

## Ch. 7 - Innovation and the Industry Life Cycle

Competitive implications of different stages in the industry life cycle.

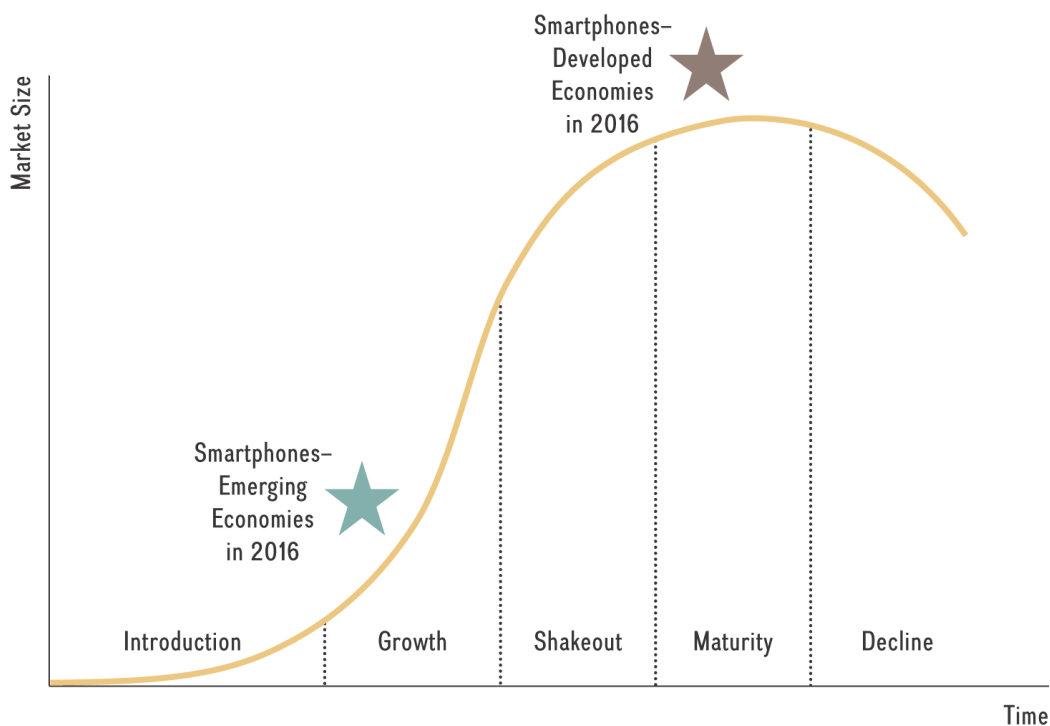
Innovations frequently lead to the birth of new industries. Innovative advances in IT and logistics facilitated the creation of the overnight express delivery industry by FedEx and that of big-box retailing by Walmart. The Internet set online retailing in motion, with new companies such as Amazon and eBay taking the lead, and it revolutionized the advertising industry first through Yahoo, and later Google and Facebook. Advances in nanotechnology are revolutionizing many different industries, ranging from medical diagnostics and surgery to lighter and stronger airplane components.

Industries tend to follow a predictable industry life cycle: As an industry evolves over time, we can identify five distinct stages: introduction, growth, shakeout, maturity, and decline. We will illustrate how the type of innovation and resulting strategic implications change at each stage of the life cycle as well as how innovation can initiate and drive a new life cycle.

The number and size of competitors change as the industry life cycle unfolds, and different types of consumers enter the market at each stage. That is, both the supply and demand sides of the market change as the industry ages. Each stage of the industry life cycle requires different competencies for the firm to perform well and to satisfy that stage's unique customer group. We first introduce the life cycle model before discussing different customer groups in more depth when introducing the crossing-the-chasm concept later in this chapter.

**Exhibit 7.4** depicts a typical industry life cycle, focusing on the smartphone industry in emerging and developed economies. In a stylized industry life cycle model, the horizontal axis shows time (in years) and the vertical axis market size. In **Exhibit 7.4**, however, we are taking a snapshot of the global smartphone industry in the year 2016. This implies that we are joining two different life cycles (one for emerging economies and one for developed economies) in the same exhibit at one point in time.

**Exhibit 7.4 / Industry Life Cycle: The Smartphone Industry in Emerging and Developed Economies**



The development of most industries follows an S-curve. Initial demand for a new product or service is often slow to take off, then accelerates, before decelerating, and eventually turning to zero, and even becoming negative as a market contracts.

