



Industry Transformation

An industry is an intricate web of relationships among companies, customers, suppliers, and providers of substitute and complementary goods. Industry structure normally changes relatively slowly. Relationships reinforce one another, and efforts to change any single thing too much meets with resistance from other parties. Power relationships and patterns of rivalry are stable, and incentives to enter the industry are balanced by barriers to entry. Change is incremental. The cases in the Competition & Strategy course illustrate the stability of structure in many industries. Even in high-technology industries such as semiconductors and personal computers, structural changes involve periods measured in decades. We have seen industries such as soft drinks and discount retailing in which patterns of competition have persisted largely unchanged since the 1960s.

Occasionally, however, an industry altogether transforms itself. Mass manufacturers such as Ford displace small craftsmen as the prime makers of automobiles. Mom & Pop hardware stores rapidly give way to retailing “category killers” such as Home Depot. Workstation producers overtake manufacturers of mainframe and mini-computers. Industry structure changes dramatically as new entrants penetrate the market and the balance of power with respect to buyers and suppliers shifts. Firms with leading positions falter and upstarts take their place.

Students of complex systems—not just industries, but organisms, ecosystems, organizations, and many others—increasingly understand that systems have two natural modes of change: evolutionary and revolutionary.¹ Evolutionary change is gradual, with individual aspects of industry structure changing one or two at a time. In times of revolutionary change, in contrast, many, related elements of industry structure change simultaneously. Industry structure comes “unfrozen,” and relative positions within an industry are shuffled. After the period of transformation, competitive forces may bear little resemblance to those that held sway before.

Periods of industry transformation pose grave threats and major opportunities to companies. Industry leaders risk being unseated, replaced by underdogs and entrants. Conversely, periods of transformation provide the sparks that launch new companies to leadership status. Most major shifts in competitive position—up and down—come from industry dynamics, not better or worse mastery of a stable structure.

Periods of transformation also give companies unusual latitude to influence future industry structure. The elements that define industry structure often affect one another. The nature of rivalry among competitors, for instance, may affect the ease with which customers can switch among providers or new companies can enter an industry. Because of these interactions, there are multiple, internally consistent structures toward which an industry in transformation can head. Rarely is post-

Professors Michael E. Porter and Jan W. Rivkin prepared this note.

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transformation industry structure preordained. Rather, by their actions, companies influence which of many potential industry futures actually occurs.

The soft drink industry, for example, currently exhibits an attractive structure: branding efforts mute consumer and bottler power and raise high barriers to entry; contractual arrangements keep bottlers in check and add to entry barriers; rivals compete on advertising and availability rather than price; and so forth. These features arose largely because of choices that Coca Cola and Pepsi made when the industry first emerged, during the late 1800s and early 1900s. One can easily imagine, however, how a very different outcome might have emerged in the soft drink industry—in which undifferentiated providers of brown sugar water competed vigorously on price, entry was easy, and customers switched readily among products.

For an industry as a whole, transformation is neither good nor bad per se. There is no guarantee that an industry will be more profitable for participants after a transformation than it was before; indeed, it may well be less attractive. Many of the industries being affected by the Internet are moving to lower levels of likely profitability. Some management thinking has stressed transformational change as an aim in its own right. Such a perspective is incomplete at best, without incorporating the consequences of transformation for industry structure and competitive advantage.

This note examines the challenge of navigating through a period of industry transformation. We first consider how periods of transformation typically unfold. We then examine how the core tools of the strategist are deployed during such eras and how new tools come to the fore.

The Nature of Industry Transformations

Our focus here is on the metamorphosis of existing industries, but most of the ideas apply equally well to the birth of altogether new industries. In fact, when one thinks broadly, it is rare to see the birth of a truly new field. The “birth” of the auto industry, for instance, was in many ways a transformation of the market for personal transportation, which had long been dominated by a substitute product: the horse-drawn carriage. Similarly, the Internet is creating some entirely new industries (e.g., the sale of gift certificates of many companies), but is more often enabling the transformation of *existing* industries (e.g., book retailing).

Industries in transformation ordinarily pass through predictable stages: a trigger, an era of ferment and experimentation, and convergence to a new, stable structure.

The Trigger

Though industry transformations involve system-wide changes, one can often point to a spark that ignites the broader fire. The spark, or trigger, enables a significantly different way of doing business that was not possible before, a way that has a major impact on cost or buyer value. As companies implement new activity systems, competitive forces and relative positions are redefined. The events that trigger such changes come in three basic forms.

First, *a change in technology* may make possible a new system of activities that generates greater buyer value, permits the creation of buyer value at lower cost, or does both. The advent of electronic computing during the 1950s and 1960s, for instance, made it possible to keep records, tabulate, and calculate dramatically more efficient than was possible with prior electromechanical methods. One old-line maker of office machines, International Business Machines, successfully reconfigured its activities to exploit the new technology. As a result, it emerged from the transformation much strengthened. Another office machinery maker, National Cash Register,

managed to muddle through the transformation. Other industry leaders, such as Remington Rand and Burroughs, disappeared altogether.²

Similarly, the emergence of a series of technologies—bar-code scanners, satellite communications, computers, and automatic distribution equipment—changed the face of U.S. retailing during the 1980s and 1990s.³ Merchants such as Wal-Mart and Toys R Us altered their logistical, merchandising, pricing, procurement, and service activities to take advantage of the new technologies. The cost savings that resulted allowed such retailers to expand rapidly, and the economies of scale inherent in the new technologies contributed to widespread consolidation among retailers. This, in turn, altered the power relationships between retailers and consumer-good manufacturers.

