

Chapter **Thirteen**

Crafting a Deployment Strategy

Deployment Tactics in the Global Video Game Industry

In the global video game industry, the introduction of each generation of console has ushered in a new battle for market dominance. New entrants have made startling entrances and toppled seemingly invincible incumbents. Game developers, distributors, and customers have had to watch the battle closely in order to place their bets about which console would emerge as the generation's victor. Each generation has also revealed which deployment strategies have paid off—or proven fatal—for the contenders.⁹

Pong: The Beginning of an Era

In the fall of 1972, Nolan Bushnell founded a company called Atari and introduced Pong, a Ping-Pong-like game that was played on a user's television set with the aid of the Atari console. Though considered to be the “second generation” of home video game consoles (a console called the Odyssey, released by Magnavox early 1972 is considered the first generation), Pong was the first home console to become known around the world. In its first year, Pong earned more than \$1 million in revenues. Pong and over 60 similar knock-offs soon flooded the market. In these early years of the video game industry, swift advances in integrated circuits enabled a rapid proliferation of new consoles and games. By 1984, video game console and games sales had reached \$3 billion in the United States alone. However, console makers in this era did not utilize strict security measures to ensure that only authorized games could be played on their consoles, leading to explosive growth in the production of unauthorized games (games produced for a console without authorization of that console's producer). As a result, the market was soon saturated with games of dubious quality, and many unhappy retailers were stuck with video game inventories they were unable to move. Profits began to spiral downward, and by 1985, many industry observers were declaring the video game industry dead.

The Emergence of 8-Bit Systems

Much to everyone's surprise, however, two new companies from Japan entered the U.S. video game market, initiating the home video game console's third generation: Nintendo, with its 8-bit Nintendo Entertainment System (NES), introduced in 1985, and Sega, which launched its 8-bit Master System in the United States in 1986. Unlike Atari, which had spent only a few hundred thousand dollars on advertising, Sega and Nintendo spent \$15 million promoting their systems. Both systems offered technological advantages over the previous generation of video game consoles. Both companies also agreed to sell to many retailers on consignment, helping to eliminate risk to the retailer of getting stuck with unsold merchandise. Sega's Master System appeared to be slightly superior to Nintendo's, but Nintendo spent much more on the development of quality games and characters and had more game titles available than Sega. The NES sold over 1 million units in the first year, sold 19 million units by 1990, and could be found in more than one-third of the households in America and Japan.^b

From 1985 to 1989, Nintendo held a near monopoly of the U.S. video game industry. The company sold its consoles for a price very close to production costs, while earning the bulk of its profits from games. Nintendo both made games for its system in-house and licensed third-party developers to produce games through very strict licensing policies that (a) limited the number of titles a developer could produce each year, (b) required the developer to preorder a minimum number of cartridges from Nintendo (which had its own contract manufacturers produce the games), and (c) restricted the developers from making similar games for other consoles. Nintendo also restricted the volume and pricing of consoles sold through distributors, ensuring that no single distributor acquired significant bargaining power.^c Nintendo's restrictive policies were very profitable; however, they also incurred sanctions by the Federal Trade Commission, and they alienated distributors and developers, potentially leaving the company more vulnerable to a competitor.

The 16-Bit Video Game Systems

In September 1989, Sega launched the fourth generation of video game console competition when it introduced its 16-bit Genesis to the U.S. video game market. The Genesis offered dramatic performance enhancement over 8-bit systems. Further, Sega leveraged its popular arcade games to the Genesis and made it backward compatible with its 8-bit Master System games. There were 20 Genesis game titles available by December 1989. NEC also introduced a 16-bit system, the TurboGrafx-16, in the fall of 1989 and had 12 game titles by December 1989. Though Nintendo had its own 16-bit system in the works, it delayed introducing it to the United States for fear of cannibalizing its 8-bit system sales.

By the end of 1989, Sega had already sold 600,000 consoles in the United States, and NEC had sold 200,000. In 1990 and 1991, both Sega and NEC added game titles to their lists, bringing their totals to 130 and 80, respectively. By the end of 1991, Sega had sold 2 million consoles in the United States, and NEC had sold 1 million. Unlike Sega, which produced a major portion of its games in-house, NEC relied completely on external games developers, who found the

system to have only a small technological advantage over 8-bit systems.^d Developers began to abandon the NEC platform, and NEC exited the market in 1991. Nintendo finally introduced its own 16-bit Super Nintendo Entertainment System (SNES) in 1991, but it was too late to quell Sega's momentum. In 1992, Nintendo controlled 80 percent of the video game market (based on combined 8-bit and 16-bit sales), but by 1994, Sega was the market leader.

Like Nintendo, Sega made little profit on the consoles and focused instead on increasing unit sales to drive game sales and software developer royalties. Sega, however, used less restrictive licensing arrangements than Nintendo and rapidly lured a large number of developers to make Sega game titles. Further, though Nintendo could have made its 16-bit system backward compatible, thus linking the value consumers possessed in their 8-bit game libraries to the new system, Nintendo chose to make the system incompatible with the 8-bit games. By the end of 1991, the SNES had 25 game titles compared to the 130 available for Genesis. Nintendo had given Sega two years of installed base lead on a system that offered a significant technological advantage and then entered the market at a ground-zero position with respect to the availability of complementary goods. The consequence of Nintendo's late move is aptly captured in a review of video game players published in *Fortune*: "To tell the truth, Nintendo just isn't cool anymore. This one is 16 bits, so it's better than the original Nintendo. But the company only made it to compete with Sega, and most kids already have that. So they don't need Super Nintendo, unless they're jerks and have to have everything. That's just idiotic."^e Over time, sales of the Nintendo SNES accelerated, and it would ultimately prove to be one of the more successful game systems ever introduced, but Nintendo's near-monopoly position had been broken; Sega had successfully leapfrogged Nintendo.

32/64-Bit Systems

In the late 1980s and early 1990s, new competitors were attracted to the video game market, with fifth generation machines that had either 32- or 64-bit systems. In 1989, Philips announced its 32-bit Compact Disc Interactive (CD-i), an interactive multimedia compact disc system that would serve as a game player, teaching tool, and music system. However, the CD-i was very complex, requiring a 30-minute demonstration. Furthermore, it was expensive—introduced at \$799 and later reduced to a below-cost \$500 (more than twice the cost of Nintendo or Sega systems).^f While the product was actually much more than a video game console, customers compared it to the popular Nintendo and Sega systems and were dismayed by its price and complexity. Making matters worse, Philips was reluctant to disclose the technical specifications, greatly limiting the software development for the system. The Philips CD-i never attained more than a 2 percent market share.^g Other companies also introduced 32-bit systems, including Turbo Technologies' Duo and 3DO's Interactive Multiplayer, but the cost of the systems (\$600 to \$700) was prohibitive. Turbo Tech's Duo was very short-lived and received little attention. But 3DO's system received considerable attention. The company was founded in October 1993 by Trip Hawkins, formerly of video games developer Electronic Arts. However, 3DO's unique strategy of licensing out all game and

hardware production made it impossible to achieve the low console prices of Sega and Nintendo by subsidizing console production with game royalties. The hardware producers (Matsushita and Panasonic) for 3DO did not sell games and were unwilling to sell the consoles without a margin. Sales of the machine never took off, and 3DO exited the market. Atari also made a surprising return to the video game market in 1993 with the technologically advanced Jaguar. However, Atari's long struggle had not inspired great confidence in either developers or distributors, and several of the large retail chains chose not to carry the product.^h

In 1995, two 32-bit systems arrived on the scene that would survive: Sega's Saturn and Sony's PlayStation. Both systems were introduced with great fanfare and considerable developer support. Although only Sega had experience and brand image in the video game market, Sony entered with tremendous brand image in consumer electronics and access to (and leverage in) extensive distribution channels in electronics and media. To rapidly gain insight into the toy industry, Sony hired experienced toy industry veteran Bruce Stein to head the video game unit. Sony's size and previous success in several electronics markets (including the development and control of the compact disc format) also enabled it to persuade several games developers (including Electronic Arts, the largest game developer in the United States at that time) to produce only PlayStation titles for the first six months after its introduction. Sony's console was designed to play games on compact discs (CDs) rather than the cartridge style games Nintendo and Sega used, and while many skeptics at first argued that the CDs would have slower game play and higher piracy rates, moving to the CD would ultimately prove to be a huge advantage. Games could be developed and manufactured at a much lower cost, which in turn, enabled Sony to allow developers to produce games in smaller batches, lowering their risk. By the end of 1995, there were already 50 PlayStation titles and this number had grown to 800 by the end of 2000.

Though Sega's Saturn had beaten Sony's PlayStation to market by several months, it was shipped to only four retailers due to limited supply: Toys "R" Us, Babbage's, Software Etc., and Electronics Boutique. This aggravated retailers such as Best Buy and Walmart, which had long supported Sega.ⁱ Developers also felt that it was easier to program for the PlayStation than the Saturn, causing it to lose crucial developer support.^j By the end of 1996, the installed base of Sony PlayStation in the United States (2.9 million units) was more than double that of the Sega Saturn (1.2 million units).

In 1996, after more than two years of announcements, Nintendo finally introduced its 64-bit game system called Nintendo 64. Though only two software titles were available at the console's release (one being Super Mario), the game units were sold out within weeks of their release. Though Nintendo's 64-bit system gained rapid consumer acceptance, neither Nintendo nor Sega was able to reclaim dominance over the video game industry. Though several new entrants (and one returning entrant, Atari) had tried to break into the video game industry through technological leapfrogging, only Sony had the successful combination of a product with a technological advantage, strategies, and resources that enabled it to rapidly build installed base and availability of complementary goods, and a reputation that signaled the market that this was a fight it could win.