As shown in **Exhibit 7.4**, in emerging economies such as Argentina, Brazil, China, India, Indonesia, Mexico, and Russia, the smartphone industry is in the growth stage (in 2016). The market for smartphones in these countries is expected to grow rapidly over the next few years. More and more of the consumers in these countries with very large populations are expected to upgrade from a simple mobile phone to a smartphone such as the Apple iPhone, Samsung Galaxy, or Xiaomi's popular Mi2S phone.

In contrast, the market for smartphones is in the maturity stage in 2016 in developed economies such as Australia, Canada, Germany, Japan, South Korea, the United Kingdom, and the United States. This implies that developed economies moved through the prior three stages of the industry life cycle (introductory, growth, and shakeout) some years earlier. Because the smartphone industry is mature in these markets, little or no growth in market size is expected over the next few years because most consumers own smartphones. This implies that any market share gain by one firm comes at the expense of others, as users replace older smartphones with newer models. Competitive intensity is expected to be high.

Each stage of the industry life cycle—introduction, growth, shakeout, maturity, and decline—has different strategic implications for competing firms. We now discuss each stage in detail.

## **INTRODUCTION STAGE**

When an individual inventor or company launches a successful innovation, a new industry may emerge. In this introductory stage, the innovator's core competency is R&D, which is necessary to creating a new product category that will attract customers. This is a capital-intensive process, in which the innovator is investing in designing a unique product, trying new ideas to attract customers, and producing small quantities—all of which contribute to a high price when the product is launched. The initial market size is small, and growth is slow.

In this introductory stage, when barriers to entry tend to be high, generally only a few firms are active in the market. In their competitive struggle for market share, they emphasize unique product features and performance rather than price.

Although there are some benefits to being early in the market (as previously discussed), innovators also may encounter first-mover disadvantages. They must educate potential customers about the product's intended benefits, find distribution channels and complementary assets, and continue to perfect the fledgling product. Although a core competency in R&D is necessary to create or enter an industry in the introductory stage, some competency in marketing also is helpful in achieving a successful product launch and market acceptance. Competition can be intense, and early winners are well-positioned to stake out a strong position for the future. As one of the main innovators in software for mobile devices, Google's Android operating system for smartphones is enjoying a strong market position and substantial lead over competitors.

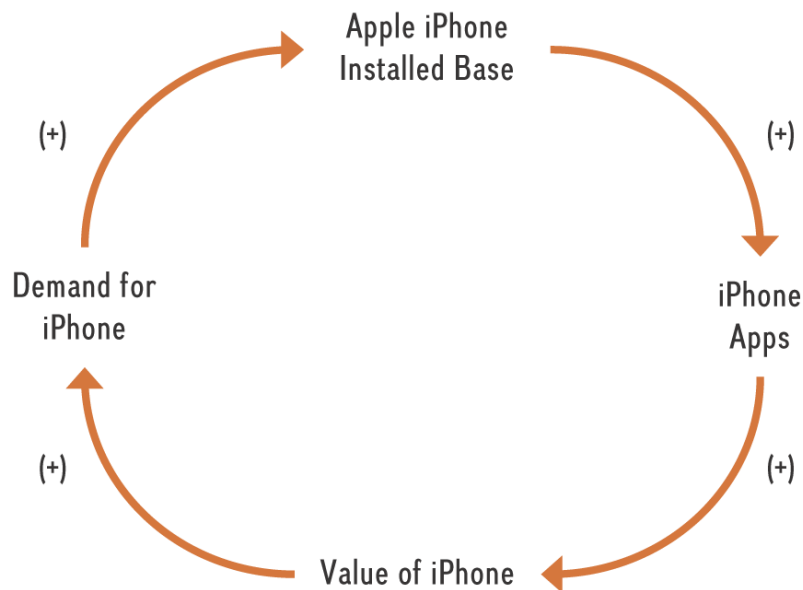
The strategic objective during the introductory stage is to achieve market acceptance and seed future growth. One way to accomplish these objectives is to initiate and leverage network effects, the positive effect that one user of a product or service has on the value of that product for other users. Network effects occur when the value of a product or service increases, often exponentially, with the number of users. If successful, network effects propel the industry to the next stage of the life cycle, the growth stage (which we discuss next).