Second, *a change in what customers need or want* can allow a new cost level or alter the very definition of buyer value. Companies that anticipate the change and configure themselves to meet the new definition emerge from the transformation with stronger positions. After World War II, for instance, American consumers became significantly more affluent, purchased automobiles, and moved to the suburbs. As a result, a store's proximity to home became less important to buyer value while ample parking became more important. An upheaval followed in the retail sector as shopping malls rapidly replaced downtown shopping districts. In personal computers, as consumers and corporate purchasers became comfortable with the technology during the 1990s, they placed less value on the handholding and expertise of computer salespeople and resellers. This shift in the definition of buyer value paved the way for the dramatic emergence of direct PC sellers such as Dell and Gateway.

Note that a change in the definition of buyer value is likely to bring on the transformation of an industry only if (a) the activities required to meet the new needs differ significantly from those necessary to satisfy the old ones, and /or (b) the new definition of value entails a major shift in one or more of the Five Forces. A new definition which can be met well with the old activity system and which does not alter competitive forces will have limited impact on the shape of an industry.

Third, *a change in regulation* can alter the mix of buyer value and cost that companies are permitted to offer. In general, regulation holds an industry at an artificial outcome. This is especially true of regulation that affects entry, expansion, product varieties, and pricing. Deregulation unleashes pent-up economic forces that push an industry to a new structure, and the torrent of changes that follow can shuffle relative positions. Airline deregulation in the United States during the late 1970s and 1980s, for example, opened the gate for a flood of new carriers and allowed airlines to compete on new dimensions such as price. The airlines that dominated the industry after deregulation were largely the ones that had done so before, but the nature of competition among them was far different. Once carriers were permitted to set prices freely, for instance, the kind of vicious price competition that one would normally expect in an industry with low marginal costs and high fixed costs indeed took hold. Some of the most profitable carriers after deregulation used innovations such as hub-and-spoke route structures and computerized reservation systems to avoid the most vigorous price competition.

The change that triggers the transformation of an industry may originate in an industry that is upstream from, downstream from, or complementary to the transformed industry. The advent of the automobile, for instance, had dire consequences for makers of yokes, horsewhips, and wooden wheels.

Changes in technology, customer taste, or regulation set the stage for the transformation of an industry, but the metamorphosis does not actually occur until individual managers and companies *see the potential for change and act upon it*. Without managerial insight and choice, industry structure will tend to persist. An alternative, more attractive structure may be feasible for years before firms take action to make the potential industry structure real. The technology necessary to deliver parcels overnight via a hub-and-spoke system, for example, was available well before Fred

Smith founded Federal Express. The component ideas and techniques required for mass production were arguably in place long before Henry Ford put the components together to transform the automotive industry (and indirectly, many other industries).

Managers not only play a role in turning potential structural changes into actual ones. They also influence the array of industry structures that are possible—by, for instance, investing in new technologies, marketing to influence customer needs, and lobbying for regulatory change. One should not lose sight of the role of individual creativity and sheer will in triggering the transformation of an industry.

Though the transformation of an industry may start with a single new technology or an isolated regulatory change, the resulting process is typically a system-wide phenomenon. Many elements of industry structure are affected. And often, though not always, industry transformations feed off multiple changes in the business environment. The rise of supermarkets in food retailing provides an example. Widespread ownership of automobiles and home refrigerators, the movement of consumers out of urban centers, consumer cost-consciousness during the Great Depression, and regulatory changes that eased the creation of chain stores—all of these helped supermarkets displace small, owner-operated food shops during and after the 1930s. The visionary zeal of Michael “King” Cullen, captured in a famous letter to the President of Kroger Foods, also fueled the change.⁴ The large supermarket chains that resulted from the process of transformation competed more fiercely than their predecessors, held more power over food suppliers, gave new bargaining power to consumers, and enjoyed greater economic advantages over substitutes (such as growing one’s own food). Economies of scale in food retailing rose dramatically, so that independent stores gave way to chains and entry into food retailing became more difficult. All aspects of the Five Forces were altered by the metamorphosis.

The most important triggers to industry transformation are those that alter relative positions wholesale. These tend to open up altogether new ways of doing business and favor some positions over others. Truly transforming changes confront existing companies with difficult tradeoffs. To respond to industry changes, incumbents must act in ways that undermine current modes of competing and degrade the value of current assets. Without tradeoffs, incumbents can simply incorporate new technologies, needs, or regulatory circumstances into their existing strategies. In many businesses affected by the Internet, for example, it is straightforward for incumbents to incorporate the Internet into their existing ways of competing. Wal-Mart, for instance, can add web-based information and ordering as an option to customers, “reusing” its brand name, purchasing power, and logistical system. Without tradeoffs, industry changes can be complementary to current modes of competing, not threatening to them.

We believe that dramatic changes in *relative positions* are *rarely ignited by improvements in operational effectiveness alone*. Such improvements shift the entire productivity frontier of an industry outward, permitting the delivery of buyer value at lower cost.⁵ By their nature, changes that improve operational effectiveness are attractive to all companies in an industry and are typically adopted widely and quickly. As a result, they do not often cause a wholesale reshuffling of relative positions within an industry unless some management teams are “asleep at the wheel” and fail to adopt the new best practices. Make no mistake: keeping up with improvement in operational effectiveness is a critical part of the manager’s agenda, as recent calls for total quality, benchmarking, and time-based competition make clear. Firms that fail to keep pace on operational effectiveness will fade quickly in most industries.