128-Bit Systems

In September 1999, Sega launched the first sixth-generation console, its 128-bit Dreamcast, a \$199 gaming system that enabled access to the Internet. Before the Dreamcast release, Sega was suffering from its lowest market share in years at 12 percent. The Dreamcast was the first 128-bit system to market, and 514,000 units were sold in the first two weeks. An installed base of 5 million was achieved by October 2000. Sega's success turned out to be short-lived, however. In March 2000, Sony launched its 128-bit PlayStation 2 (PS2) in Japan and introduced the system to the United States in October. Despite price cuts on the Dreamcast and a promotion rebate that would make the console essentially free (in exchange for a two-year contract for Sega's SegaNet Internet service), the Dreamcast was crushed in the holiday sales season. In early 2001, Sega announced it would cease making consoles and transform itself into a third-party developer of games for other consoles.

Sony's PS2 was an unprecedented success. Not only did it offer a significant technological advantage over the 32-bit systems, but it was also backward compatible, enabling gamers to play their PlayStation games on the console until they amassed new game libraries.^k During the opening sales weekend of March 4, 2000, PS2 sales reached about 1 million units, a figure that eclipsed by 10 times the amount of original PlayStation units sold during the three-day release period in 1994. Demand for the new unit was so high that on the opening day of pre-orders on Sony's Web site, more than 100,000 hits in one minute were received, and Sony was forced to briefly shut down the Web site.

At the time of the PS2 release, Nintendo had just postponed the launch of its new 128-bit system, the GameCube, to a release date in the first half of 2001. Unlike the PS2, the GameCube did not offer backward compatibility with Nintendo 64 games. The GameCube was also targeted toward a younger market (8- to 18-year-olds) than Sony's 16- to 24-year-old demographic. The real threat to Sony's PS2 came in the form of a new entrant to the video console industry: Microsoft's Xbox. The Xbox, launched in November 2001, was targeted at the 18- to 34-year-old male, positioning it directly against the PS2.

Microsoft had previously produced PC-based computer games (such as Flight Simulator and the Age of Empires series) and operated an online gaming service (Microsoft Gaming Zone) and thus had some familiarity with the industry. However, it did not have either the arcade experience of Sega or Nintendo or the consumer electronics experience of Sony. By the time the Xbox hit the market, PS2 already had a significant lead in installed base and availability of games (more than 300 PS2 game titles were available at the end of 2001), but Microsoft was counting on the technological advantages offered by the Xbox to tip consumer preferences. The Xbox offered a faster processor and more memory than the PS2. Furthermore, customers did not have to trade-off technological advantages against price: The Xbox launched at a retail price of \$299, significantly less than its production costs (it is estimated that Microsoft lost between \$100 and \$125 per unit).^l

To rapidly deploy the console and build installed base, Microsoft leveraged its existing relationships with distributors that carried its software, though it was now forced to seek much greater penetration into distributors such as Toys "R" Us, Babbages, and Circuit City. Microsoft also faced the challenge of cultivating

a radically different brand image in the game console market than the one that it had achieved in the software market, and to make much greater use of marketing channels such as television advertising and gaming magazines. To that end, Microsoft budgeted \$500 million to be spent over 18 months to market the Xbox—more than any other marketing campaign in the company's history.^m Microsoft planned to produce 30 to 40 percent of its games in-house and gave away \$10,000 game development kits to attract third-party games developers.

Both the Xbox and Nintendo's GameCube were launched just in time for the extremely important 2001 Christmas season and sold briskly. By the year's end, it was estimated that 1.3 million GameCube units had been sold, and 1.5 million Xbox units had been sold.ⁿ However, both of the new consoles were outrun by PS2, which sold 2 million units in the month of December alone. This market share pattern remained remarkably consistent over the next few years. By the end of fiscal year 2005, Microsoft reported it had shipped a total of 22 million Xbox consoles, which was slightly more than Nintendo's 20.6 million GameCube shipments, and far behind the Sony PS2's 100 million consoles shipped.^o

The Seventh Generation: A Second Round of Competition in 128-bit Systems

In late 2005, Microsoft was first to introduce a seventh-generation console: Xbox 360. Though severe manufacturing shortages resulted in only 600,000 units being sold in the 2005 Christmas season, Microsoft was hoping its head start over Sony and Nintendo (both of which would not debut their next generation consoles until late 2006) would enable it to attain a dominant position.

The console was designed around a custom IBM processor that had three Power PC processors on a single chip, and a custom graphics processor from ATI. The result was a powerful console that generated high-definition video with stunning graphics. The Xbox 360 was also backward compatible with a portion of the Xbox game library (though not with all Xbox games). At launch, buyers could get a basic model for \$299 or a premium model for \$399.^p More important (from Microsoft's perspective at least), the console was supposed to be for more than just games—it was Microsoft's next attempt to secure control over the digital living room. Users could download music, movies, TV shows, and purchase premium content. With an optional high-definition DVD drive users could also watch high-definition movies (or at least they could have if Microsoft's bet on Toshiba's HD-DVD standard had not gone awry—in early 2008, Toshiba conceded defeat to Sony in the high-definition DVD format war, and announced that it would stop making the drives). By early 2006, Microsoft had sold 3.2 million Xbox 360s. The number would have been higher but the company could not keep up with demand.^q

Sony launched its PlayStation 3 (PS3) in November of 2006. The console had a powerful IBM cell processor; it included Sony's Blu-ray disc player (for playing high-definition DVDs) and launched with a hefty price tag of \$599 for a 60-gigabyte model, or \$499 for a 20-gigabyte model. Estimates put the cost of the components used to produce the consoles at \$840 and \$805, respectively, meaning that Sony lost more than \$200 on every unit.^r Sony claimed that the PS3 was backward compatible with all games written for the Playstation and PS2,

but it turned out that not all of the older games would play on the new system. Though the console sold out within minutes of its launch, by early 2007, Sony had sold only 3.5 million PS3s worldwide—significantly less than it had forecasted.

Instead of joining Sony and Microsoft in a technological arms race, Nintendo changed the rules of the game with its Wii console in time for the Christmas season of 2006. Instead of a controller with buttons or a joystick that players had to vigorously manipulate, it offered an innovative wireless motion-sensing remote that enabled users to simulate real play, such as swinging a tennis racket in a tennis match or punching an opponent in a boxing match. The console was also launched at a price of \$250—significantly cheaper than the Xbox 360 or PS3. It was fully compatible with GameCube games, and because it was much cheaper to develop a Wii game (e.g., as little as \$5 million compared to the \$20 million for a PS3 game), it attracted third-party developers in droves. The net result was dramatic—the console attracted casual gamers in unprecedented numbers, and from a remarkably wide range of demographics. Wiis were being used in nursing homes, for Wii bowling leagues, and on cruise ships.⁵ Instead of simply being purchased by soccer moms for their children, they were being played by the soccer moms themselves. By mid-2007, the Wii was selling twice as fast as the Xbox 360 and four times as fast as the PS3. While Microsoft and Sony lost money on every console in hopes of profiting on future game sales, Nintendo was estimated to make \$50 on every unit of the Wii sold.

In fall of 2008, Microsoft slashed the price of the Xbox 360 to \$199, making it the cheapest console of the generation. However, even Don Mattrick, senior vice president of Microsoft's Interactive Entertainment Business admitted that the Xbox 360 was unlikely to overtake the Wii, noting: "I'm not at a point where I can say we're going to beat Nintendo . . . we will sell more consoles this generation than Sony."⁶ Sony followed suit by lowering the price of its starter model to \$399. The years 2009 and 2010 were worse for all of the console companies—the recession led to a significant drop in sales and profits for all three companies and they responded by dropping the price of their consoles. However, the pattern of sales remained the same. By December of 2010, over 75 million Wiis had been sold worldwide, compared to 45 million Xbox 360's, and 42 million PS3s.

In 2010, both Sony and Microsoft launched their own motion-based controllers. The Playstation Move was a handheld motion sensor wand, similar to the Wii Remote. Microsoft's Kinect, on the other hand, did not require holding anything—it was a webcam-style peripheral that detected user motion within a range of play in front of the device. Both devices were sold as add-on units to the companies' consoles and were priced at over \$150 (nearly as much as the entire Wii console). However, despite the high price, by March 2011, Microsoft reported that it had sold more than ten million Kinect sensors worldwide, making it the fastest selling consumer device ever, according to the Guinness World Records Committee.

The Eighth Generation: Increasing Competition from Mobile Devices

The eighth generation saw the video game console makers focusing on further integration with other media and connectivity. In late 2012, Nintendo launched

its Wii U, a tablet/controller hybrid with an embedded touch screen that would enable users to get a different perspective than the one on the main display. The Wii U was backward compatible with most Wii games, but the initial lineup of games written specifically for the device was weak at the consoles launch. Furthermore, because Nintendo had beaten Sony and Microsoft to market by a year, many customers decided to wait until they could compare all three consoles, leading to sluggish sales for the Wii U.

Sony launched its PlayStation 4 (PS4) in November of 2013, a device which would emphasize connectivity with other devices (such as the PlayStation Vita or Apple iOS or Android powered mobile devices), social game play, and cloud-based subscription gaming. The device launched at a price of \$399, signaling that Sony had learned a painful-but-important lesson with PS3. Microsoft released its Xbox One the same month, billing the device as an “all-in-one entertainment system.” Like the PS4, the device enabled game streaming from the cloud and included a Blu-Ray player. However, it also gave users the ability to connect to their television set-top box and overlay live television with gaming in a split-screen and to record and share highlights of game play. The console was launched at a price of \$499.