Apple effectively leveraged the network effects generated by numerous complementary software applications (apps) available via iTunes to create a tightly integrated ecosystem of hardware, software, and services, which competitors find hard to crack. The consequence has been a competitive advantage for over a decade, beginning with the introduction of the iPod in 2001 and iTunes in 2003. Apple launched its enormously successful iPhone in the summer of 2007. A year later, it followed up with the Apple App Store, which boasts, for almost anything you might need, "there's an app for

that.” Apps are small software programs developed to provide mobile users with inexpensive business and personal services wherever they may be. Popular apps allow iPhone users to access their business contacts via LinkedIn, hail a ride via Uber, call colleagues overseas via Skype, check delivery of their Zappos packages shipped via UPS, get the latest news on Twitter, and engage in customer relationship management using Salesforce.com. You can stream music via Pandora, post photos using Instagram, watch Netflix, access Facebook to check on your friends, or video message using Snapchat.

Even more important is the effect that apps have on the value of an iPhone. Arguably, the explosive growth of the iPhone is due to the fact that the Apple App Store offers the largest selection of apps to its users. The 1.5 million apps available were downloaded 75 billion times as of spring 2015. Moreover, Apple argues that users have a better experience because the apps take advantage of the tight integration of hardware and software provided by the iPhone. The availability of apps, in turn, leads to network effects that increase the value of the iPhone for its users. **Exhibit 7.5** shows how. Increased value creation, as we know from Chapter 6, is positively related to demand, which in turn increases the installed base, meaning the number of people using an iPhone. As of the spring of 2015, Apple had sold more than 75 million iPhone 6 models, introduced just six months prior. As the installed based of iPhone users further increases, this incentivizes software developers to write even more apps. Making apps widely available strengthened Apple’s position in the smartphone industry. Based on positive feedback loops, a virtuous cycle emerges where one factor positively reinforces another. Apple’s ecosystem based on integrated hardware, software, and services providing a superior user experience is hard to crack for competitors. Apple now hopes that its vast App Store in combination with a seamless user experience will now also ignite a virtuous cycle of continuous demand based on network effects for its Apple Watch, introduced in early 2015.

**Exhibit 7.5 / Leveraging Network Effects to Drive Demand: Apple’s iPhone**



## **GROWTH STAGE**

Market growth accelerates in the growth stage of the industry life cycle (see Exhibit 7.4). After the initial innovation has gained some market acceptance, demand increases rapidly as first-time buyers rush to enter the market, convinced by the proof of concept demonstrated in the introductory stage.

As the size of the market expands, a standard signals the market's agreement on a common set of engineering features and design choices. Standards can emerge bottomup through competition in the marketplace or be imposed top-down by government or other standard-setting agencies such as the Institute of Electrical and Electronics Engineers (IEEE) that develops and sets industrial standards in a broad range of industries, including energy, electric power, biomedical and health care technology, IT, telecommunications, consumer electronics, aerospace, and nanotechnology.

An agreed-upon standard, such as the IBM PC, ensures that all components of the system work well together, regardless of who developed them. It also helps legitimize the new technology by reducing uncertainty and confusion. A standard tends to capture a larger market share and can persist for a long time.

In the 1980s, the Wintel standard (a portmanteau of Windows and Intel) marked the beginning of exponential growth in the personal computer industry; it still holds some 90 percent of market share in personal computers. In the 2000s we saw a standards war between the HD-DVD format and the higher-definition rival, the Blu-ray Disc (BD). Blu-ray, backed by an association of electronics companies including Sony, Panasonic, and others, bested the HD-DVD format backed by Toshiba. Some argue that Sony's PlayStation 3 acted as a catalyst for adopting the Blu-ray format. A tipping point in favor of the Blu-ray format may have been the decision in 2008 by Warner Bros. to release discs only in Blu-ray format. Leading retailers such as Walmart and Best Buy began carrying DVDs in Blu-ray format and did not stock as large a selection in the HD-DVD format; Netflix and Blockbuster also fell in line. As a consequence, many companies stopped making HD-DVD players. Barriers to entry fell as technological uncertainties were overcome, and many new and established firms rushed to participate in the growth opportunity. As a side note, Sony and others never reaped the full rewards of this victory. Today the HD-DVD format still prevails, and wars on media formats have been overshadowed by delivery through video on demand (VOD) and streaming.

Government bodies or industry associations can also set standards by making top-down decisions. The European Union determined in the 1980s that GSM (Global System for Mobile Communications) should be the standard for cell phones in Europe. The United States relied instead on a market-based approach, and CDMA (Code Division Multiple Access), a proprietary standard developed by Qualcomm, emerged as an early leader. While North American manufacturers and service providers such as AT&T, Verizon, Motorola, and others were fighting a format war, Scandinavian companies such as Nokia and Ericsson faced no such uncertainty, and they leveraged their early lead into a temporary competitive advantage. Today, about 80 percent of the global mobile market uses the GSM standard.

