then auctions off rights to use these segments to the highest bidders. This means that early movers in wireless services can preemptively capture the rights to use portions of the wireless spectrum for their own purposes, while effectively blocking other providers. By 2003, the proliferation of wireless services had caused the spectrum to become a scarce commodity, and the FCC was under pressure to allow the holders of wireless spectrum rights to sublet unused portions of their spectrum to other organizations.

Exploiting Buyer Switching Costs

Once buyers have adopted a good, they often face costs to switch to another good. For example, the initial cost of the good is itself a switching cost, as is the cost of complements purchased for the good. Additionally, if a product is complex, buyers must spend time becoming familiar with its operation; this time investment becomes a switching cost that deters the buyer from switching to a different product. If buyers face switching costs, the firm that captures customers early may be able to keep those customers even if technologies with a superior value proposition are introduced later. This is often the reason given for the dominance of the QWERTY typewriter keyboard. In 1867, Christopher Sholes began experimenting with building a typewriter. At that time, letters were struck on paper by mechanical keys. If two keys were struck in rapid succession, they often would jam. Key jamming was a particularly significant problem in the 1800s, because typewriters then were designed so that keys struck the back side of the paper, making it impossible for users to see what they were typing. The typist thus might not realize he or she had been typing with jammed keys until after removing the page. Scholes designed his keyboard so that commonly used letter combinations were scattered as widely as possible over the keyboard. The QWERTY keyboard also puts a disproportionate burden on the left hand (3,000 English words can be typed with the left hand alone, while only 300 can be typed with the right hand alone). This positioning of keys would slow the typing of letter combinations, and thus reduce the likelihood of jamming the keys.⁶

Over time, many competing typewriter keyboards were introduced that boasted faster typing speeds or less-tiring typing. For example, the Hammand and Blickensderfer "Ideal" keyboard put the most commonly used letters in the bottom row for easy access, and used only three rows total. Another example, the Dvorak keyboard, placed

all five vowels and the three most commonly used consonants in the home row, and common letter combinations required alternating hands frequently, reducing fatigue. However, QWERTY's early dominance meant typists were trained only on QWERTY keyboards. By the time Dvorak keyboards were introduced in 1932, tens of millions of typists were committed to QWERTY keyboards—the switching costs of learning how to type all over again were more than people were willing to bear.⁷ Even after daisy-wheel keys (and later, electronic typewriters) removed all possibility of jamming keys, the QWERTY keyboard remained firmly entrenched. August Dvorak is said to have died a bitter man, claiming, "I'm tired of trying to do something worthwhile for the human race. They simply don't want to change!"⁸

Reaping Increasing Returns Advantages

In an industry with pressures encouraging adoption of a dominant design, the timing of a firm's investment in new technology development may be particularly critical to its likelihood of success. For example, in an industry characterized by increasing returns to adoption, there can be powerful advantages to being an early provider; a technology that is adopted early may rise in market power through self-reinforcing positive feedback mechanisms, culminating in its entrenchment as a dominant design. Intel is an apt example of this.

Intel's Ted Hoff invented the first microprocessor in 1971, and in 1975, Bill Gates and Paul Allen showed that it could run a version of BASIC that Gates had written. Gates's BASIC became widely circulated among computer enthusiasts, and as BASIC was adopted and applications developed for it, the applications were simultaneously optimized for Intel's architecture. IBM's adoption of Intel's 8088 microprocessor in its PC introduction secured Intel's dominant position, and each of Intel's subsequent generations of products has set the market standard.⁹

FIRST-MOVER DISADVANTAGES

Despite the great attention that first-mover advantages receive, there are also arguments for not entering a market too early. In a historical study of 50 product categories, Gerard Tellis and Peter Golder found that market pioneers have a high failure rate—roughly 47 percent—and that the mean market share of market pioneers is 10 percent.¹⁰ By contrast, early leaders (firms that enter after market pioneers but assume market leadership during the early growth phase of the product life cycle) averaged almost three times the market share of market pioneers.¹¹ Tellis and Golder point out that the market may often perceive first movers to have advantages because it has misperceived who the first mover really was. For example, while today few people would dispute Procter & Gamble's claim that it "created the disposable diaper market,"¹² in actuality, Procter & Gamble entered the disposable market almost 30 years after Chux, a brand owned by a subsidiary of Johnson & Johnson. In the mid-1960s, *Consumer Reports* ranked both products as best buys. However, over time Pampers became very successful and Chux disappeared, and eventually people began to reinterpret history.