Cumulative changes in operational effectiveness over time can alter the nature of *competitive forces* in an industry. If the new best practices increase the switching costs that customers experience, for instance, the bargaining power of customers may fall significantly. Frequent flier programs, introduced almost universally in the airline industry in the 1980s, did little to alter the relative positions of carriers. Industry observers did, however, believe that the programs would make

customers more loyal to individual airlines.⁶ (The extent to which frequent flier programs actually succeeded in raising switching costs is questionable.)

Changes in operational effectiveness can also alter industry structure—for the worse—if blind pursuit of operational effectiveness leads firms to converge on a single positioning within an industry. Such competitive convergence can leave few distinctions among companies and lead to mutually destructive rivalry. In commercial printing, for example, all major companies have adopted the same new printing technologies and have become indistinguishable to customers.

The barcode scanner and the Universal Product Code (UPC), which came to the grocery industry in the 1970s, provide other useful examples. For leading supermarket chains such as Kroger and Safeway, installation of scanners constituted an improvement in operational effectiveness. All adopted the new technology (though at differing rates), and relative positions among leading players were little altered. Because the installation of scanners involved considerable fixed costs, the technology increased the advantage of large chains over small Mom & Pop grocers. Advent of scanners and the UPC shifted bargaining power away from grocery manufacturers toward supermarkets, who increasingly possessed better information than manufacturers about consumer demand.

Experimentation

A period of widespread experimentation typically follows the trigger. Knowing that the industry is changing but unsure of the ultimate direction and extent of change, companies engage in trial-and-error search for a winning formula. They try out different positions—different customer targets, for instance, various mixes of price and non-price value, or different configurations of activities and degrees of integration. Existing companies modify the activities of their core businesses or launch fresh ventures to tap the new opportunities or fend off the new threats. Startups or companies in related fields seize the opening to try their hand in the industry.

Particularly when the trigger event lowers the barriers to entry into an industry, new entrants may flood the market in large numbers. Indeed entry barriers usually decline at least temporarily during transformational periods. Existing customer relationships and loyalties may be disrupted as the products or services offered in an industry change dramatically. Old skills may become less important and new ones crucial. New customer segments, distribution channels, or sources of supply may become available.

In industries undergoing transformation, a multitude of experiments may be launched. Witness, for instance, the current proliferation of Internet business models. Similar patterns of broad experimentation have played themselves out in industries as diverse as biotechnology in the 1990s, personal computers in the 1980s, products related to integrated circuits in the 1970s, and synthetic materials in the 1960s.

Auto retailing in the United States is currently passing through such a stage of experimentation. As new technologies for managing information and supply chains have developed and consumers have grown unhappy with their car-buying experiences, a number of players have spotted an opportunity to restructure this highly fragmented industry. A diverse set of experiments is underway. Circuit City, for instance, has tried to apply its formula from electronics retailing to the used car market: its CarMax subsidiary consists of large, edge-of-town sites with a wide selection of cars where well-informed sales staff quote from price lists and do not haggle. Republic Industries has attempted to piece together a company that spans the markets for new, used, and rental cars. In its first eighteen months of operations, it acquired 22 new-car dealerships, opened seven used-car superstores, and purchased two major rental car companies. Auto-By-Tel has adopted a very different model, serving as an Internet-based clearinghouse that refers consumers to existing car dealers. General Motors and Ford have considered whether they need to purchase dealerships

themselves or assist others in consolidating their dealer networks. It remains to be seen which of these and other experiments will prove successful.

Risk and lack of information characterize this stage of an industry's transformation. To hedge their bets and gain knowledge from others, companies often seek out a *wide array of partners* at this point. In the Internet portal, browser, and access industries, for example, America Online is reported to have struck at least 65 joint ventures, partnerships, and alliances during 1999 alone, with partners ranging from American Airlines and Citibank to Compaq and Motley Fool.⁷

Fed by alliances, which serve as information conduits between firms, and rampant imitation, fads sweep quickly through industries in transition. Experiments launched by one company or set of companies are quickly mimicked by others. Part of the follow-the-leader behavior is rational; faced with severe uncertainty about the basic direction of the industry, firms mimic rivals whom they think know more about the future than they themselves do. Part comes from a simple fear of being left behind. As firms mimic one another, more may crowd into a particular position in an industry than can possibly thrive there in the long run.

Capital providers play a crucial role in defining the nature and consequences of this period. In the thick of rapid partnering and herd behavior, the providers of capital to an industry are as subject to uncertainty as are the companies in the industry. Their assessments of company prospects may be far more removed from reality—either optimistically or pessimistically—than they would be in calmer times. Often they lack tried and true metrics such as profit or cash flow. When assessments are overly optimistic, as some believe they long were in Internet-related industries, high valuations may fuel experimentation. High-priced stocks give companies the means to fund fresh experiments and mergers and alliances. Access to capital without near-term profit discipline can support behavior that is unsustainable and may undermine industry structure.