Since demand is strong during the growth phase, both efficient and inefficient firms thrive; the rising tide lifts all boats. Moreover, prices begin to fall, often rapidly, as standard business processes are put in place and firms begin to reap economies of scale and learning. Distribution channels are expanded, and complementary assets in the form of products and services become widely available.

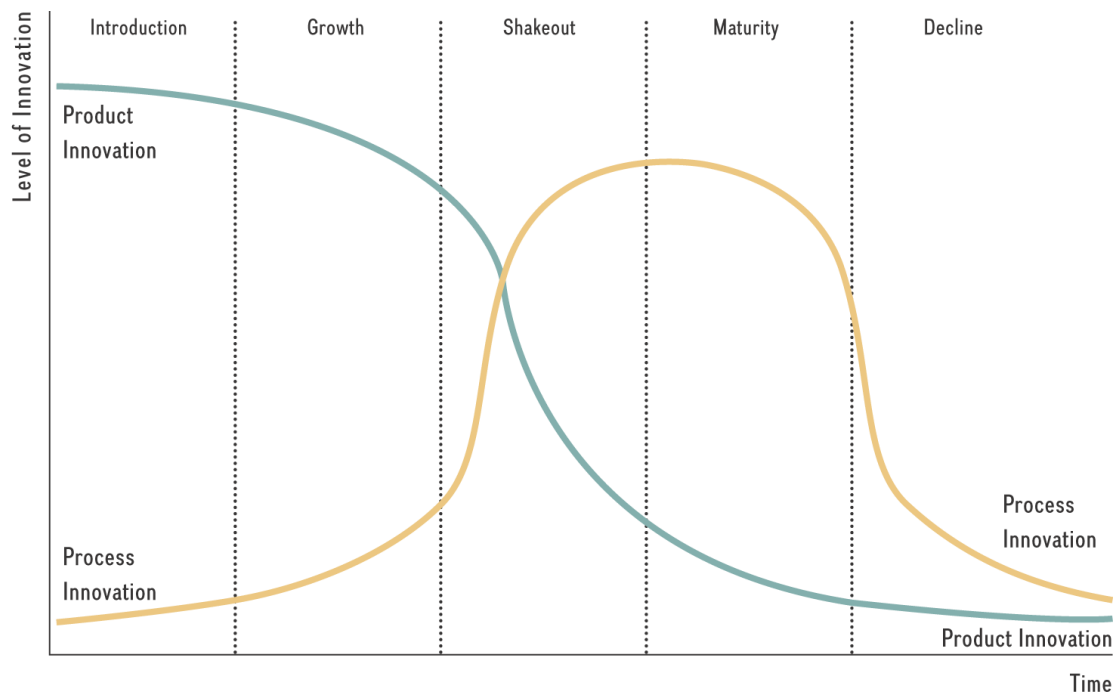
After a standard is established in an industry, the basis of competition tends to move away from product innovations toward process innovations. Product innovations, as the name suggests, are new or recombined knowledge embodied in new products—the jet airplane, electric vehicle, smartphones, and wearable computers. Process innovations are new ways to produce existing products or to deliver existing services. Process innovations are made possible through advances such as the Internet, lean manufacturing, Six Sigma, biotechnology, nanotechnology, and so on.

Process innovation must not be high-tech to be impactful, however. The invention of the standardized shipping container, for instance, has transformed global trade. By loading goods into uniform containers that could easily be moved between trucks, rail, and ships, significant savings in cost and time were accomplished. Before containerization was invented some 60 years ago, it cost almost \$6 to load a ton of (loose) cargo, and theft was rampant. After containerization, the cost for loading a ton of cargo had plummeted to \$0.16 and theft all but disappeared (because containers are sealed at the departing factory). Efficiency gains in terms of labor and time were even more impressive. Before containerization, dock labor could move 1.7 tons per hour onto a cargo ship. After containerization, this had jumped to 30 tons per hour. Ports are now able to accommodate much larger ships, and travel time across the oceans has fallen in half. As a consequence, costs for shipping goods across the globe have fallen rapidly. Moreover, containerization enabled optimization of global supply chains and set the stage for subsequent process innovations such

as just-in-time (JIT) operations management. Taken together, a set of research studies estimated that containerization alone more than tripled international trade within five years of adopting this critical process innovation.