The eight generation also brought increasing competition from new players. Mobile device platforms such as Android and Apple’s iOS began to account for significantly more gaming. Though the devices were small and the games lacked the high fidelity and motion-based play offered by the home consoles, they made up for it—at least in part—by a rapid proliferation of free or low-cost games and the fact that their owners tended to have them available at all times. Smartphones had much lower game development costs and offered access to a very wide range of consumers. As a result, smartphone platforms not only attracted existing game developers but also helped spur the rise of many new game developers. By 2018, there were more than 800,000 mobile games available (a number unimaginable on home consoles) and mobile gaming accounted for more than half of the \$138 billion in global gaming revenues.^u Increased competition and digital distribution had also given rise to new revenue models such as “freemium” where the initial game was provided for free but consumers spent money through in-game purchases.^v Despite the increasing pressure, sales of the home video game consoles remained surprisingly strong. By April of 2018, the Sony PS4 had sold almost 74 million units and though the Nintendo Wii U had been a flop, the Nintendo Switch (released in early 2017) had already sold 18 million units, making it the fastest selling game console of all time.^w

Microsoft had ceased releasing unit sales figures noting that this was no longer the key metric for success; instead the company noted it had 59 million active users for its Xbox Live service.^x

Discussion Questions

1. What factors do you think enabled Sega to break Nintendo’s near monopoly of the U.S. video game console market in the late 1980s?
2. Why did Nintendo choose not to make its early video game consoles backward compatible? What were the advantages and disadvantages of this strategy?

3. What strengths and weaknesses did Sony have when it entered the video game market in 1995? What strengths and weaknesses did Microsoft have when it entered the video game market in 2001?
4. In what ways did Nintendo's Wii break with the norms of competition in the video game industry? How defensible was its position?
5. Comparing the deployment strategies used by the firms in each of the generations, can you identify any timing, licensing, pricing, marketing, or distribution strategies that appear to have influenced firms' success and failure in the video game industry?

^a Adapted from M. A. Schilling, "Technological leapfrogging: Lessons from the U.S. videogame industry," *California Management Review* 45, no. 3 (2003), pp. 6–32.

^b D. Sheff, *Game Over: How Nintendo Zapped an American Industry, Captured Your Dollars and Enslaved Your Children* (New York: Random House, 1993).

^c A. Brandenberger, "Power Play (A): Nintendo in 8-Bit Video Games," Harvard Business School case no. 9-795-167, 1995.

^d A. Brandenberger, "Power Play (B): Sega in 16-Bit Video Games," Harvard Business School case no. 9-795-103, 1995.

^e J. Hadju, "Rating the hot boxes," *Fortune* 128, no. 16 (1993), pp. 112–13.

^f N. Turner, "For Giants of Video Games It's an All-New Competition," *Investor's Business Daily*, January 24, 1996, p. A6.

^g J. Trachtenberg, "Short Circuit: How Philips Flubbed Its U.S. Introduction of Electronic Product," *Wall Street Journal*, June 28, 1996, p. A1.

^h Y. D. Sinakin, "Players Take Bold Step to Keep Up with New Rules," *Electronic Buyers' News*, February 19, 1996, p. 50.

ⁱ P. Hisey, "Saturn lands first at toys 'R' Us," *Discount Store News* 34, no. 11 (1995), pp. 6–8.

^j T. Lefton, "Looking for a sonic boom," *Brandweek* 39, no. 9 (1998), pp. 26–30.

^k M. A. Schilling, R. Chiu, and C. Chou, "Sony PlayStation2: Just Another Competitor?" in *Strategic Management: Competitiveness and Globalization*, 5th ed., eds. M. Hitt, D. Ireland, and B. Hoskisson (St. Paul, MN: West Publishing, 2003).

^l D. Becker and J. Wilcox, "Will Xbox Drain Microsoft?" *CNET News.com*, March 6, 2001; L. P. Norton, "Toy Soldiers," *Barrons* 81, no. 20 (2001), pp. 25–30; and S. H. Wildstrom, "It's All about the Games," *BusinessWeek* 37, no. 63 (2001), p. 22.

^m T. Elkin, "Gearing up for Xbox launch," *Advertising Age* 71, no. 48 (2000), p. 16.

ⁿ D. Frankel, "Video game business Boffo on big launches," *Video Business*, December 31, 2001, p. 38.

^o Microsoft 2005 Annual Report; Nintendo 2005 Annual Report; Sony Corporation press release, November 30, 2005.

^p S. H. Wildstrom, "Xbox: A Winner Only at Games" *BusinessWeek Online*, December 1, 2005.

^q K. Terrell, "Gamers Push Pause," *U.S. News & World Report* 140, no. 18 (2006), pp. 42–43.

^r A. Hesseldahl, "Teardown of Sony's Playstation 3," *BusinessWeek Online*, December 24, 2008, p. 10.

^s J. M. O'Brien, "Wii will rock you," *Fortune* 155, no. 11 (2007), pp. 82–92.

^t J. Greene, "Microsoft will cut Xbox prices in the U.S.," *BusinessWeek Online*, September 4, 2008, p. 2.

^u Wijman, T., "Mobile Revenues Account for More Than 50% of the Global Games Market as It Reaches \$137.9 Billion in 2018," *Newzoo*, April 30, 2018.

^v Rietveld, J., "Creating and Capturing Value from Freemium Business Models: A Demand–Side Perspective," *Strategic Entrepreneurship Journal* 12, no. 2 (2018): 171–193.

^w Gilbert, B., "The PlayStation 4 Is Still Outselling Every Other Console, Including Nintendo's Red-Hot Switch," *Business Insider*, April 27, 2018; Kaser, R., "The Nintendo Switch Sold 17.8 Million Units in 1 Year—More Than the Wii U Sold in 5," *TheNextWeb*, April 26, 2018.

^x Crecente, B., "Microsoft Explains Why It Isn't Releasing Xbox One Sales Numbers Anymore," *Variety*, May 3, 2018; Madan, A., "Xbox Live Hits 59 million Monthly Active Users in FY18 Q3," *WindowsCentral*, April 26, 2018.

OVERVIEW

The value of any technological innovation is only partly determined by what the technology can *do*. A large part of the value of an innovation is determined by the degree to which people can understand it, access it, and integrate it within their lives. Deployment is not just a way for the firm to earn revenues from its innovations; deployment is a core part of the innovation process itself.

Deployment strategies can influence the receptivity of customers, distributors, and complementary goods providers. Effective deployment strategies can reduce uncertainty about the product, lower resistance to switching from competing or substitute goods, and accelerate adoption. Ineffective deployment strategies can cause even brilliant technological innovations to fail. As shown in the opening vignette, 3DO's Interactive Multiplayer and Philips' Compact Disk Interactive were two of the first 32-bit video game systems introduced to the market and offered significant technological advantages over previous generations of consoles. However, both were priced so high and introduced with so few games that neither was able to attract a significant share of the market. When Sega introduced its 32-bit system to the market—beating Sony's PlayStation by several months—the price was low and some popular games were available, but weak distribution ultimately hobbled the console's deployment. On the other hand, despite being a newcomer to the video game industry, Sony's exceptionally executed deployment strategies for the PlayStation made the console a nearly overnight success. Sony used a combination of intense marketing, low prices, strong games availability, and aggressive distribution to ensure that the product launched with unmistakable impact.

We will cover five key elements of the deployment process in this chapter: launch timing, licensing and compatibility, pricing, distribution, and marketing. Several of these topics warrant entire courses and textbooks in their own right; only an introduction to the issues most central to the deployment of a new technological innovation will be covered here.

LAUNCH TIMING

As illustrated by the video game industry, the timing of the product launch can be a significant part of a company's deployment strategy. For example, even though Nintendo had a 16-bit video game system in development when Sega's 16-bit Genesis was introduced, Nintendo delayed introducing a 16-bit system for fear of cannibalizing its 8-bit system sales. The advantages and disadvantages of being a first, early-but-not-first, or late mover were discussed in Chapter Five; the focus here is on how a firm can use timing as a deployment strategy.

Strategic Launch Timing

Generally, firms try to decrease their development cycles in order to decrease their costs and to increase their timing of entry options, but this does not imply that firms should always be racing to launch their products as early as possible. A firm can strategically use launch timing to take advantage of business cycle or seasonal effects, to position its product with respect to previous generations of related technologies, and

to ensure that production capacity and complementary goods or services are in place. The role of each of these tactics is illustrated in the video game industry.

Nintendo, Sony, and Microsoft all took advantage of seasonal effects by introducing their consoles shortly before Christmas so that the hype of the consoles' launch would coincide with the Christmas buying season. The majority of video game consoles are sold in December. By launching their consoles close to December, firms could target their advertising for this time and leverage the free publicity that surrounded a console's launch such as press releases announcing the introduction and external product reviews.

Because the video game industry is characterized by distinct generations of technology, the timing of a console's launch also plays a key role in its positioning within a technological generation and with respect to competing consoles. If a console is introduced too early, it may receive a tepid welcome because customers want to wait to compare the consoles with others that will compete in the generation. Furthermore, by launching well ahead of competitors, a console maker may forfeit the opportunity to incorporate more advanced technology or may create customer confusion about which generation the product belongs to. For example, though the Xbox offered a processor that was double the speed of the PS2, its introductory timing positioned it as being in the same generation as the PS2. Many customers saw it as a competitor to a product they already had, rather than as a next generation technology. If the console is introduced too late, the company can lose its image as a technological leader and may have already conceded a considerable installed base lead to earlier entrants. This is aptly illustrated in the quote about Nintendo's late introduction of the SNES in the opening vignette: "To tell the truth, Nintendo just isn't cool anymore. This one is 16 bits, so it's better than the original Nintendo. But the company only made it to compete with Sega, and most kids already have that. So they don't need Super Nintendo. . . ."

Finally, timing the introduction of a console to coincide with production capacity and games availability has proven very important in the video game console industry. For example, in Sega's rush to ensure that the Saturn beat Sony's PlayStation to market, it introduced the product before it had built adequate production capacity. Sega was subsequently unable to stock many important distributors, and it alienated companies that had supported Sega in previous generations. Similarly, the importance of having games available at the time of launch is also clearly demonstrated: Every video game console producer that has been successful in at least one generation (e.g., Atari, Nintendo, Sega, Sony, Microsoft) has ensured that games would be available at the console's launch, even if that meant buying games development companies to force them to produce compatible games! Games availability was also encouraged through licensing strategies, as discussed later in the chapter.

cannibalization

When a firm's sales of one product (or at one location) diminish its sales of another of its products (or at another of its locations).