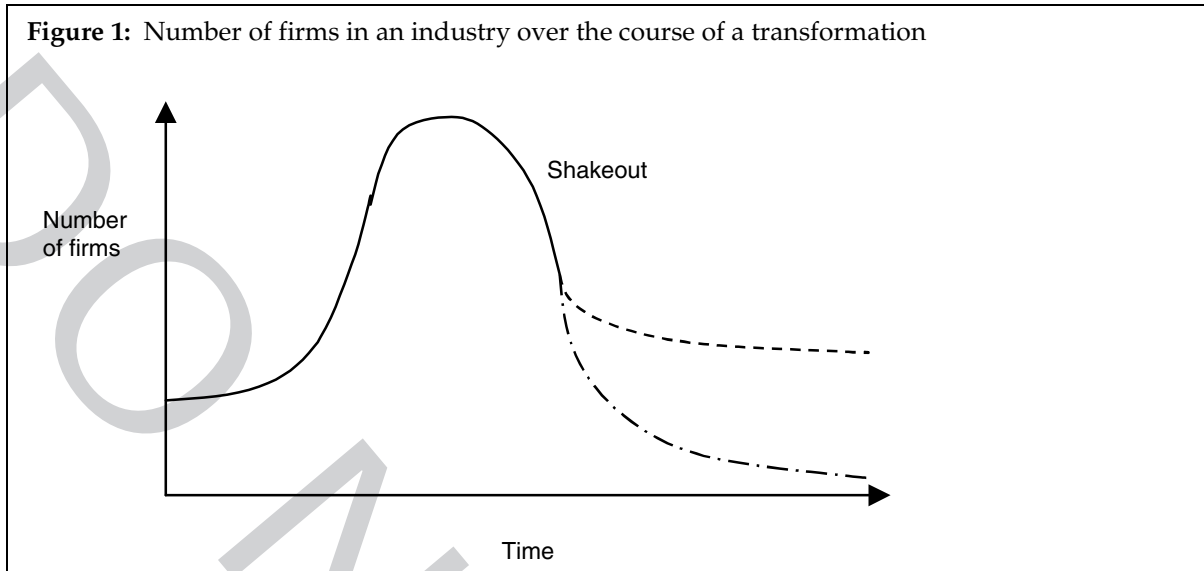
The pattern of experimentation during industry transformations is crucial because it deeply influences which of the potential industry structures eventually emerges. In the soft drink industry, for instance, early efforts by Coca Cola and Pepsi to brand their product, sell franchises to bottlers, and compete on image advertising set the stage for the eventual, attractive industry structure. Had the companies established different precedents—vigorous price competition, direct contact with retailers, and no advertising, say—the industry that coalesced later might have had a dramatically different structure.

Because early experiments can be highly influential, companies that hope to be eventual industry leaders must think carefully about the precedents they set during this period. They must consider whether their actions—played out to incorporate rivals' responses—will improve industry attractiveness or undermine it. Often, a company will face a dilemma: should it try something that will enhance its own relative position even though the action may undermine future industry structure?

Convergence

Most experiments fail; they poorly meet the new definition of buyer value or otherwise fail to drive a superior wedge between buyer value and costs for a sufficient number of customers. As experiments are shut down, a handful of successful ways of doing business in the transformed industry—sometimes termed “dominant designs”—emerge from the process of trial and error.⁸ Industry structure and the bases of relative position become more clear. As uncertainty fades and some companies recognize that their efforts have failed, a shakeout typically ensues (**Figure 1**). Recent research on the evolution of 46 products—ranging from ballpoint pens to lasers—indicates that, in the typical industry, roughly half of the companies in an industry at its population peak fail in the subsequent shakeout.⁹

Figure 1: Number of firms in an industry over the course of a transformation



The period of shakeout can extend for a long time.* For the average of the 46 products mentioned above, it lasted for over ten years. The products considered in this study, however, date back as far as 1887. There are some indications that the pace of industry transformation has quickened in recent years. One reflection of this is the duration of complete first-mover monopoly: the period between when a pioneer in an industry launches a new product and when a second company enters the market. For products introduced in the period 1887-1906, such as shampoos, zippers, and phonograph records, the average first-mover monopoly endured for 33 years. For products introduced in 1967-86, including laser printers, video games, and microwave ovens, the monopoly lasted only 3.4 years on average.¹⁰ The shortening of first-mover monopoly may reflect improvements in information flows and communications, widening access to technology, and increasingly efficient public and private equity markets.

Though entrants typically crowd into a market during the period of transformation, the number of players surviving the shakeout may be *higher or lower* than the original count. When the transformation involves an increase in the benefits of scale, the eventual population of the industry is typically smaller than it was initially. We see this, for instance, in hardware retailing, where advertising, information technology investments, and purchasing scale favors big players such as

* To see why this is so, consider the following simple example. Suppose that a new industry is on the verge of being born. To enter, a company has to invest \$10 million that can never be recovered. Everyone knows that there will eventually be three “winners” in the industry, each of whom will enjoy an annual profit of \$4 million forever—providing a hefty 40% return on investment. Other firms may earn some profit, but not enough to justify entry. All firms that enter have an equal chance of becoming one of the winners. After ten years, any entrant must invest another \$10 million to stay in business.

The first thing to note is that more than three firms will enter the industry. How do we know this? Suppose for a moment that there are only three entrants. A fourth company, looking at this situation, will say to itself, “If I enter, I’ll have a three-in-four chance of being one of the winners and earning a 40% return. Not bad. Let’s enter.” So more companies will enter the industry than can win in the long run.

Once the winners have been declared, however, the losing firms may not exit immediately. As long as they are covering their operating expenses, they will remain in business. Only when required to make the next \$10 million investment will they exit.

In sum, the chance of winning may tempt entry by more firms than can win. And the fact that sunk investments cannot be recovered may lead losers to remain in the industry for some time. Shakeouts are likely to last for a particularly long period of time when initial investments are long-lived and cannot be recovered, when relatively little on-going investment is required, or, more generally, when exit barriers are high.