**Exhibit 7.6** shows the level of product and process innovation throughout the entire life cycle. In the introductory stage, the level of product innovation is at a maximum because new features increasing perceived consumer value are critical to gaining traction in the market. In contrast, process innovation is at a minimum in the introductory stage because companies produce only a small number of products, often just prototypes or beta versions. The main concern is to commercialize the invention—that is, to demonstrate that the product works and that a market exists.

**Exhibit 7.6 / Product and Process Innovation throughout an Industry Life Cycle**



The relative importance, however, reverses over time. Frequently, a standard emerges during the growth stage of the industry life cycle (see the second column, “Growth,” in Exhibit 7.6). At that point, most of the technological and commercial uncertainties about the new product are gone. After the market accepts a new product, and a standard for the new technology has emerged, process innovation rapidly becomes more important than product innovation. As market demand increases, economies of scale kick in: Firms establish and optimize standard business processes through applications of lean manufacturing, Six Sigma, and so on. As a consequence, product improvements become incremental, while the level of process innovation rises rapidly.

During the growth stage, process innovation ramps up (at increasing marginal returns) as firms attempt to keep up with rapidly rising demand while attempting to bring down costs at the same time. The core competencies for competitive advantage in the growth stage tend to shift toward manufacturing and marketing capabilities. At the same time, the R&D emphasis tends to shift to process innovation for improved efficiency. Competitive rivalry is somewhat muted because the market is growing fast.

Since market demand is robust in this stage and more competitors have entered the market, there tends to be more strategic variety: Some competitors will continue to follow a differentiation strategy, emphasizing unique features, product functionality, and reliability. Other firms employ a cost-leadership strategy in order to offer an acceptable level

of value but lower prices to consumers. They realize that lower cost is likely a key success factor in the future, because this will allow the firm to lower prices and attract more consumers into the market. When introduced in the spring of 2010, for example, Apple's first-generation iPad was priced at \$829 for 64GB with a 3G Wi-Fi connection. Just three years later, in spring 2013, the same model was priced at only one-third of the original price, or \$275. Access to efficient and large-scale manufacturing operations (such as those offered by Foxconn in China, the company that assembles most of Apple's products) and effective supply chain capabilities are key success factors when market demand increases rapidly. By 2015, Gazelle, an ecommerce company that allows people to sell their electronic devices and to buy pre-certified used ones, offered \$30 for a "flawless" first-generation iPad.

The key objective for firms during the growth phase is to stake out a strong strategic position not easily imitated by rivals. In the fast-growing shapewear industry, startup company Spanx has staked out a strong position. In 1998, Florida State University graduate Sara Blakely decided to cut the feet off her pantyhose to enhance her looks when wearing pants. Soon after she obtained a patent for her bodyshaping undergarments, and Spanx began production and retailing of its shapewear in 2000. Sales grew exponentially after Blakely appeared on The Oprah Winfrey Show. By 2015, Spanx had grown to 150 employees and sold millions of Spanx "power panties," with revenues exceeding \$250 million. To stake out a strong position and to preempt competitors, Spanx now offers over 200 products ranging from slimming apparel and swimsuits to bras and activewear. Moreover, it now designs and manufactures bodyshaping undergarments for men ("Spanx for Men—Manx"). Spanx products are now available in over 50 countries globally via the Internet. Moreover, to strengthen its strategic position and brand image in the United States, Spanx is opening retail stores across the country.



*Sara Blakely, founder and long-time CEO of Spanx. World's youngest female billionaire. © Zuma Press, Inc/Alamy*

The shapewear industry's explosive growth has attracted several other players: Flexees by Maidenform, BodyWrap, and Miraclesuit, to name a few. They are all attempting to carve out positions in the new industry. Given Spanx's ability to stake out a strong position during the growth stage of the industry life cycle and the fact that it continues to be a moving target, it might be difficult for competitors to dislodge the company.

Taking the risk paid off for Spanx's founder: After investing an initial \$5,000 into her startup, Blakely became the world's youngest self-made female billionaire. Blakely was also listed in the Time 100, the annual list of the most influential people in the world.