Optimizing Cash Flow Versus Embracing Cannibalization

A second key point about timing of entry is also illustrated in the video game industry. For firms introducing a next generation technology into a market in which they already compete, entry timing can become a decision about whether and to what degree to embrace **cannibalization**. Traditionally, research on product life cycles has emphasized the importance of timing new product introduction so as to optimize cash flows or profits from each generation and minimize cannibalization. If a firm's current product is very profitable, the firm will often delay introduction of a next generation

product until profits have begun to significantly decrease for the current product. This strategy is intended to maximize the firm's return on investment in developing each generation of the product. However, in industries driven by technological innovation, delaying the introduction of a next generation product can enable competitors to achieve a significant technological gap. If competitors introduce products that have a large technological advantage over the firm's current products, customers might begin abandoning the firm's technology.

Instead, if the firm invests in continuous innovation and willingly cannibalizes its existing products with more advanced products, the firm can make it very difficult for other firms to achieve a technological lead large enough to prove persuasive to customers. By providing incentives for existing customers to upgrade to its newest models, the firm can further remove any incentive customers have to switch to another company's products when they purchase next generation technology. Many would argue that this is where Nintendo made a key mistake. In the late 1980s, Nintendo was deriving significant profits from its 8-bit system and thus was reluctant to cannibalize those sales with a 16-bit system. However, by not embracing cannibalization, Nintendo enabled Sega to steal customers away by offering a product with a significant technological advantage.

LICENSING AND COMPATIBILITY

Chapter Nine revealed how making a technology more open (i.e., not protecting it vigorously or partially opening the technology through licensing) could speed its adoption by enabling more producers to improve and promote the technology and allowing complementary goods developers to more easily support the technology. However, the chapter also pointed out that making a technology completely open poses several risks. First, if a firm completely opens its technology, other producers may drive the price of the technology down to a point at which the firm is unable to recoup its development expense. If competition drives the price down so no producer earns significant margins on the technology, no producer will have much incentive to further develop the technology. Finally, opening a technology completely may cause its underlying platform to become fragmented as different producers alter it to their needs, resulting in loss of compatibility across producers and the possible erosion of product quality.

Each of these effects was demonstrated in the opening vignette. By not protecting their technologies enough, video game console producers in the first generation relinquished their ability to control game production quantity and quality. The resulting market glut of poor-quality games decimated the video game industry. But Nintendo's highly restrictive licensing policies for its 8-bit system made games developers eager to give their support to the first rival that appeared viable. In the 16-bit, 32/64-bit, and 128-bit generations, the console makers sought to achieve a delicate balance of making licensing open enough to attract developer support while making licensing strict enough to control game quantities and quality.

In deploying a technological innovation, often a firm must decide how compatible (or incompatible) to make its technology with that provided by others or with previous generations of its own technology. If there is an existing technology with a large installed base or availability of complementary goods, the firm can sometimes leverage

the value of that installed base and complementary goods by making its technology compatible with current products. For instance, producers of IBM-compatible computers (as detailed in Chapter Nine) were able to tap IBM's installed base and complementary goods advantages by offering computers that operated identically to those made by IBM. Users of IBM compatibles reaped the same installed base advantages and had access to all the same software as they would have with an IBM computer.

If the firm wishes to avoid giving away its own installed base or complementary goods advantages to others, it may protect them by ensuring its products are incompatible with those of future entrants. Most competitors in the U.S. video game industry (with the exception of Atari) have been fairly successful at this strategy. Nintendo, for example, uses a security chip to ensure that only licensed Nintendo games may be played in its consoles, and only Nintendo consoles may be used to play Nintendo games.

backward

compatible

When products of a technological generation can work with products of a previous generation. For example, a computer is backward compatible if it can run the same software as a previous generation of the computer.

Firms must also decide whether or not to make their products **backward compatible** with their own previous generations of technology. Nintendo repeatedly opted not to make its consoles backward compatible, believing it would be more profitable to require customers to purchase new games. This is understandable given that the consoles were sold at cost and profits were made through game sales; however, it also meant that Nintendo forfeited a significant potential source of advantage over Sega. In contrast, Sega made its 16-bit Genesis compatible with its 8-bit Master System games—though this may not have proven terribly persuasive to customers given the limited success of the Master System. More significantly, Sony made its PS2 console backward compatible with PlayStation games, thereby not only ensuring a tremendous existing library of compatible games at its launch but also providing a significant incentive to PlayStation owners who were considering upgrading to a 128-bit system to choose the PS2 as opposed to Sega's Dreamcast, or waiting for the Xbox or GameCube.

Many products use backward compatibility to ease customer adoption of upgraded technology. Blu-ray video players, for example, will play standard DVDs in addition to Blu-ray DVDs, and most audio devices are designed to work with standard 3.5-millimeter headphone connectors even if they enable other more advanced connection types. If these products were not backward compatible, it might slow customer adoption of the new technology.

Sometimes backward compatibility is at odds with the firm's technological objectives of the upgrade, creating a difficult strategic decision about whether or not to offer backward compatibility. When Apple introduced the iPhone 7, for example, it abandoned the analog headphone jack standard to most other audio devices, stating that it was time to move on to wireless headphone solutions. As Phil Schiller, Apple's marketing chief noted, "Some people have asked why we would remove the analog headphone jack from the iPhone. . . . It really comes down to one word: courage. The courage to move on to do something new that betters all of us."¹ Apple's Lightning port could be used with standard headphones with a special adapter, but this proved to be a source of irritation for many consumers who neither wanted to move to wireless headphones (because of their expense and their need to be charged) nor to carry the special adapter. Moving to a nonbackward compatible headphone jack was, on the other hand, very effective at boosting sales of Apple and Beats (which is owned by Apple) headphones.

Some firms use a particularly powerful strategy that combines continuous innovation with backward compatibility. A firm that both innovates to prevent a competitor from

creating a technological gap and utilizes backward compatibility so that its new platform or models are compatible with previous generations of complementary goods can leverage the existing value yielded by a large range of complementary goods to its new platforms. While such a strategy may cause the firm to forfeit some sales of complementary goods for the new platform (at least initially), it can also effectively link the generations through time and can successfully transition customers through product generations while preventing competitors from having a window to enter the market. Microsoft has utilized this strategy deftly with Windows—though the operating system is regularly updated, each successive generation provides backward compatibility with most of the major software applications developed for previous generations. Thus, customers can upgrade without having to replace their entire libraries of software applications.

PRICING

survival pricing

When the price of a good is set to cover variable costs and part of fixed costs. This is a short-run strategy that does not create long-term profits for the firm.

Pricing is a crucial element in the firm's deployment strategy. Price simultaneously influences the product's positioning in the marketplace, its rate of adoption, and the firm's cash flow. Before a firm can determine its pricing strategy, it must determine the objectives it has for its pricing model. For example, if a firm is in an industry plagued with overcapacity or intense price competition, the firm's objective may be simply *survival*. A **survival price** strategy prices goods to cover variable costs and some fixed costs. It is a short-run strategy, however; in the long run, the firm will want to find a way to create additional value. One common pricing objective is to *maximize current profits*. Under this pricing strategy, the firm first estimates costs and demand and then sets the price to maximize cash flow or rate of return on investment. This strategy emphasizes current performance, but may sacrifice long-term performance.

For new technological innovations, firms often emphasize either a *maximum market skimming* objective or a *maximum market share* objective. To skim the market, firms will initially set prices high on new products. The high price may signal the market that the new product is a significant innovation that offers a substantial performance improvement over previously available products. The high price can also help the firm recoup initial development expenses, assuming there is also high initial demand. However, high initial prices may also attract competitors to the market and can slow adoption of the product. If costs are expected to decline rapidly with the volume of units produced, a skimming strategy can actually prove less profitable than a pricing strategy that stimulates more rapid customer adoption.

penetration pricing

When the price of a good is set very low (or free) to maximize the good's market share.

When achieving high volume is important, firms will often emphasize a maximum market share objective. To maximize market share, firms often use **penetration pricing**. The firm will set the lowest price possible hoping to rapidly attract customers, driving volume up and production costs down. Effective utilization of penetration pricing often requires that the firm builds large production capacity in advance of demand. In the short run, the firm may bear significant risk from this capital investment, and it may lose money on each unit if the price is less than its initial variable costs. However, if its volume increases and drives its production costs down, the firm can achieve a very powerful position: It can have a low-cost position that enables it to earn profits despite a low price, and it can have a substantial share of the market.

Firms in industries characterized by increasing returns (strong learning-curve effects and/or network externalities) will often use the objective of maximizing market share and a penetration pricing strategy. In such industries, there is strong pressure for the industry to adopt a single dominant design (as discussed in Chapter Four). It is in the firm's best interest to accelerate adoption of its technology, building its installed base, attracting developers of complementary goods, and riding down the learning curve for its production costs.