Home Depot. On the other hand, companies may be more numerous after the transformation if economies of scale decline. In the televised entertainment industry in the United States, for example, economies of scale declined significantly during the early 1980s. The rise of independent production companies made it possible to enter the business without producing one's own shows, and new satellite and cable technology reduced the fixed costs of transmission. As a result, the number of television networks doubled and niche cable channels proliferated.¹¹

The shakeout among competitors is part of a larger process of convergence to a new industry structure. Rivalry settles down into a more predictable pattern, and relative positions tend to solidify. Relationships with customers and suppliers stabilize, and entry becomes less common. In time, a new, reinforcing web of relationships among industry participants emerges, as do new sets of activities within companies. Among the many industry structures that might have arisen, one structure is realized.

Strategy During Periods of Transformation

A common reaction to the uncertainty that accompanies industry transformation is to postpone or abandon the effort to set a strategy. Surely, some argue, it is pointless to fix on a strategy when conditions change monthly or daily. "On the Internet, companies have to be ready to change goals or strategy virtually overnight."¹² The analysis on which strategy is based is made obsolete by change, goes this line of thought, and the time required to articulate a strategy would be better spent learning and executing. Besides, an explicit strategy would only make a company inflexible. Rather than set a strategy, senior managers should simply stay agile, run harder, and sleep faster.

Our conviction, to the contrary, is that the deliberate and explicit setting of strategy is *more important than ever* during periods of change and uncertainty. In a period of transformation, strategy offers a clear direction to allow managers to discern important decisions and focus on them in the midst of many distractions. Without an explicit strategy communicated throughout the ranks, management decisions can quickly lead a company in numerous, inconsistent directions. A company with a clear strategy is less likely to follow fads blindly and better able to stake out a distinctive position. A strategy, with its focus on the spread between customer value and cost, guards against the tendency to seek growth for its own sake. The Internet is once again proving that growth in revenues from products sold below cost is hardly a sign of a sustainable strategy.

Those firms with clear strategies often play a major role in *defining* the nature of the post-transformation industry. Ford, with its clear concept of competing—"you can have any color you like as long as it is black"—defined the structure in the mass-production era of the automobile industry. Yahoo!, by defining itself as a media company, not a mere search engine, significantly shaped competition in Internet portals. Rivals were influenced to compete on broader dimensions than offering the most efficient search algorithms. This expanded the industry, while allowing Yahoo! to prosper disproportionately.

The argument that strategy cannot, or should not, be set deliberately in highly uncertain environments is often based on the mistaken impression that strategic positioning is static, or that strategy requires predicting the future precisely. On the contrary, an effective positioning is dynamic—a mix of value a company aims to deliver to its chosen customers over time. It is a direction and concept of value, not a formula. It is a path, not a point of arrival. Any strategic position must be constantly refined as new insights about the value model emerge and as new technologies change the prospects for its delivery. This need for continual refinement does not make the setting of strategy any less essential.

The Role of Strategy Fundamentals

The fundamentals of strategy continue to govern even as new rules of competition are being written. Strategy fundamentals such as industry structure, competitive advantage, relative buyer value, relative cost, operational effectiveness, and strategic positioning represent the inherent underpinnings of corporate performance. These fundamentals focus on the *ends* of competition, not the specific technologies or means of competing at any given point in time in any particular field. In this sense, then, the Internet sector represents no “new economy” but the latest broad-based enabling technology. Whether the Internet will support profitability will be determined industry by industry, based on these strategy fundamentals. While rapid growth can obscure fundamentals for a time and capital market expectations may delay the need to register current profitability, sooner or later the reality of the need to earn a good return sets in. The fundamentals of strategy explain why some industries and companies meet this need while others do not.

Even in a transforming industry, industry structure (the Five Forces) dictates the long-term potential of an industry to generate attractive returns for the average player. In assessing the promise of the online auction industry, for example, one must consider the questions posed by the Five Forces: How fierce and oriented to price will the rivalry among eBay, Amazon, and others be? Will the players find distinct positions, or will they converge on a single position in a mutually destructive race? Will there be forces that counteract the customer’s ability to switch sites at the click of a mouse? What barriers, if any, will prevent new companies from establishing viable auction sites, perhaps around a more specialized set of products? And so forth.

The failure to ground thinking with systematic industry analysis exposes managers to some characteristic pitfalls in transforming settings. One is to mistake growth for profit potential. Another is to confuse high tech with industry attractiveness.

Applying the tools of structural analysis in a transforming industry often requires greater skill than doing so in a more placid environment. It is more challenging to anticipate the structure of an industry that barely exists than to dissect a well-established competitive arena. The payoffs from foreseeing the evolution of structure are high, however. Managers who anticipate structure well are more likely to choose attractive industries in which to compete and are better able to position their companies with respect to the competitive forces. The Five Forces framework also gives managers a lens through which to view the changes that arise constantly in such a setting.

Good analysts of future industry structure follow some important principles. First, they take care to distinguish the enduring from the transient. In the online auction market, for instance, rapid growth currently mitigates the rivalry among the leading auction sites to some degree. However, growth rates are certain to decline eventually. On the other hand, the bargaining power of the sites’ technology suppliers is modest and likely to remain so. Second, good analysts look for internal consistency in the predictions they make about industry structure. For example, an industry in which buyers have low switching costs and care about price is unlikely to avoid fierce price-based competition in the long run.¹³ Third, good industry analysts identify clearly the uncertainties that remain even after they have done their best job to predict structure. This allows them to focus their ongoing efforts to monitor—and to shape—industry structure. Tools to address uncertainty in future structure are discussed below.