Other studies have found that first movers earn greater revenues than other entrants, but that they also face higher costs, causing them to earn significantly lower profits in

the long run.¹³ First movers typically bear the bulk of the research and development expenses for their product or service technologies, and they must also often pay to develop suppliers and distribution channels, plus consumer awareness. A later entrant often can capitalize on the research and development investment of the first mover, fine-tune the product to customer needs as the market becomes more certain, avoid any mistakes made by the earlier entrant, and exploit **incumbent inertia**.¹⁴ Later entrants can also adopt newer and more efficient production processes while early movers are either stuck with earlier technologies or must pay to rebuild their production systems.¹⁵

incumbent inertia

The tendency for incumbents to be slow to respond to changes in the industry environment due to their large size, established routines, or prior strategic commitments to existing suppliers and customers.

Research and Development Expenses

Developing a new technology often entails significant research and development expenses, and the first to develop and introduce a technology typically bears the brunt of this expense. By the time a firm has successfully developed a new technology, it may have borne not only the expense of that technology but also the expense of exploring technological paths that did not yield a commercially viable product. This firm also typically bears the cost of developing necessary production processes and complementary goods that are not available on the market. Since the new product development failure rate can be as high as 95 percent, being the first to develop and introduce an unproven new technology is expensive and risky.

By contrast, later entrants often do not have to invest in exploratory research. Once a product has been introduced to the market, competitors can often ascertain how the product was created. The later entrant can also observe the market's response to particular features of the technology and decide how to focus its development efforts. Thus, the later entrant can both save development expense and produce a product that achieves a closer fit with market preferences.

Undeveloped Supply and Distribution Channels

When a firm introduces a new-to-the-world technology, often no appropriate suppliers or distributors exist. The firm may face the daunting task of developing and producing its own supplies and distribution service, or assisting in the development of supplier and developer markets. For example, when DEKA Research began developing its self-balancing IBOT wheelchair, it needed a type of ball bearing for which there were no suppliers. DEKA was forced to develop a machine to mold the bearings. According to Dean Kamen, the company's founder, "Nobody here planned to invent new ball bearings, but in order to make this engine practical we have to develop a bearing technology that doesn't exist."¹⁶

Immature Enabling Technologies and Complements

When firms develop technologies, they often rely on other producers of **enabling technologies**. For instance, the opening vignette demonstrated that even though producers of personal digital assistants (PDAs) had created palm-size devices with significant computing power, the potential of these devices would be delivered only if battery and modem technologies were further developed. Since few PDA manufacturers were actually involved in the development of batteries or modems, they were reliant on the development efforts of other firms.

enabling technologies

Component technologies that are necessary for the performance or desirability of a given innovation.

Theory in Action Obstacles to the Hydrogen Economy

Fuel cells create electricity from a reaction between hydrogen and oxygen, and are much more efficient than internal combustion gasoline engines. Whereas a typical internal combustion engine converts less than 20 percent of the energy potential of gasoline into power for the automobile, fuel cells capture 40 percent to 60 percent of the energy potential of their fuel source, which can be any hydrogen-rich liquid or gas.^a Hydrogen is one of the most abundant elements on earth and can be obtained in a number of ways, including electrolysis of water or steam conversion of methanol. Furthermore, the only waste products of hydrogen fuel cells are water vapor and carbon dioxide. Hydrogen thus offers an inexhaustible and environmentally friendly fuel source.^b Utilizing hydrogen to power vehicles (among other things) offers the promise of reducing reliance on dwindling fossil fuel reserves while dramatically decreasing the environmental impact of automobiles. Many of the key players in fuel cell development envision a "hydrogen economy" whereby automobiles with hydrogen fuel cells are used to supply power to homes and offices, eventually replacing the existing electrical power grids.