For example, Honda's first hybrid electric vehicle, the Insight, was introduced at a price (\$20,000) that actually caused Honda to lose money on each Insight it sold. However, Honda believed the hybrid technology would become profitable in the long term, and that the experience it would gain by working with hybrid technology and the continuance of its "green" car company image were strong enough motivations to sell the Insight at a loss for the first few years.²

Sometimes firms price below cost because the losses are expected to be recouped through profits on complementary goods or services. In the video game industry, this has proven to be a very important strategy. Nintendo, Sega, Sony, and Microsoft have each sold their video game consoles at a price very close to (or below) production costs while profiting from subsequent game sales and licensing royalties. Similarly, printers are often sold below cost with the intention of making profits on compatible ink cartridges. This is sometimes called the "razor and razor blade strategy" because companies such as Gillette and Schick famously were early users of this strategy, offering razors at a very low price but charging high margins on replacement cartridges. The key to making this strategy pay off is to be able to control compatibility with complements, and to be able to offer complements at a sufficient range of price and quality to meet customer needs. Printers do not recoup their costs, for example, if customers are able to seek out and use cheaper ink cartridges that do not pay a license fee to the printer company.³

Firms can also influence cash flow and the customers' perception of costs through manipulating the timing of when the price of a good is paid. For instance, while the most typical pricing model requires the customer to pay the full price before taking ownership, other pricing models enable the customer to delay paying the purchase price by offering a free trial for a fixed time. This permits the customer to become familiar with the benefits of the product before paying the price, and it can be very useful when customers face great uncertainty about a new product or service. Another pricing model enables customers to pay as they go, such as through leasing programs, or a pricing model whereby the initial product is free (or available at a low price) but the customer pays for service. For example, when cable television subscribers order cable service, they typically pay little or no fee for the equipment and instead pay a significant amount (often between \$20 and \$90 depending on the package) for monthly service that may include some portion for the equipment expense.

Another way to manipulate consumers' perception of the costs is through a "**freemium**" model, where the base product is free, but additional features or capacity have a price. For example, when Drew Houston and Arash Ferdowsi founded Dropbox, a popular cloud storage and file synchronization service, they quickly realized they could not afford to use advertising programs such as Google's AdWords to promote the service—it was simply too expensive. They thus combined a freemium model with a very successful referral program. First, users could get an initial storage allotment for free but would have to pay to get additional storage. Since users' reliance upon the

freemium

A pricing model where a base product or service is offered for free, but a premium is charged for additional features or service.

service and storage needs both tend to increase over time, ultimately they often end up paying for additional capacity. By early 2018, Dropbox had more than 500 million registered users, of which more than 11 million were paying. In some situations, however, a freemium pricing model may signal the consumer that a product is less valuable. Research by professor Joost Rietveld using experiments and the Steam gaming platform, for example, found that consumers spent more time using a game, and spent more on in-game purchases when they had to pay for the base game.⁴

When it is unclear how customers will respond to a particular price point, firms often use introductory pricing that indicates the pricing is for a stipulated time. This allows the company to test the market's response to a product without committing to a long-term pricing structure.

DISTRIBUTION

manufacturers' representatives

Independent agents that promote and sell the product lines of one or a few manufacturers. They are often used when direct selling is appropriate but the manufacturer does not have a sufficiently large direct sales force to reach all appropriate market segments.

wholesalers

Companies that buy manufacturer's products in bulk, and then resell them (often in smaller or more diverse bundles) to other supply channel members such as retailers.

retailers

Companies that sell goods to the public.

Selling Direct versus Using Intermediaries

Firms can sell their products directly to users through their direct sales force or an online ordering system or mail-order catalog. Alternatively, firms can use intermediaries such as **manufacturers' representatives**, **wholesalers**, and **retailers**. Selling direct gives the firm more control over the selling process, pricing, and service. For example, when Tesla Motors launched its Model S electric vehicle, its managers suspected that the dealer networks used by other automakers were not the best distribution method: electric vehicles require more explanation to consumers about estimating fuel savings, how often and where they will charge their automobiles, battery life and resale value, and so on. Salespeople at dealerships would require extensive training, and additional incentives to motivate them to invest that amount of time in customer education. Management at Tesla Motors thus decided to utilize a direct-to-customer model whereby it operates its own boutique stores in high-traffic urban locations.

In many situations, however, selling direct can be impractical or overly expensive. Intermediaries provide a number of important services that can make distribution more efficient. First, wholesalers and retailers *break bulk*. In general, manufacturers prefer to sell large quantities of a limited number of items, while customers prefer to buy limited quantities of a large number of items. Wholesalers and retailers can pool large orders from a large number of manufacturers and sell a wider range of goods in small quantities to customers.

For example, a typical book publisher produces a limited range of book titles, but desires to sell them in high volume. The average final consumer may wish to purchase only one copy of a particular book title, but often wants a wide range of book titles to choose from. Both wholesalers and retailers provide valuable bulk-breaking services in this channel. A wholesaler such as Ingram will purchase pallets of books from many different publishers such as McGraw-Hill, Simon & Schuster, and Hachette Group. It then breaks apart the pallets and reassembles bundles of books that include titles from multiple publishers but have fewer copies of any particular book title. These bundles are then sold to retailers such as Barnes & Noble, which offers a wide range of titles sold on an individual basis. Though publishers could sell directly to final consumers using the Internet or a mail-order catalog, customers would have to examine

the offerings of many different publishers to be able to consider the same range of books offered by a retailer.

Intermediaries also provide a number of other services such as transporting goods, carrying inventory, providing selling services, and handling transactions with customers. Many intermediaries also offer greater convenience for customers by offering geographically dispersed retail sites. Location convenience can be particularly important if customers are geographically dispersed and they are likely to want to examine or try different product options or to need on-site service. By contrast, if the product is primarily sold to a few industrial customers or if the product can be routinely ordered without close examination, trial, or service, geographic dispersion may be less important.

original equipment manufacturer (or value-added reseller)

A company that buys products (or components of products) from other manufacturers and assembles them or customizes them into a product that is then sold under the OEM's own name.

disintermediation

When the number of intermediaries in a supply channel is reduced; for example, when manufacturers bypass wholesalers and/or retailers to sell directly to end users.

Original equipment manufacturers (OEMs) (also called **value-added resellers**, or VARs) provide an even more crucial role in the distribution process. An OEM buys products (or components of products) from other manufacturers and assembles them into a product that is customized to meet user needs. The OEM then sells this customized product under its own name and often provides marketing and service support for the product. OEMs are very common in the computer and electronics industries where manufacturers are often specialized in the production of individual components but users prefer to purchase whole, assembled products. Dell Computer, for example, is a very successful OEM in the computer industry. OEMs can provide a very valuable coordinating function in an industry by aggregating components and providing a single contact point for the customer.

In some industries, advances in information technology (such as the Internet) have enabled **disintermediation** or a reconfiguration in the types of intermediaries used. For example, online investing services such as E-trade or Ameritrade caused some disintermediation in the investment market by enabling customers to bypass brokers and place their own stock or bond orders online. In industries where the product is information that can be conveyed digitally, such as newspapers, software, and music, the Internet can deliver the product from the manufacturer straight to the consumer. In most industries, however, information technology has simply shifted the roles of intermediaries or expanded the services they provide. For example, online stores such as Dell.com or Amazon.com enable customers to bypass traditional retail outlets such as computer stores or bookstores. However, in most cases this has not shortened the supply chain by which goods are delivered to customers—it has just rerouted it. In other instances, moving commerce online has required creating additional intermediaries (such as companies specialized in delivering the goods of others) or enhanced the services that intermediaries provide. For example, while grocers traditionally required customers to provide their own distribution for “the last mile” (the distance between the store and the customer’s home), online grocery shopping shifts the responsibility of moving goods “the last mile” to the stores, requiring them either to develop their own delivery services or to purchase delivery services from other providers. Barnes & Noble uses online sales to complement its bricks-and-mortar retail outlets: Customers can come into the stores to see and physically handle books (an option many book shoppers express a strong preference for), but they can also order books online—from home or from within a Barnes & Noble store—if they are looking for a book that is not stocked at a convenient location.

To determine whether to use intermediaries and what type of intermediaries would be appropriate, the firm should answer the following questions:

1. *How does the new product fit with the distribution requirements of the firm's existing product lines?* Whether the firm already has an existing sales channel that would suit the product will be a primary consideration in how the product should be distributed. For example, if the firm already has a large direct sales force and the new product would fit well with this direct sales system, there may be no need to consider other distribution options. On the other hand, if the firm does not have an existing direct sales force, it will have to determine whether the new product warrants the cost and time of building a direct sales force.
2. *How numerous and dispersed are customers, and how much product education or service will customers require? Is prepurchase trial necessary or desirable? Is installation or customization required?* If customers are dispersed but require little product education or service, mail order or online ordering may suffice. On the other hand, if customers are dispersed and require moderate amounts of education, service, or prepurchase trial, using intermediaries is often a good option because they can provide some on-site education and service and/or trial. If customers are not dispersed, or will require *extensive* education and service, it may be necessary for the firm to provide the education and service directly. Furthermore, if the product will require installation or customization, the firm will often need to employ either a direct sales force or an intermediary capable of providing extensive service.
3. *How are competing products or substitutes sold?* The firm must consider how competing or substitute products are sold, because this both determines the nature of the existing distribution channel options and shapes customer expectations about how products will be purchased. For example, if customers are used to purchasing the product in a retail environment where the product can be viewed and handled and where customers can receive personal sales assistance, they may be reluctant to switch to a sales channel with less contact, such as online purchasing or mail order. How the product is sold may also affect the product's positioning from the perspective of the customer. For example, if competing products are primarily sold in a high-contact mode such as specialty stores or via a direct sales force, selling the new product in a lower-contact channel such as mass discounters or through mail order might cause the customer to perceive the product as being of lower quality or more economical. Market research can assess how the sales channel influences the customer's perception of the product.

Strategies for Accelerating Distribution

When the industry is likely to select a single technology as the dominant design, it can be very important to deploy the technology rapidly. Rapid deployment enables the technology to build a large installed base and encourages the developers of complementary goods to support the technology platform. As the technology is adopted, producer and user experience can be used to improve the technology, and producer costs should also decrease due to learning effects and economies of scale. The firm can use a variety of strategies to accelerate distribution, such as forging alliances with distributors, creating bundling relationships, sponsoring or contracting with large customer groups, and providing sales guarantees.⁵

Alliances with Distributors

Firms introducing a technological innovation can use strategic alliances or exclusivity contracts to encourage distributors to carry and promote their goods. By providing a distributor a stake in the success of the new technology, the firm may be able to persuade the distributor to carry and promote the new technology aggressively. Firms that already have relationships with distributors for other goods are at an advantage in pursuing this strategy; firms without such relationships may need to cultivate them, or even consider forward vertical integration to ensure that their product is widely available.