Just as the Five Forces determine the long-run ability of an industry to generate attractive returns, the fundamentals of competitive advantage continue to drive relative profitability even within transforming industries. The superior profits in an industry go to those firms whose sets of activities generate—in the long run—greater buyer value at lower cost than do the activities of rivals. Inevitably, analyses of costs and buyer value during periods of rapid flux involve a healthy dose of estimation. Nonetheless, such analyses can be highly revealing. By examining costs and buyer value, one can see, for example, what categories of merchandise are likely to be dominated by online

retailers rather than conventional merchants. Online retailers are likely to have the largest cost advantages over conventional bricks & mortar retailers for products and services that can be delivered digitally, directly over the Internet—items such as travel tickets, software, brokerage services, and eventually music, videos, and books. For goods that require physical delivery, conventional retailers may have a cost advantage due to the efficiency of bulk shipments to stores. Unfortunately for pure on-line retailers, there are few tradeoffs that prevent brick and mortar retailers from incorporating the Internet. Conventional retailers with well-developed web sites might also gain advantages by offering the consumer the option of home delivery or pickup at a nearby store with no delivery charges.

In short, the strategy fundamentals force managers in uncertain and changing settings to moor their choices to economic reality. The discipline to understand prices and costs, and relate them to activity choices, provides a powerful grounding in reality where herd behavior is common and wishful thinking is likely. In the end, a company must be able to see a robust rationale for attaining attractive returns in equilibrium, and understand the assumptions needed to get there.

New Emphasis

While the fundamentals of strategy remain the same and are arguably more essential than ever in transforming industries, this setting brings with it the need for heightened attention to some issues and analytical tools. These same issues arise in strategy formulation in any setting, but can be decisive when industry structure is radically changing. We mention some of the most important concepts and tools here, but leave detailed descriptions to the references cited in the endnotes.

Substitution. The transformation of an industry almost always involves the *substitution* of one product or service for others. The analysis of the substitution process, then, takes on great importance. The rate and extent of substitution is essential to understanding the potential size of the industry, its rate of growth, and the order in which customers and segments adopt a new product.¹⁴ Clearly central to exploring industry growth, substitution analysis is also important to profitability. The economic inducement for substitution, together with the particular segments that are penetrated, have much to do with customers' price sensitivity and the bases of rivalry.

When a substitution threat arises, incumbent industry leaders face a predictable set of dilemmas and choices. Should the company try to harvest its current business, vigorously fight off the new threat with its current array of products and services, or adopt the substitute itself? Should the company embrace the substitute even at the risk of cannibalizing its existing products and services? Does the company have reason to expect that it will enjoy a competitive advantage in the delivery of the substitute products and services? To what extent will the company's existing set of activities, past commitments, relationships, and routines hamper it in providing the substitute?¹⁵ Or to say it differently, what tradeoffs exist?

The importance of shaping competition, not just reacting to it. During industry transformations, the rules of competition are rewritten. A company's latitude to *influence* the future structure of its industry is never greater. Accordingly, a strategist should consider the impact of a company's choices not only on its competitive advantage, but also on long-term industry structure. A decision that undermines structure can be justified, but only if it helps a company establish a substantial and sustained edge over the competition. Conversely, choices that enhance structure may have a greater influence on a company's growth and profitability than efforts to improve market share marginally.

Addressing uncertainty. A third issue of unusual importance in transforming industries is *uncertainty*. As we noted above, uncertainty is a hallmark of an industry in transformation, particularly during the experimentation period. A number of tools are available to help strategists assess and cope with uncertainty better. When the uncertainty in one's environment is fairly modest

and its structure is clear, *decision trees* are often helpful. Using decision trees, managers lay out the range of possible paths the future might take, the decisions they can take to influence the paths, the probabilities that distinct futures will arise, and the payoffs associated with different outcomes. Simple calculations allow managers to compare the likely consequences of alternative actions.

When the path taken by an industry depends not only on one's own choices but also the decisions made by a small number of identifiable other players whose incentives can be assessed, *game theory* is often a more appropriate tool than decision trees. Decision trees and game theory are described at length in other references.¹⁶ Both tools require that analysts be able to specify the sequence of possible actions and reactions in an industry in some detail.

In intricate situations involving hard-to-specify uncertainty, *scenario analysis* is a particularly powerful tool.¹⁷ The focus of building scenarios is to create alternative views of the future that are internally consistent. That is, scenarios describe a set of dimensions of competition, including needs, economics, and company choices that could all coexist and reinforce one another. Based on the particular uncertainties present, a range of scenarios should be constructed which aim to reveal the different ways in which industry structure and other aspects of competition could evolve. Scenarios are constructed using core strategy tools; a scenario should specify the state of each of the Five Forces; the identity, strategy, and likely behavior of major competitors; and the relative position of the strategist's company. The goal in scenario analysis is not to generate a single view of the most likely future, but to create a set of views—each internally consistent and plausible—which together cover the breadth of possibilities.