Fuel cells were developed more than 150 years ago, but were initially too bulky and expensive to be used in automobiles. In the 1970s, however, the energy crisis sparked a resurgence in fuel cell development, and a number of prototypes emerged through the late 1970s and 1980s. By the 1990s, several auto manufacturers, including Toyota and Daimler had developed automobiles powered by fuel cells and were planning commercial production. A number of

serious obstacles, however, stood in the way of fuel cell adoption by the mass market. The most serious of these was the lack of a complementary refueling infrastructure. Before fuel cell vehicles could be promoted to the mass market, refueling options had to be developed that would be convenient and easy for consumers to use. This was no small feat—the existing fuel stations that were ubiquitous in almost every corner of the globe could not handle a gaseous fuel such as hydrogen. While liquid gasoline can be stored in almost any type of container, hydrogen gas is liquid only under very high pressure and has very small molecules. It would rapidly leak out of existing gasoline storage containers. Both fueling stations and automobiles would need to be able to keep compressed hydrogen in a pressurized tank. Furthermore, many of the existing gasoline stations were owned or otherwise connected to oil companies. Since it was not yet clear what role oil companies would play in the hydrogen economy, many suspected that oil companies would use their resources and lobbying power to resist the adoption of hydrogen fuel cells. To unleash the power of the "hydrogen economy" vision would not only require heavy investment in new infrastructure, but also require resolving or overcoming the conflicting interests of numerous stakeholders, including government, utilities, auto manufacturers, oil producers, and consumers.

^a www.doe.gov.

^b J. Rifkin, "The Hydrogen Economy," *E Magazine*, January–February 2003, pp. 26–37.

As discussed in Chapter Four, many products also require complementary goods to be useful or valuable. Computers need software, cameras need film, automobiles need service, gasoline, and roads. When new technologies are introduced to a market, important complements may not yet be fully developed, thus hindering adoption of the innovation. The development of vehicles powered by hydrogen fuel cells (see the above Theory in Action) provides an excellent example of how a lack of complementary technologies and infrastructure can pose serious obstacles for early movers.

Uncertainty of Customer Requirements

A first mover to the market may face considerable uncertainty about what product features customers will ultimately desire and how much they will be willing to pay for them. For a very new product technology, market research may be of little help.

Customers may have little idea of the value of the technology or the role it would play in their lives. As a consequence, first movers may find that their early product offerings must be revised as the market begins to reveal customer preferences.

For instance, when Kodak introduced the 8-mm video camera in the late 1980s, it expected that customers would flock to the design's smaller size and superior recording ability. Instead, consumers rejected the product. The 8-mm video cameras were more expensive, and consumers had not yet recognized a need for this product and were unsure of what value it could provide. Kodak decided to withdraw from the market. However, by the early 1990s, consumers had become more comfortable with the concept of 8-mm video camera technology, and several competitors (most notably Sony) successfully entered this market.

First movers have an opportunity to shape customer preferences by establishing the precedent for product design in the newly emerging market and by investing in customer education. Customer education efforts are expensive, however. If the product is slow to begin to reap revenues for the sponsoring firm, it may collapse under the weight of its R&D and marketing expenses. Figure 5.2 provides a number of product categories with their first movers, prominent followers, and which of these were ultimately more successful.

FIGURE 5.2
First Movers
and
Followers—
Who Wins?

Source: R. M. Grant, *Contemporary Strategy Analysis* (Malden, MA: Blackwell Publishers, 1998); D. Teece, *The Competitive Challenge: Strategies for Industrial Innovation and Renewal* (Cambridge, MA: Ballinger, 1987); and M. A. Schilling, "Technology Success and Failure in Winner-Take-All Markets: Testing a Model of Technological Lock Out," *Academy of Management Journal* 45 (2002), pp. 387-98.