Lack of distribution may have contributed significantly to the failure of the Sega Saturn to gain installed base. Sega had very limited distribution for its Saturn launch, which may have slowed the building of its installed base both directly (because customers had limited access to the product) and indirectly (because distributors that were initially denied product may have been reluctant to promote the product after the limitations were lifted). Nintendo, by contrast, had unlimited distribution for its Nintendo 64 launch, and Sony not only had unlimited distribution, but also had extensive experience negotiating with retailing giants such as Walmart for its consumer electronics products. Consequently, Sony PlayStation had better distribution on its first day of business than the Sega Saturn, despite Sega's decade of experience in the market.⁶

Bundling Relationships

Firms can also accelerate distribution of a new technology by bundling it with another product that is already in wide use.⁷ Bundling enables the new technology to piggyback on the success of another product that already has a large installed base. Once customers acquire the new product in tandem with something else that they already use, switching costs may prevent customers from changing to a different product, even if the different product might have initially been preferred. As customers become familiar with the product, their ties to the technology (for instance, through the cost of training) increase and their likelihood of choosing this technology in future purchase decisions may also increase. Bundling arrangements have proven to be a very successful way for firms to build their installed base and ensure provision of complementary goods. Consider, for example, SiriusXM radio, whose success is overwhelmingly attributed to its bundling arrangements with car companies. Sirius spends more than a billion dollars a year to subsidize the installation of SiriusXM equipment in new cars. Once people have used a free trial of Sirius radio in their car, almost 40 percent convert to paid accounts.⁸

Contracts and Sponsorship

Firms can also set up contractual arrangements with distributors, complementary goods providers, and even large end users (such as universities or government agencies) to ensure that the technology is used in exchange for price discounts, special service contracts, advertising assistance, or other inducements. For example, when medical equipment manufacturers introduce significantly new medical devices such as new ultrasound equipment or magnetic resonance imaging machines, they will often donate or lend a number of these machines to large teaching hospitals. As the new equipment's benefits become clear to the doctors and hospital administration, their likelihood of purchasing additional machines increases. Because large teaching hospitals train medical

staff that may ultimately work for other hospitals and are often influential leaders in the medical community, providing these hospitals with free equipment can be an effective way of encouraging the rest of the medical community to adopt the product.

Guarantees and Consignment

If there is considerable market uncertainty about the new product or service, the firm can encourage distributors to carry the product by offering them guarantees (such as promising to take back unsold stock) or agreeing to sell the product on consignment. For example, when Nintendo introduced the Nintendo Entertainment System to the U.S. market, distributors were reluctant to carry the console or games because many had been stuck with worthless inventory after the crash of the video game market in the mid-1980s. Nintendo agreed to sell the Nintendo Entertainment System to distributors on consignment: Nintendo would be paid only for consoles that were sold, rather than requiring distributors to buy consoles up front. Retailers bore little risk in distributing the good because unsold units could be returned to Nintendo, and the video game industry was reborn.

A similar argument can be made for offering guarantees to complementary goods producers. If complementary goods producers are reluctant to support the technology, the firm can guarantee particular quantities of complementary goods will be purchased, or it can provide the capital for production, thus bearing the bulk of the risk of producing complementary goods for the technology. The complementary goods producer may still have forfeited time or effort in producing goods that may not have a long-term market, but its direct costs will be less at risk.

MARKETING

The marketing strategy for a technological innovation must consider both the nature of the target market and the nature of the innovation. For example, is the target market composed primarily of large industrial users or individual consumers? Is the innovation likely to appeal only to technophiles or to the mass market? Are the benefits of the technology readily apparent, or will they require considerable customer education? Will customers respond more to detailed technical content or eye-catching brand images? Can the marketer alleviate customer uncertainty about the innovation? Major marketing methods are briefly reviewed next, along with how marketing can be tailored to particular adopter categories. Also explored is how marketing can shape perceptions and expectations about the innovation's installed base and availability of complementary goods.

Major Marketing Methods

The three most commonly used marketing methods include advertising, promotions, and publicity/public relations.

Advertising

Many firms use advertising to build public awareness of their technological innovation. Doing so requires that the firm craft an effective advertising message and choose advertising media that can convey this message to the appropriate target market.

In crafting an advertising message, firms often attempt to strike a balance between achieving an entertaining and memorable message versus providing a significant quantity of informative content. Too much focus on one or the other can result in advertisements that are memorable but convey little about the product, or advertisements that are informative but quickly lose the audience's attention. Many firms hire an advertising agency to develop and test an advertising message.

The media used are generally chosen based on their match to the target audience, the richness of information or sensory detail they can convey, their reach (the number of people exposed), and their cost per exposure. Some of the advantages and disadvantages of various advertising media are provided in Figure 13.1.

Promotions

Firms can also use promotions at the distributor or customer level to stimulate purchase or trial. Promotions are usually temporary selling tactics that might include:

- Offering samples or free trial.
- Offering cash rebates after purchase.
- Including an additional product (a “premium”) with purchase.
- Offering incentives for repeat purchase.
- Offering sales bonuses to distributor or retailer sales representatives.
- Using cross-promotions between two or more noncompeting products to increase pulling power.
- Using point-of-purchase displays to demonstrate the product's features.

Publicity and Public Relations

Many firms use free publicity (such as articles that appear in a newspaper or magazine about the company or its product) to effectively generate word of mouth. For example, Pfizer's drug Viagra got an enormous amount of free exposure from unofficial celebrity endorsements and humorous coverage on TV shows such as *The Tonight Show* and *Late Show with David Letterman*. Other firms rely on internally generated publications (e.g., annual reports, press releases, articles written by employees for trade magazines or other media) to reach and influence target markets. **Viral marketing** is an attempt to capitalize on the social networks of individuals to stimulate word-of-mouth advertising. Information is sent directly to a set of targeted consumers (a process called “seeding”) that are well-positioned in their social networks in some way (e.g., they may be “hubs” in that they have many more friends than others, or may have high potential for opinion leadership). The objective is to spark rapid spreading of the information through social networks, akin to a viral epidemic. Such strategies leverage the fact that people may be more receptive to, or have greater faith in, information that comes through personal contacts.⁹ Firms may also sponsor special events (e.g., sporting events, competitions, conferences), contribute to good causes (e.g., charities), exhibit at trade associations, or encourage online consumer reviews to generate public awareness and goodwill.¹⁰ Farnam even involved potential customers in the testing process of its drug Domosedan to generate awareness, as described in the accompanying Theory in Action.

viral

marketing

Sending information directly to targeted individuals in effort to stimulate word-of-mouth advertising. Individuals are typically chosen on the basis of their position or role in particular social networks.

FIGURE 13.1
Advantages and Disadvantages of Major Advertising Media

Media	Advantages	Disadvantages
Online Advertising: Pay-per-click (search engines)	Can be highly targeted to a particular audience; pay only for results (clicks); fast to deploy—can gain immediate visibility, and can be adjusted or deleted just as quickly; enables rapid and efficient tracking of responses for analyzing effectiveness of the ad	Vulnerable to click-through fraud (e.g., clicks by a competitor or an unhappy customer or employee), which could result in wasted advertising spend
Online Advertising: Social Media	Can connect with customers in a rich way; potential for broad reach and viral marketing; can be highly targeted to a particular audience; relatively inexpensive; can be quickly deployed and adjusted; can track visitors in real-time	Conversion of visitors to customers is often low; can be difficult to build awareness and traffic to social media site
Television	High sensory richness that combines sight, sound, and motion; high geographic and demographic reach; independent stations offer new opportunities to more directly target-specific audiences	Increasingly fragmented audience due to proliferation of stations; increasing use of DVR's enables viewers to skip the advertising; high absolute cost; fleeting exposure
Radio	High geographic and demographic selectivity; medium reach; relatively low cost	Audio presentation only; advertisers may need to buy ads with multiple stations to achieve desired audience reach; fleeting exposure
Newspaper	Timeliness; good local market coverage; broad acceptance; high believability; audience can keep or revisit the advertisement; wide price ranges available	Newspaper audiences are decreasing; easy for audience to skip over ad; relatively poor production quality; high advertising clutter; may be difficult to selectively target a particular audience
Magazine	High geographic and demographic selectivity; high quality visual production; long life; can enable significant technical content; good pass-along readership	Slow deployment (long ad purchase lead times); some waste circulation; may require advertising in multiple magazines to achieve desired reach
Direct Mail	High audience selectivity; no ad competition within the same medium; personalization; enables communication of significant technical content; may be passed along to others; responses can usually be efficiently tracked	Relatively high cost; "junk mail" image; requires access to good mailing lists; requires relatively long lead times for printing and mailing
Outdoor (e.g., billboards, banners)	High repeat exposure; low cost; low competition	Limited audience selectivity; very limited technical content
Telephone	High audience selectivity; can give personalized message	Relatively high cost; can be perceived as an annoyance

Tailoring the Marketing Plan to Intended Adopters

As described in Chapter Three, innovations tend to diffuse through the population in an s-shape pattern whereby adoption is initially slow because the technology is unfamiliar; it then accelerates as the technology becomes better understood and utilized by the mass market, and eventually the market is saturated so the rate of new

When the Finnish company Farnos Group Limited introduced its veterinary drug Domosedan, executives knew that building awareness of the drug among known opinion leaders would be crucial. Domosedan represented a disruptive innovation in painkillers for horses and cattle; it would significantly alter the way veterinarians performed their examinations and treatments. Unlike previous sedatives and painkillers used in the treatment of large animals, Domosedan enabled veterinarians to conduct clinical and surgical examinations without tying up or anesthetizing their patients. Animals could be treated while standing, and in most instances they would not have to be transported to the veterinarian's clinic.