When alternative, plausible scenarios for the future exist, it becomes important to test a strategy for *robustness*. How will the strategy fare not only under the expected version of the future, but also under other possible scenarios? How will it fare if an unlikely event comes to pass or a competitor makes a move contrary to expectations? A robust strategy will produce acceptable returns, or at least not a disastrous outcome, even under the turn of events that is most hostile to it. Managers in many Internet start-ups, for instance, must pay special attention to questions such as "What's the worst thing that could happen given our strategy?", "How would we respond to such a turn of events?", and "What can we do to head off that possible future?"

Analyses of industries in transformation, as any strategic assessment, should strive to include some numerical calculations. Because conditions are so volatile and the future so unpredictable in such settings, a single quantitative view of the future, or financial projections that culminate in a single net-present-value number—so called "point estimates"—have little value. Far more interesting is the range and distribution of possible outcomes. *Sensitivity analysis* becomes particularly important. This requires an analyst to change the inputs to his or her calculations, typically one or two at a time, and examine the effect of the change on the calculated outcome. Sensitivity analysis is useful not only because it shows how far actual outcomes may depart from expected point estimates, but also because it highlights the key sources of uncertainty that must be monitored, managed, and resolved. *Monte Carlo simulation* is a more sophisticated, automated version of sensitivity analysis. When performing a Monte Carlo simulation, an analyst assigns a probability distribution to each input variable in, say, a spreadsheet. A computer program then calculates how uncertainties in input variables combine to produce a range of possible outcomes.

Postures toward uncertainty. There is no one ideal way to deal with uncertainty. In some situations, companies can cope with uncertainty by making *big bets* that aim to *purposefully resolve* uncertainty in their favor. In the early days of the video cassette recorder (VCR) industry, for instance, it was very unclear which cassette standard would prevail: Sony's Betamax or JVC's VHS. According to some observers, the Betamax standard was superior from a technical perspective. JVC, however, invested aggressively to support its standard, winning over other machine manufacturers and, critically, the film studios that produced videotapes. As a result, JVC won the standards battle, and VHS remains the dominant format to this day. The maneuvers of Republic Industries in auto

retailing provide a more current example. By buying up as many new car dealerships as possible first, Republic aimed to force consolidation of the industry with it in first position.

In general, a big bet makes sense when a company has a better grasp of the future than its competitors do, and when a major investment can swing industry structure in a company's favor. Such bets, however, are only for managers and shareholders with healthy appetites for risk. They must also be made with a keen appreciation for and deep understanding of the underlying industry structure. For example, a bid to expand rapidly and "lock up" market share in a new industry makes little sense if customers are unlikely to face switching costs in the future or entrants can easily come in later. A bet against the laws of economics is rarely successful.

A second posture toward uncertainty, quite different from and often at odds with a big bet, is selective *flexibility*.¹⁸ This entails an investment in the ability to change rapidly in response to the environment. In general, such an approach is advisable when the environment is changing rapidly and cannot be influenced in a company's favor.

But note well, agility does not equal strategy. A strategy remains necessary in order to set some boundaries within which flexibility is preserved for subsequent improvements in products and processes. Investing in flexibility will generally represent a transient stage in industry evolution. Pure flexibility as a strategy is unlikely to yield superior long-run returns, because choice is the heart of competitive advantage.

Experimentation, a third posture toward uncertainty, involves a purposive process of making a series of controlled investments to probe customer needs, technological approaches, and activity configurations. In any strategy, continuous learning and the capacity to incorporate new learning is a necessity. A strategy is a path toward a distinctive approach to value creation, that can and must be enhanced as new opportunities arise. In transforming industries, a conscious and systematic process of learning is especially desirable. Companies skilled at experimentation pursue an array of well-chosen approaches, cut off failed experiments quickly, and are willing to institutionalize aggressively those ideas that succeed. In general, experimentation is a sensible approach when the competitive landscape—customer preferences, technology, competitive behavior—is unknown but knowable. Rarely is the competitive environment so unstable and path independent that learning does not cumulate and prove valuable.

Experimentation is not simply the delegation of strategy to a pair of dice. Experiments are chosen carefully, consistent with an overarching strategy. For example, Wells Fargo Bank, with a strategy of offering high convenience to sophisticated, busy customers, has been a pioneer in exploring every high-convenience delivery option very early, ranging from on-line banking and branches in Starbucks to webTV. Experimentation is not as easy as it may sound. Smart learning requires a careful design to map out the areas of uncertainty in the competitive environment and to exploit the correlation structure of the underlying uncertainty (e.g., to create hedges). A company that sees two scenarios possible in an industry, for instance, might launch two experiments—one that would succeed under each scenario, *not* two that would both succeed in one scenario and both fail in the other. Also, successful experimentation involves a supportive set of organizational conditions: e.g., celebration of failure and a willingness to cut losses quickly.

Flexibility and experimentation are increasingly being analyzed, conceptually and quantitatively, in terms of *option theory*. Techniques developed to assess the value of financial options such as puts and calls can be adapted (with care) to evaluate so-called "real options." An experiment that gives a company an opportunity, but not an obligation, to do something later can be thought of, and valued as, an option. Consider, for instance, Walt Disney's launch of its first three Disney Stores in 1987. The experimental stores offered Disney two things. First, they gave Disney the cash flows from those particular stores. On this basis alone, those three stores probably looked like an investment with a negative net present value. However, the initial stores also gave Disney an option: should the stores perform well, Disney could follow up by opening many more stores. Indeed

Disney did so, and today it operates a profitable chain of more than 700 retail outlets. A key aspect of an option is that it offers a right *but not an obligation* to follow up. From 1990 to 1992, for instance, Disney experimented with a fast food chain, Mickey's Kitchen. Disappointing early results in two sites led the company not to exercise its option to expand.¹⁹

Scenarios provide a structure in which the other tools and approaches can be embedded. Scenarios help decide which bets to make, what risks to hedge against, what to test robustness against. Scenarios also help define the range of experiments that should be undertaken.