Product	First Mover	Notable Follower(s)	The Winner
8-mm video camera	Kodak	Sony	Follower
Disposable diaper	Chux	Pampers Kimberly Clark	Followers
Float glass	Pilkington	Corning	First mover
Groupware	Lotus	AT&T	First mover
Instant camera	Polaroid	Kodak	First mover
Microprocessors	Intel	AMD Cyrix	First mover
Microwave	Raytheon	Samsung	Follower
Personal computer	MITS (Altair)	Apple IBM	Followers
Personal computer operating system	Digital Research	Microsoft (MS-DOS)	Follower
Smartphones	IBM (Simon)	Apple Nokia	Followers
Social networking sites	SixDegrees.com	MySpace Facebook	Followers
Spreadsheet software	VisiCalc	Microsoft (Excel) Lotus	Followers
Video game console	Magnavox	Atari Nintendo	Followers
Web browser	NCSA Mosaic	Netscape Microsoft (Internet Explorer)	Followers
Word processing software	MicroPro (WordStar)	Microsoft (MS Word) WordPerfect	Followers
Workstation	Xerox Alto	Sun Microsystems Hewlett-Packard	Followers

FACTORS INFLUENCING OPTIMAL TIMING OF ENTRY

In very early market stages, a technology may be underdeveloped and its fit with customer needs unknown. In late market stages, a technology may be well understood, but competitors may have already captured controlling shares of the market. How does a firm decide whether to attempt to pioneer a technology category or to wait while others do so? The answer will depend on several factors, including customer certainty, the margin of improvement offered by the new technology, the state of enabling technologies and complementary goods, the threat of competitive entry, the degree to which the industry exhibits increasing returns, and the firm's resources.

1. How certain are customer preferences?

When new-to-the-world technologies are first developed, customers may have difficulty understanding the technology and its role in their life. Both producers and customers may face considerable ambiguity about the importance of various features of the technology. As producers and customers gain experience with the technology, features that initially seemed compelling may turn out to be unnecessary, and features that had seemed unimportant may turn out to be crucial. For example, many of the companies that raced to establish an online presence in the e-commerce frenzy of the late 1990s believed that their Web sites needed exciting graphics and sounds to be competitive. Graphics and sound, however, turned out to be the downfall of many early Web sites. Many customers did not have high-speed Internet access or computers with enough processing power to quickly download the Web sites, making multimedia Web sites an annoyance rather than an attraction.

The reverse scenario is demonstrated in Sony's introduction of the PlayStation2. When Sony introduced its multifeatured PlayStation2, many industry analysts believed that Sony had overestimated consumer interest in having a game console that would play music CDs or DVD movies. It turned out, however, that Sony may have *underestimated* the desirability of these features. Video game consoles are typically sold at cost (or at a loss) in order to rapidly build an installed base. Profits are then made on game royalties. However, when consumers realized that the PlayStation2 was a very affordable combination of game console and high-quality DVD player, many consumers bought the system for its DVD capabilities first and game capabilities second. Many of these consumers bought very few games, causing Sony's strategy of subsidizing the console with the intention of making money on the games to backfire. Observing this, Microsoft disabled DVD playback on its Xbox unless consumers purchased an add-on DVD playback kit.

Not all pioneers face customer uncertainty—some innovations are developed in response to well-understood customer needs. Customer requirements may have been long known even if the method of meeting them was not. For example, the developers of Tagamet (a medication for patients with chronic heartburn or ulcers) faced very little customer uncertainty. Customers wanted an affordable, easy-to-use solution to their stomach discomfort. Once a method of achieving this objective had been developed, tested, and approved, its developers raced the product to market in hopes of patenting it and securing market share ahead of competing products. Other things being equal, less customer uncertainty favors earlier timing of entry.