Farnos knew that university professors and advanced practitioners were important opinion leaders in veterinary medicine. To educate this group and encourage them to support the product, Farnos asked them to help with the testing process required for the drug's approval and sales permit. University professors were involved in the preclinical testing, and visionary practitioners were utilized for clinical testing. By proactively involving these influential potential adopters, the

testing simultaneously acted as a premarketing tool while establishing the drug's efficacy and safety. This enabled opinion leaders to acquire advanced knowledge of and experience with the product before it was released. By the time the drug was launched, many of these influential users were already enthusiastic supporters of the product.

Because the drug represented a scientific breakthrough, it was featured in presentations at scientific conferences and was investigated in numerous dissertations, generating further awareness and excitement about the drug. When it was launched in Finland, the company hosted a large dinner party for all practicing veterinarians to attend, creating a celebratory atmosphere for the drug's introduction. Farnos' tactics were successful—Domosedan was adopted rapidly, spreading quickly around the world, and became a significant commercial success.

Source: Adapted from Birgitta Sandberg, "Creating the Market for Disruptive Innovation: Market Proactiveness at the Launch Stage," *Journal of Targeting, Measurement and Analysis for Marketing* 11, no. 2 (2002), pp. 184–96.

adoptions declines. These stages of adoption have been related to the adopter categories of *innovators* (in the very early stages); followed by *early adopters*, which cause adoption to accelerate; then the *early majority* and *late majority* as the innovation penetrates the mass market; and finally the *laggards* as the innovation approaches saturation.¹¹ The characteristics of these groups make them responsive to different marketing strategies.

Innovators and early adopters are typically looking for very advanced technologies that offer a significant advantage over previous generations. They are willing to take risks and to pay high prices, and they will accept some incompleteness in the product, but they may also demand considerable customization and technical support.¹² They are more likely to respond to marketing that offers a significant amount of technical content and that emphasizes the leading-edge nature of the innovation. Marketing channels that enable high content and selective reach are appropriate for this market. To market to the early majority, on the other hand, requires that the company communicate the product's completeness, its ease of use, its consistency with the customer's way of life, and its legitimacy. For this market segment, detailed technical information is not as important as using market channels with high reach and high credibility.

Firms often find it is difficult to make the transition between successfully selling to early adopters versus the early majority. While early adopters may be enthusiastic about the innovation's technological features, the early majority may find the product

too complex, expensive, or uncertain. This can result in a chasm in the product's diffusion curve: Sales drop off because the early adopter market is saturated and the early majority market is not yet ready to buy (see Figure 13.2).¹³ The company must simultaneously weather a period of diminished sales while scaling up its production capacity and improving efficiency to target the mass market.

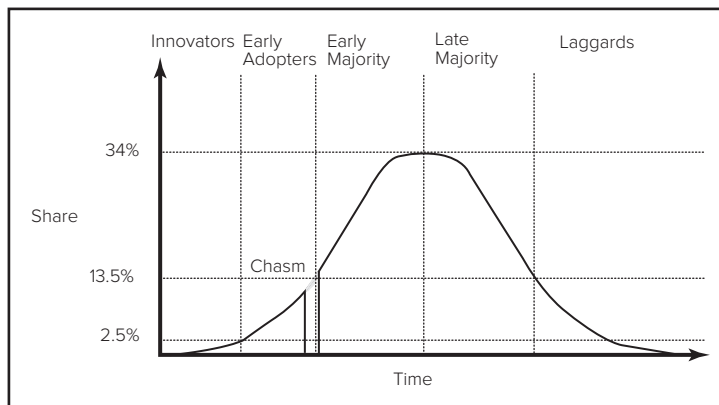
To target the late majority and laggards, firms will often use similar channels as those used to target the early majority, although emphasizing reducing the cost per exposure. The marketing message at this stage must stress reliability, simplicity, and cost-effectiveness. The marketing channel need not enable high content, but it must have high credibility and not be so expensive as to drive product costs up significantly.

Recently, marketers have begun to tap the contagion-like spread of information by targeting individuals most likely to rapidly spread information. This is described in detail in the accompanying Research Brief.

Using Marketing to Shape Perceptions and Expectations

As described in Chapter Four, when distributors and customers are assessing the value of a technological innovation, they are swayed not only by evidence of the innovation's actual value, but also by their perception of the innovation's value and their expectations for its value in the future. Advertising, promotions, and publicity can play a key role in influencing the market's perceptions and expectations about the size of the installed base and the availability of complementary goods. Preannouncements can generate excitement about a product before its release, while press releases extolling forecasted sales can convince customers and distributors that the product's installed base will increase rapidly. The firm can also shape expectations about the future of the technology by signaling the market (including distributors, end users, manufacturers of complementary goods, and perhaps even other potential contenders for the new standard) that this is a battle it intends to win and is capable of winning. The firm's reputation may create a signal about its likelihood of success. Firms may also use credible commitments such as major fixed capital investments and guarantees to convince stakeholders that the firm has what it takes to challenge the incumbents.

FIGURE 13.2
The Chasm
between Early
Adopters and
Early Majority
Customers



Preannouncements and Press Releases

A firm that aggressively promotes its products can increase both its actual installed base and its perceived installed base. Even products that have relatively small installed bases can obtain relatively large mindshares through heavy advertising. Since perceived installed base may drive subsequent adoptions, a large perceived installed base can lead to a large actual installed base. Such a tactic underlies the use of *vaporware*—preadvertised products that are not actually on the market yet and may not even exist—by many software vendors. By building the impression among customers that a product is ubiquitous, firms can prompt rapid adoption of the product when it actually is available. Vaporware may also buy a firm valuable time in bringing its product to market. If other vendors beat the firm to market and the firm fears that customers may select a dominant design before its offering is introduced, it can use vaporware to attempt to persuade customers to delay purchase until the firm's product is available.

The Nintendo 64 provides an excellent example. In an effort to forestall consumer purchases of 32-bit systems, Nintendo began aggressively promoting its development of a 64-bit system (originally named Project Reality) in 1994, though the product would not actually reach the market until September 1996. The project underwent so many delays that some industry observers dubbed it “Project Unreality.” Another interesting vaporware example was Nintendo's rewritable 64M disk drive. Though the product was much hyped, it was never introduced.

Major video game producers also go to great lengths to manage impressions of their installed base and market share, often to the point of exaggeration or deception. For example, at the end of 1991, Nintendo claimed it had sold 2 million units of the SNES to the U.S. market, while Sega disagreed, arguing that Nintendo had sold 1 million units at most. Nintendo also forecast that it would sell an additional 6 million units by the end of 1992 (actual installed base of Super Nintendo systems in the United States reached just over 4 million units in 1992). By May 1992, Nintendo was claiming a 60 percent share of the 16-bit market, and Sega was claiming a 63 percent share. Similar tactics were deployed in the battle for the 32/64-bit market. For example, in October 1995, Sony announced to the press that it had presold 100,000 consoles in the United States, to which Mike Ribero, Sega's executive vice president for marketing and sales, countered that Sony's figures were deceptive, arguing that many preorders would never materialize into actual purchases.¹⁴

Reputation

When a firm is poised to introduce a new technological innovation, its reputation for both technological and commercial competence will critically influence the market's expectation about its likelihood of success.¹⁵ Customers, distributors, and complementary goods producers will use the firm's track record for technological innovation as an indicator of the new product's functionality and value. The firm's prior commercial success acts as an indicator of the firm's ability to build and manage the necessary support network around the new technology (distribution, advertising, alliances) to create the necessary momentum in the installed base—complementary goods cycle.

Research Brief Creating an Information Epidemic

Some individuals, by virtue of their natural proclivities and talents, can initiate a cascade of information that travels with startling momentum through a population. Such individuals can have a remarkable effect on marketplace behavior. Gladwell identifies three distinct types of individuals who have such a disproportionate amount of influence: connectors, mavens, and salespersons.^a

Connectors are individuals who tend to form an exceptionally large circle of acquaintances. Sociologists have found that if a random sample of people is asked to identify the individuals they know on a first-name basis, connectors will identify many times the number of people an average person identifies.^b These people may have an exceptionally high social drive; they also tend to have a knack for remembering people's names and keeping track of social details such as birthdays. However, it is not just the quantity of acquaintances that distinguishes connectors. Connectors also tend to have a diverse array of affiliations. They may belong to a number of different kinds of clubs, associations, or other social institutions. They belong to multiple social worlds. Thus, connectors can bring together people who would otherwise be unlikely to meet.

Mavens are individuals who are driven to obtain and disseminate knowledge about one or more of their interests. Economists have widely studied "market mavens," otherwise known as "price vigilantes." These individuals will closely track the prices charged by various retailers (or other market outlets) and will vociferously complain if they find something inappropriate, such as a promotion that is misleading.^c Other mavens may take great pride in always knowing the best restaurants or hotels, or they may be avid readers of *Consumer Reports*. Mavens not only collect information, but they are also keenly interested

in educating others. They will frequently volunteer information and derive great pleasure out of helping other consumers.

Finally, **salespersons** are those individuals who are naturally talented persuaders. Such individuals are gifted at providing verbal responses that their listener is likely to find compelling. They may also have an acute ability to send and respond to nonverbal cues, enabling them to influence other people's emotional response to something. These individuals can infect others with their mood!^d

Any of these individuals is capable of sparking an information epidemic. While a connector with a valuable piece of information is likely to expose a great number and diversity of people, the maven is likely to convey the information to fewer people but in more detail, making it more convincing. The salesperson may not expose as many people as the connector and may not be driven to acquire and disseminate the volumes of information that the maven transmits, but the people the salesperson does transmit information to are likely to find it irresistible. Some individuals possess more than one of these traits simultaneously, making them a veritable typhoon of influence in the marketplace.

^a Adapted from M. Gladwell, *The Tipping Point* (Boston: Little, Brown and Company, 2000).

^b A. L. Barabasi, *Linked: The New Science of Networks* (Cambridge, MA: Perseus Books, 2002).