The Value of Leadership and Supportive Organizational Structure

The leadership of a company, together with its organizational choices, are always crucial in setting and executing a strategy. However, they become paramount during periods of industry transformation. Management teams are called upon to learn quickly, adapt rapidly, and distinguish vital changes from a flood of less important news. Companies have a tendency to respond, appropriately, by decentralizing. They create a more modular organization in which each part of the company can make its own decisions, launch its own experiments, and adjust without disrupting the rest of the organization. The danger in this approach, of course, is that parts of the organization will wander down separate, perhaps conflicting, paths. The best defense against this hazard is a clear strategy, aggressively communicated, which channels independent units toward consistent action.

Notes

- ¹ See, for instance, N. Eldredge and S.J. Gould, "Punctuated Equilibrium: An Alternative to Phyletic Gradualism" in T.J.M. Schopf (ed.), *Models in Paleobiology* (San Francisco: Freeman, Cooper and Co., 1972); D. Miller, "Evolution and Revolution: A Quantum View of Structural Change in Organizations," *Journal of Management Studies* (19), 1982, pp. 131-151; M. Tushman and E. Romanelli, "Organizational Evolution: A Metamorphosis Model of Convergence and Reorientation" in L. Cummings and B. Staw (eds.), *Research in Organizational Behavior* (Greenwich: JAI Press, 1985, Volume 7); and M. Tushman and P. Anderson, "Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change," *Administrative Science Quarterly* (35), 1990, pp. 604-633.
- ² R.S. Rosenbloom, "Leadership, Capabilities, and Technological Change: The Transformation of NCR in the Electronic Era," Harvard Business School mimeo.
- ³ J.T. Dunlop and J.W. Rivkin, "Introduction" in S.A. Brown, *Revolution at the Checkout Counter: The Explosion of the Bar Code* (Cambridge: Harvard University Press, 1997).
- ⁴ M.M. Zimmerman, *The Supermarket: A Revolution in Distribution* (New York: Mass Distribution Publication, 1955), pp. 32-35.
- ⁵ M.E. Porter, "What Is Strategy?" *Harvard Business Review* (74: 6), 1996, pp. 61-78.
- ⁶ See, for instance, "The Sky's the Limit in Luring the Frequent Flier," *Business Week*, October 18, 1982 and K. Hoffman, "Airlines Soaring with Frequent Fliers," *Advertising Age*, May 10, 1984.
- ⁷ Based on information in the OneSource business database.
- ⁸ The notion of a dominant design emerged from literature on technological evolution, especially W. Abernathy, *The Productivity Dilemma* (Baltimore: Johns Hopkins University Press, 1978) and W. Abernathy and J. Utterback, "Patterns of Industrial Innovation," *Technology Review* (80), 1978, pp. 40-47. For a recent synthesis, see M. Tushman and J.P. Murmann, "Dominant Designs, Technology Cycles, and Organizational Outcomes," *Research in Organizational Behavior* (Greenwich: JAI Press, 1998, Volume 20).
- ⁹ S. Klepper and E. Graddy, "The Evolution of New Industries and the Determinants of Market Structure," *RAND Journal of Economics* (21), 1990, pp. 27-44.
- ¹⁰ R. Agarwal and M. Gort, "First Mover Advantage and the Speed of Competitive Entry, 1887-1986," State University of New York at Buffalo mimeo.
- ¹¹ J. Edmonds, S.B. Garell, and P. Ghemawat, "Fox Broadcasting Company," Harvard Business School Case 387-096, 1993.
- ¹² Marcia Stepanek, "How Fast Is Net Fast?" *Business Week E.biz*, November 1, 1999, pp. 52-54.
- ¹³ This combination of competitive forces is especially unlikely if industry characteristics prevent firms from colluding to maintain high prices and entry barriers are modest.
- ¹⁴ See Chapter 8 of M.E. Porter, *Competitive Advantage* (New York: Free Press, 1985).
- ¹⁵ For more discussion of these and related questions, see P. Ghemawat, *Strategy and the Business Landscape* (Reading: Addison-Wesley, 1999), pp. 90-95.
- ¹⁶ For an introduction to decision trees, see D.E. Bell and A. Schleifer, Jr., *Decision Making Under Uncertainty* (Cambridge: Course Technology, 1995, especially Chapter 1. For a manager's introduction to game theory, see A.K. Dixit and B.J. Nalebuff, *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life* (New York: Norton, 1991).
- ¹⁷ For introductions to scenario analysis, see Chapter 13 of M.E. Porter, *Competitive Advantage* (New York: Free Press, 1985) and P. Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World* (New York: Doubleday, 1991).
- ¹⁸ Chapter 6 of P. Ghemawat, *Commitment: The Dynamic of Strategy* (New York: Free Press, 1991) describes how to incorporate considerations of flexibility and recourse into strategy formulation.
- ¹⁹ For a managerial introduction to real options, see A.K. Dixit and R.S. Pindyck, "The Options Approach to Capital Investment," *Harvard Business Review*, May-June 1995, pp. 105-115. A more thorough and technical treatment is given in A.K. Dixit and R.S. Pindyck, *Investment Under Uncertainty* (Princeton: Princeton University Press, 1994).