2. How much improvement does the innovation provide over previous solutions?

The degree to which the technology represents an improvement over previous technologies increases a firm's likelihood of successful early entry. That is, when a technology makes a dramatic improvement over previous generations or different technologies that serve similar functions, it will more rapidly gain customer acceptance. There will be less ambiguity about the value of the technology and more early adoptions (as well as more support by complementary goods providers); as a consequence, customer expectations should become known sooner, and adoptions should be more rapid.¹⁷

3. Does the innovation require enabling technologies, and are these technologies sufficiently mature?

As mentioned earlier, many innovations rely on crucial enabling technologies to ensure their performance. A high-definition television set is of little value if networks are incapable of broadcasting in high definition; cellular phones or portable stereos would have little value if small and long-lasting batteries were unavailable. A developer must identify which enabling technologies will affect the performance of the new innovation and assess the degree to which those technologies are mature enough (or *will be* mature enough) to deliver the desired performance. More mature enabling technologies allow earlier entry; less mature enabling technologies may favor waiting for enabling technologies to be further developed.

4. Do complementary goods influence the value of the innovation, and are they sufficiently available?

If the value of an innovation hinges critically on the availability and quality of complementary goods, then the state of complementary goods determines the likelihood of successful entry. Not all innovations require complementary goods, and many more innovations can utilize existing complementary goods. For example, though numerous innovations in 35-mm cameras have been introduced in the last few decades, almost all have remained compatible with standard rolls of 35-mm film; thus availability of that complementary good was ensured. If, on the other hand, the innovation requires the development of new complementary goods, then a pioneer must find a way to ensure their availability. Some firms have the resources and capabilities to develop both a good and its complements, while others do not. If the firm's innovation requires complementary goods that are not available on the market, and the firm is unable to develop those complements, successful early entry is unlikely.

5. How high is the threat of competitive entry?

If there are significant entry barriers or few potential competitors with the resources and capabilities to enter the market, the firm may be able to wait while customer requirements and the technology evolve. Over time, one would expect customer expectations to become more certain, enabling technologies to improve, and support goods and services to be developed, thus increasing the likelihood that sponsored technologies will possess a set of attributes that meet consumer demands. However, if the technology proves to be valuable, other firms are also likely to be attracted to the market. Thus, if entry barriers are low, the market could quickly become quite competitive, and entering a market that has already become highly competitive can be much more challenging than entering an emerging market.¹⁸ Margins may already have been

Research Brief Whether and When to Enter?

In a study of 30 years of data on entry into the medical diagnostic imaging industry, Will Mitchell examined the factors that drive whether and when a firm that is an incumbent in one subfield of an industry chooses to enter a newly emerging subfield of the industry.^a For instance, what determines whether and when a manufacturer of conventional X-ray machines decides to go into magnetic resonance imaging (MRI) equipment? While new goods offer opportunities for growth, they can cannibalize existing products, and they also require an investment in new skills. Incumbents often are slow to enter new technical subfields.^b They may be intentionally waiting for industry turbulence to subside, or they may be unintentionally slowed by factors that create inertia, such as the difficulty in altering well-established routines and strategic commitments to the firm's existing supplier and customer base.

Mitchell pointed out that entry barriers and imitability of a new product (for example, whether it can be effectively protected by patents) interact to create different incentives for timing. First, if only one firm can produce an inimitable good, it can enter if and when it wants. However, if several firms could produce a good that will subsequently be inimitable, they may race to do so to capture the market. In such a circumstance, being early confers a significant advantage. Finally, if

the good is expected to be highly imitable (for example, if it would be difficult to effectively protect with patents because competitors could easily invent around the patent), then firms will prefer to wait while others bear the expense of developing and introducing the good. There are disincentives to being early to market.^c

Mitchell found that firms that had more specialized assets that would be useful in the new subfield (for example, a well-established distribution system that could be used for the new imaging equipment) were more likely to enter the new subfield. A firm was also more likely to enter if the products it currently produced were threatened by the new products (i.e., if the new technology was likely to displace the firm's current technology as the dominant choice in the market). Furthermore, the incumbent was likely to enter *earlier* if its core products were threatened and there were several potential rivals.

^a W. Mitchell, "Whether and When? Probability of Incumbent's Entry into Emerging Technical Subfields," *Administrative Science Quarterly* 38 (1989), pp. 208-30.

^b F. M. Scherer, *Industrial Market Structure and Economic Performance*, 2nd ed. (Chicago: Rand McNally, 1980).