^c L. F. Feick and L. L. Price, "The Market Maven: A Diffuser of Marketplace Information," *Journal of Marketing* 51 (1987), pp. 83–97.

^d E. Hatfield, J. T. Cacioppo, and R. L. Rapson, *Emotional Contagion* (Cambridge: Cambridge University Press, 1994); and H. Friedman et al., "Understanding and Assessing Nonverbal Expressiveness: The Affective Communication Test," *Journal of Personality and Social Psychology* 39, no. 2 (1980), pp. 333–51.

When Sega entered the video game market, it had the benefit of having several highly successful arcade games to its credit (both Atari and Nintendo had also been arcade game producers before developing home video games). The company had a reputation for developing exciting games, and this reputation may have facilitated customer acceptance of its 16-bit challenge to Nintendo's 8-bit dominance. By contrast, when Sony entered the video game market, it did not have the arcade background that

underscored the other primary competitors. However, it did have a wealth of technological expertise as a consumer electronics manufacturer and exceptional brand equity in electronic products. Furthermore, Sony had demonstrated its ability to win a format war through its successful introduction of the CD format (with Philips) that supplanted vinyl records and analog cassettes.

Similarly, reputation was probably Microsoft's greatest strength in the battle for dominance over 128-bit video game systems. Microsoft's near monopoly in the personal computer operating system market was achieved through its unrivaled skill in using network externalities to its advantage. Microsoft had skillfully leveraged its controlling share in PC operating systems into domination over many categories of the software market, obliterating many would-be competitors. Microsoft's reputation sent a strong signal to distributors, developers, and customers that would shape their expectations for its future installed base and availability of complementary goods. Microsoft's success was not assured, but it was a powerful force to be reckoned with.

Credible Commitments

A firm can also signal its commitment to an industry by making substantial investments that would be difficult to reverse. For example, it was well publicized that Sony spent more than \$500 million developing the PlayStation, in addition to manufacturing the system and establishing an in-house games development unit. By contrast, 3DO's cumulative research and development costs at the launch of its multiplayer were less than \$37 million, and the company utilized a strategy whereby all console and game production was performed by third parties. Thus, 3DO may not have signaled the market that it had enough confidence in the platform to bear the brunt of the capital risk.

Summary of Chapter

1. A firm can use its launch timing strategy to take advantage of business cycle or seasonal effects, to influence its positioning vis-à-vis competitors, and to ensure that production capacity and complementary goods are sufficiently available at time of launch.
2. The launch timing decision must also consider the need to harvest cash flows from existing product generations versus the advantages of willingly cannibalizing existing products to preempt competitors.
3. Successful deployment requires striking a careful balance between making a system open enough to attract complementary goods providers (and/or other producers if that is desirable) and protected enough to ensure that product quality, margins, and compatibility can be sustained.
4. Common pricing strategies for technological innovations include market skimming and penetration pricing. While the first attempts to maximize margins earned on early sales of the product, the second attempts to maximize market share. Pricing strategies should consider the firm's ability to earn profits from sales of complementary goods or services—if profits from complements are expected to be high, lower prices on the platform technology may be warranted.
5. Firms can manipulate the customer's perception of the product's price (and the timing of cash flows) through the timing of when the price is paid.

6. Intermediaries provide a number of valuable roles in the supply chain, including breaking bulk, transporting, carrying inventory, providing selling services, and managing customer transactions.
7. Sometimes a firm can accelerate distribution of its innovation by forging relationships with distributors, bundling the good with others that have a wider installed base, sponsoring large customer groups, or providing sales guarantees to distributors or complements producers.
8. Marketing methods vary in attributes such as cost, reach, information content, duration of exposure, flexibility of message, and ability to target particular segments of the market. When designing the marketing plan, the firm must take into account both the nature of the innovation (e.g., Is it complex? Are benefits easy to observe?) and the nature of the customer (e.g., Does the customer require in-depth technical detail? Is the customer likely to be influenced by brand images and/or reputation? How much uncertainty is the customer likely to tolerate?).
9. Marketing strategies can influence the market's perception of how widely used the product is or will be, and thus can influence the behavior of customers, distributors, and complementary goods producers. Preannouncements, the firm's reputation, and credible commitments can all influence the market's assessment of the product's likelihood of success.

Discussion Questions

1. Identify one or more circumstances when a company might wish to delay introducing its product.
2. What factors will (or should) influence a firm's pricing strategy?
3. Pick a product you know well. What intermediaries do you think are used in bringing this product to market? What valuable services do you think these intermediaries provide?
4. What marketing strategies are used by the producers of the product you identified for Question 3? What are the advantages and disadvantages of these marketing strategies?

Suggested Further Reading

Classics

- Corey, E. R., F. V. Cespedes, and V. K. Rangan, *Going to Market: Distribution Systems for Industrial Products* (Boston: Harvard Business School Press, 1989).
- Gladwell, M., *The Tipping Point* (Boston: Little, Brown and Company, 2000).
- Mohr, J. J., S. Sengupta, and S. F. Slater, *Marketing of High-Technology Products and Innovations*, 3rd ed. (Upper Saddle River, NJ: Prentice Hall, 2009).
- Moore, G., *Crossing the Chasm: Marketing and Selling Technology Products to Mainstream Customers* (New York: HarperCollins, 1991).
- Rogers, E. M., *Diffusion of Innovations*, 5th ed. (New York: Free Press, 2003).
- Schilling, M. A., "Technological Leapfrogging: Lessons from the U.S. Videogame Industry," *California Management Review* 45, no. 3 (2003), pp. 6–32.

Recent Work

- Aral, S. and D. Walker, “Creating Social Contagion through Viral Product Design: A Randomized Trial of Peer Influence in Networks,” *Management Science* 57 (2011), pp. 1623–1639.
- Chen, H., Y. J. Hu, and M. D. Smith, “The Impact of E-Book Distribution on Print Sales: Analysis of a Natural Experiment,” *Forthcoming in Management Science*, 2018.
- Curtius, H. C., et al., “Shotgun or Snowball Approach? Accelerating the Diffusion of Rooftop Solar Photovoltaics through Peer Effects and Social norms,” *Energy Policy*, 118 (2018): 596–602.
- Grimpe, C., et al., “R&D, Marketing Innovation, and New Product Performance: A Mixed Methods Study,” *Journal of Product Innovation Management* 34 (2018): 360–384.
- Hinz, O., B. Skiera, C. Barrot, and J. U. Becker, “Seeding Strategies for Viral Marketing: An Empirical Comparison,” *Journal of Marketing* 75, no. 6 (2011), pp. 55–71.
- Liu, H., “Dynamics of Pricing in the Video Game Console Market: Skimming or Penetration Pricing?” *Journal of Marketing Research* 47 (2010), pp. 428–443.
- Reinders, M. J., R. T. Frambach, and J. P. L., Schoormans, “Using Product Bundling to Facilitate the Adoption Process of Radical Innovations,” *Journal of Product Innovation Management* 27 (2010), pp. 1127–1140.

Endnotes

1. Kastrenakes, J., “The Biggest Winner from Removing the Headphone Jack Is Apple,” *The Verge*, September 8, 2016.
2. J. Johng, Y. Kang, M. A. Schilling, J. Sul, and M. Takanashi, “Honda Insight: Personal Hybrid,” New York University teaching case, 2003.
3. M. A. Schilling, “To Protect or to Diffuse? Appropriability, Architectural Control, and the Rise of a Dominant Design,” in A. Gawer’s *Platforms, Markets, and Innovation* Cheltenham, UK Edward Elgar Publishing 2011).
4. Rietveld, J., “Creating and Capturing Value from Freemium Business Models: A Demand-Side Perspective,” *Strategic Entrepreneurship Journal* 12, no. 2(2018): 171–193.
5. Schilling, “Technological Leapfrogging”; and M. A. Schilling, “Winning the Standards Race: Building Installed Base and the Availability of Complementary Goods,” *European Management Journal* 17 (1999), pp. 265–74.
6. D. Machan, “Great Job—You’re Fired,” *Forbes* 158, no. 7 (1996), pp. 145–46.
7. Reinders, MJ, Frambach, RT, and Schoormans, JPL. “Using Product Bundling to Facilitate the Adoption Process of Radical Innovations,” *Journal of Product Innovation Management* 27 (2010):1127–1140.
8. Munarriz, R., “Conversions Dip at Sirius XM Radio but Don’t Panic,” *The Motley Fool*, February 2, 2016.
9. O. Hinz, B. Skiera, C. Barrot, and J. U. Becker, “Seeding Strategies For Viral Marketing: An Empirical Comparison,” *Journal of Marketing* 75 (2011) (November), pp. 55–71; see also M. Bampo, M. T. Ewing, D. R. Mather, D. Stewart and M. Wallace, “The Effects Of Social Structure Of Digital Networks On Viral Marketing Performance,” *Information Systems Research* 19 (2008) (3), pp. 273–90.

10. P. Kotler, *Marketing Management* (Upper Saddle River, NJ: Prentice Hall, 2003). See also Y. Chen and J. Xie, "Online Consumer Review: Word-Of-Mouth As A New Element Of Marketing Communication Mix," *Management Science* 54 (2008), pp. 477–91.
11. E. M. Rogers, *Diffusion of Innovations*, 3rd ed. (New York: Free Press, 1983).
12. J. Mohr, *Marketing of High-Technology Products and Innovations* (Upper Saddle River, NJ: Prentice Hall, 2001).
13. G. Moore, *Inside the Tornado* (New York: Harper Business, 1995).
14. M. E. McGann, "Crossing Swords," *Dealerscope Consumer Electronics Marketplace* 37, no. 10 (1995), pp. 63–65; and Schilling, "Technological Leapfrogging."
15. R. K. Chandy and G. Tellis, "The Incumbent's Curse? Incumbency, Size, and Radical Product Innovation," *Journal of Marketing* 64, no. 3 (2000), pp. 1–18.