## SHAKEOUT STAGE

Rapid industry growth and expansion cannot go on indefinitely. As the industry moves into the next stage of the industry life cycle, the rate of growth declines (**see Exhibit 7.4**). Firms begin to compete directly against one another for market share, rather than trying to capture a share of an increasing pie. As competitive intensity increases, the weaker firms are forced out of the industry. This is the reason this phase of the industry life cycle is called the shakeout stage: Only the strongest competitors survive increasing rivalry as firms begin to cut prices and offer more services, all in an attempt to gain more of a market that grows slowly, if at all. This type of cut-throat competition erodes profitability of all but the most efficient firms in the industry. As a consequence, the industry often consolidates, as the weakest competitors either are acquired by stronger firms or exit through bankruptcy.

The winners in this increasingly competitive environment are often firms that stake out a strong position as cost leaders. Key success factors at this stage are the manufacturing and process engineering capabilities that can be used to drive costs down. The importance of process innovation further increases (albeit at diminishing marginal returns), while the importance of product innovation further declines.

Assuming an acceptable value proposition, price becomes a more important competitive weapon in the shakeout stage, because product features and performance requirements tend to be well-established. A few firms may be able to implement a blue ocean strategy, combining differentiation and low cost, but given the intensity of competition, many weaker firms are forced to exit. Any firm that does not have a clear strategic profile is likely to not survive the shakeout phase.

## MATURITY STAGE

After the shakeout is completed and a few firms remain, the industry enters the maturity stage. During the fourth stage of the industry life cycle, the industry structure morphs into an oligopoly with only a few large firms. Most of the demand was largely satisfied in the prior shakeout stage. Any additional market demand in the maturity stage is limited. Demand now consists of replacement or repeat purchases. The market has reached its maximum size, and industry growth is likely to be zero or even negative going forward. This decrease in market demand increases competitive intensity within the industry. In the maturity stage, the level of process innovation reaches its maximum as firms attempt to lower cost as much as possible, while the level of incremental product innovation sinks to its minimum (**see Exhibit 7.6**).

Generally, the firms that survive the shakeout stage tend to be larger and enjoy economies of scale, as the industry consolidated and most excess capacity was removed. As shown in **Exhibit 7.4**, the smartphone industry in the United States and other developed economies is in the maturity stage. Competitive intensity is likely to increase even further going forward.

The domestic airline industry has been in the maturity stage for a long time. The large number of bankruptcies as well as the wave of mega-mergers, such as those of Delta and Northwest, United and Continental, and American Airlines and US Airways, are a consequence of low or zero growth in a mature market characterized by significant excess capacity.

## DECLINE STAGE

Changes in the external environment (such as those discussed in Chapter 3 when presenting the PESTEL framework) often take industries from maturity to decline. In this final stage of the industry life cycle, the size of the market contracts further as demand falls, often rapidly. At this final phase of the industry life cycle, innovation efforts along both product and process dimensions cease (**see Exhibit 7.6**). If a technological or business model breakthrough emerges that opens up a new industry, however, then this dynamic interplay between product and process innovation starts anew.

If there is any remaining excess industry capacity in the decline stage, this puts strong pressure on prices and can further increase competitive intensity, especially if the industry has high exit barriers. At this final stage of the industry life cycle, managers generally have four strategic options: exit, harvest, maintain, or consolidate:

- **Exit.** Some firms are forced to exit the industry by bankruptcy or liquidation. The U.S. textile industry has experienced a large number of exits over the last few decades, mainly due to low-cost foreign competition.
- **Harvest.** In pursuing a harvest strategy, the firm reduces investments in product support and allocates only a minimum of human and other resources. While several companies such as IBM, Brother, Olivetti, and Nakajima still offer typewriters, they don't invest much in future innovation. Instead, they are maximizing cash flow from their existing typewriter product line.
- **Maintain.** Philip Morris, on the other hand, is following a maintain strategy with its Marlboro brand, continuing to support marketing efforts at a given level despite the fact that U.S. cigarette consumption has been declining.
- **Consolidate.** Although market size shrinks in a declining industry, some firms may choose to consolidate the industry by buying rivals. This allows the consolidating firm to stake out a strong position—possibly approaching monopolistic market power, albeit in a declining industry.

Although chewing tobacco is a declining industry, Swedish Match has pursued a number of acquisitions to consolidate its strategic position in the industry. It acquired, among other firms, the Pinkerton Tobacco Company of Owensboro, Kentucky, maker of the Red Man brand. Red Man is the leading chewing tobacco brand in the United States. Red Man has carved out a strong strategic position built on a superior reputation for a quality product and by past endorsements of Major League Baseball players since 1904. Despite gory product warnings detailing the health risk of chewing tobacco and a federally mandated prohibition on marketing, the Red Man brand has remained not only popular, but also profitable.