^c M. Katz and C. Shapiro, "Technology Adoption in the Presence of Network Externalities," *Journal of Political Economy* 94 (1986), pp. 822-41.

driven down to levels that require competitors to be highly efficient, and access to distribution channels may be limited. If the threat of competitive entry is high, the firm may need to enter earlier to establish brand image, capture market share, and secure relationships with suppliers and distributors. This is discussed further in the Research Brief "Whether and When to Enter?"

6. Is the industry likely to experience increasing returns to adoption?

In industries that have increasing returns to adoption due to strong learning curve effects or network externalities, allowing competitors to get a head start in building an installed base can be very risky. If a competitor's offering builds a significant installed base, the cycle of self-reinforcing advantages could make it difficult for the firm to ever catch up. Furthermore, if there are forces encouraging adoption of a single dominant design, a competitor's technology may be selected. If protection mechanisms such as patents prevent the firm from offering a compatible technology, the firm may be locked out.¹⁹

7. Can the firm withstand early losses?

As was discussed earlier, a first mover often bears the bulk of the expense and risk of developing and introducing a new innovation. First movers thus often need significant amounts of capital that either is available internally (in the case of large firms) or can be accessed externally (e.g., through the debt or equity markets). Furthermore, the first mover must be able to withstand a significant period with little sales revenue from the product. Even in the case of successful new technologies, often a considerable period elapses between the point at which a first mover introduces a new innovation and the point at which the innovation begins to be adopted by the mass market. The s-curve shape of technology diffusion (discussed in Chapter Three and Chapter 13) illustrates this aptly. New innovations tend to be adopted very slowly at first, while innovators and early adopters try the technology and communicate their experience to others. This slow initial takeoff of new innovations has caused the demise of many start-up firms. For example, in the personal digital assistant (PDA) industry—the precursor to smartphones—start-ups such as GO Corporation and Momenta had received accolades for their technology designs, but were unable to withstand the long period of market confusion about PDAs and ultimately ran out of capital. Companies such as IBM and Compaq survived because they were large and diversified, and thus not reliant on PDA revenues. Palm was a relatively late mover in the PDA industry so it did not have to withstand as long of a takeoff period, but even Palm was forced to seek external capital and was acquired by U.S. Robotics, which was later bought by 3COM.

On the other hand, firms with significant resources also may be able to more easily catch up to earlier entrants.²⁰ By spending aggressively on development and advertising, and leveraging relationships with distributors, a late entrant may be able to rapidly build brand image and take market share away from earlier movers. For example, though Nestlé was very late to enter the freeze-dried coffee market with Taster's Choice, the company was able to use its substantial resources to both develop a superior product and rapidly build market awareness. It was thus able to quickly overtake the lead from General Foods' Maxim.²¹

8. Does the firm have resources to accelerate market acceptance?

A firm with significant capital resources not only has the capability to withstand a slow market takeoff, but also can invest such resources in accelerating market takeoff. The firm can invest aggressively in market education, supplier and distributor development, and development of complementary goods and services. Each of these strategies can accelerate the early adoption of the innovation, giving the firm much greater discretion over entering early.²² These strategies are discussed in more detail in Chapter 13. Thus, a firm's capital resources can give it some influence on the shape of the adoption curve.

9. Is the firm's reputation likely to reduce the uncertainty of customers, suppliers, and distributors?

In addition to capital resources, a firm's reputation and credibility can also influence its optimal timing of entry.²³ A firm's reputation can send a strong signal about its likelihood of success with a new technology. Customers, suppliers, and distributors will use the firm's track record to assess its technological expertise and market prowess. Customers may use the firm's reputation as a signal of the innovation's quality, and

thus face less ambiguity about adopting the innovation. A firm with a well-respected reputation for successful technological leadership is also more likely to attract suppliers and distributors.²⁴ This was aptly demonstrated in Microsoft's entry into the videogame console industry: despite having little experience in producing hardware, suppliers and distributors eagerly agreed to work with Microsoft because of its track record in personal computing. Other things being equal, an entrant with a strong reputation can attract adoptions earlier than entrants without strong reputations.

STRATEGIES TO IMPROVE TIMING OPTIONS

As should now be clear, managing the timing of entry into the market is a complex matter. If the technology has a clear advantage to consumers, entering the market early may give the entrant a path-dependent advantage that is nearly impossible for competitors to overcome. If, on the other hand, a firm enters a market very early and the advantages of the technology are not very clear to consumers, there is a strong possibility that the technology will receive a tepid welcome. Confounding this risk is the fact that watchful competitors may be able to use the firm's failure to their advantage, refining the technology the firm has introduced to the market and making any corrections necessary to improve the technology's market acceptance. The later entrant may be able to enter at a lower cost because it can capitalize on the research and development of the early firm, and use knowledge of the market gained from observing the early entrant's experience.

In the above, it is assumed that timing of entry is a matter of *choice* for the firm. However, implicit in this assumption is a corollary assumption that the firm is capable of producing the technology at any point in the time horizon under consideration. For this to be true, the firm must possess the core capabilities required to produce the technology to consumer expectations, or be able to develop them quickly. Furthermore, if the firm intends to refine an earlier entrant's technology and beat the earlier entrant to market with a new version of this technology, it must have *fast-cycle development processes*. If a firm has very fast cycle development processes, the firm not only has a better chance at being an early entrant, but it can also use experience gained through customers' reactions to its technology to quickly introduce a refined version of its technology that achieves a closer fit with customer requirements. In essence, a firm with very fast development deployment processes should be able to take advantage of both first- and second-mover advantages. The research on new product development cycle time indicates that development time can be greatly shortened by using strategic alliances, cross-functional new product development teams, and **parallel development processes**. Chapter 11 will deal specifically with how firms can ensure that their innovations are deployed rapidly to the market.

parallel development process

When multiple stages of the new product development process occur simultaneously.

Summary of Chapter

1. A first mover may be able to build brand loyalty and a reputation for technological leadership, preemptively capture scarce resources, and exploit buyer switching costs.
2. First movers may also benefit from increasing returns to adoption due to learning curve effects and network externalities.

3. Some studies, however, argue that first movers may have higher failure rates. First movers have to bear the brunt of R&D expenses and may face considerable consumer ambiguity. Second movers can capitalize on the R&D and marketing efforts of the first mover, producing a technology that costs less to develop and that corrects for any of the first mover's mistakes.
4. First movers may also face poorly developed supplier markets, distribution channels, and availability of complementary goods, all of which can increase the challenge of successfully launching their new product or service. Enabling technologies may also be immature, hindering the new technology's performance.
5. The biggest disadvantage many first movers face is uncertainty over customer requirements. Customers themselves may be uncertain about what features or form they desire in a new innovation. A firm may have to withstand significant losses before customer preferences become more certain.
6. The optimal timing of entry is thus a function of several factors, including the margin of advantage offered by the new innovation, the state of enabling technologies and complements, the state of customer expectations, the threat of competitive entry, whether the industry faces increasing returns, and a firm's resources.
7. Firms that have fast-cycle development processes have more options when it comes to timing. Not only does a fast-cycle developer have an advantage in introducing innovations earlier, but it also can be its own fast follower by quickly introducing refined versions of its own technology.

Discussion Questions

1. What are some advantages of entering a market early? Are there any advantages to entering a market late?
2. Name a successful (a) first mover, (b) early follower, and (c) late entrant. Identify unsuccessful examples of each.
3. What factors might make some industries harder to pioneer than others? Are there industries in which there is no penalty for late entry?

Suggested Further Reading

Classics

David, P. A., "Clio and the economics of QWERTY," *American Economic Review* 75 (1985), pp. 332–38.

Lieberman, M. B., and D. B. Montgomery, "First-mover (dis)advantages: Retrospective and link with the resource-based view," *Strategic Management Journal* 19 (1998):1111–25.

Spence, M., "The learning curve and competition," *Bell Journal of Economics* 12 (1981), pp. 49–70.

Tellis, G. J., and P. N. Golder, "First to market, first to fail? Real causes of enduring market leadership," *Sloan Management Review* 37, no. 2 (1996), pp. 65–75.