

# How Industries Evolve

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*Firms can improve their performance by tailoring investments to ride industry trends rather than to fight them. This article sheds light on how. It argues that better corporate performance hinges on understanding how industries evolve and that the main frameworks currently in use (the five forces and the S-curve/product life cycle models) are incomplete for this purpose. Building on an extensive body of fieldwork and statistical research, the author identifies four basic models of industry evolution which she calls “receptive”, “blockbuster”, “radical organic”, and “intermediating”. Each kind of evolution involves specific kinds of risks, and each carries different implications for the relevance of established capabilities and investment priorities.*

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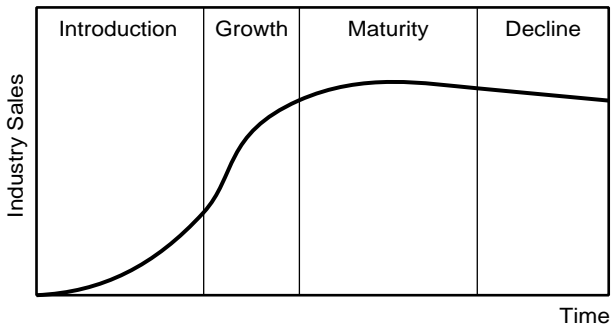
Over the last two decades, the profitability of US firms dropped by nearly a third while stock market values soared to create a huge financial market premium on corporate assets. The absolute level of the financial market premium today puts unprecedented pressure on managers to generate real returns on invested

capital. Either fundamental operating performance must improve, or shareholder value will not rise at historic rates.

There is no shortage of theories on how to relieve the pressure. Many of them involve technology. Some optimists believe that the blanket introduction of new technology across the whole economy will somehow result in new value, almost by osmosis. Others look for more specific links between strategy, investment and increased profitability. Building on the five-forces framework (Porter 1980) and on the S-curve framework (Abernathy and Utterback 1978, Foster 1986), the fundamental premise of this article is that you cannot increase profitability without a thorough understanding of the structural changes shaping the industry concerned.

The five-forces framework (figure 2 overleaf) is essentially static: it provides an approach for determining the financial performance of an industry, and thus its attractiveness for investors, *at a specific point in time*. Although the S-curve framework (figure 1 overleaf) is dynamic – it focuses on how industries evolve over time – it does not deal with how companies move across product generations, ie across S-curves. Using a large body of fieldwork and statistical research (see Appendix, “The Statistical Evidence”), this article introduces a new framework that identifies four models of industry evolution. The approach is complementary to the five-forces and S-curve frameworks. How an individual should tackle the problem of increasing profitability in his or her own firm depends largely

Figure 1  
The S-Curve



on which of the four models best characterizes the nature of innovation in the industry.

A major distinction in this new framework is between “architectural” and non-architectural change. Architectural change (Henderson and Clark 1990) is here defined as any innovation that disrupts the industry’s established relationships with *both* suppliers *and* customers. Often this is based on new technology but it can also involve the redeployment of existing technology (Markides 1999). For instance, the department store and the supermarket represented architectural changes in retailing, but neither was based on radical technology. Non-architectural change involves innovation through established customer or

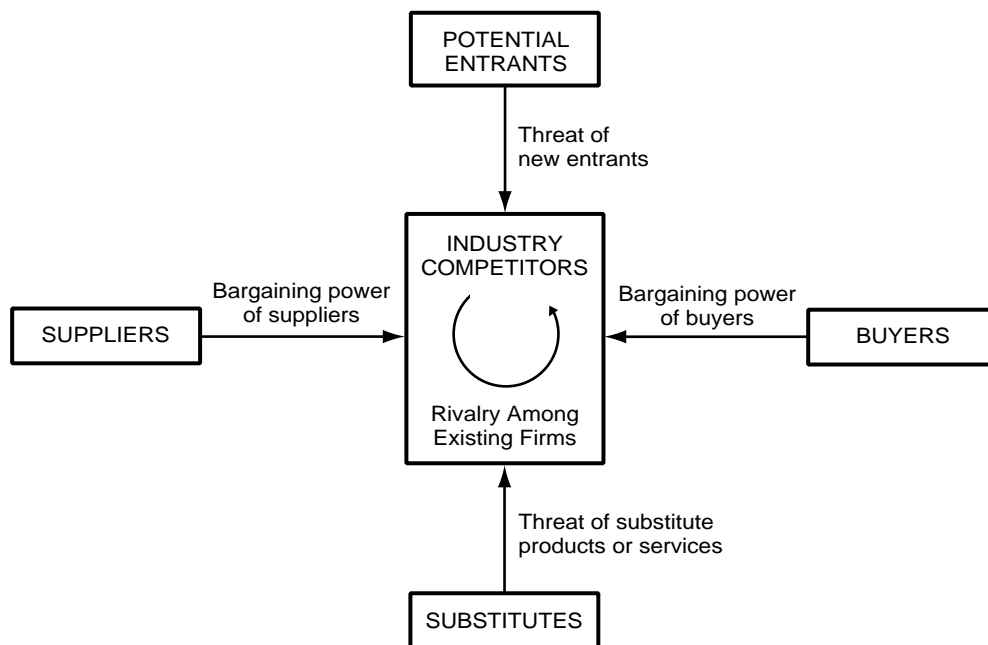
supplier relationships. Examples include new supermarket layouts or the introduction of a new pharmaceutical product.

Two of the four models of industry evolution identified in this article are non-architectural, with firms innovating within the structure of established relationships. The other two are architectural, with firms innovating outside the structure of the industry’s established customer and supplier relationships. Before describing them in detail I first show why we need to go beyond the S-curve. The Appendix sets out the research evidence on which the four-model framework for industry evolution is based.

**Beyond the S-Curve**

The S-curve and the closely-related Product-Life-Cycle (PLC) frameworks are based on the idea that industries move through periods of emergence, shake-out, maturity, and decline. Although the models are appealing, they are hard to use on their own for corporate planning, and may even be misleading in some situations (Foster 1986). Industry leaders may become trapped in a kind of self-fulfilling logic of maturity if they take action based on an oversimplified S-curve; if they believe that an industry has reached the “mature” phase of the S-curve, they may wrongly assume it is past innovation.

Figure 2  
Five Forces Framework



Source: Porter 1980

This perspective threatened toy retailers in the early 1990s (Coxe *et al* 1996). At the time, many studies of toy retailing reported that the industry was mature. Toys-R-Us, Wal-Mart, K-Mart, and Kaybee dominated the US mass market. Given the stability in the industry structure, the leading firms invested incrementally to build out their store networks and to improve their information systems. Neighborhood Mom-and-Pop toy stores exited steadily as the mass marketers grew. A few upstart educational stores – like the Discovery Zone, the Learning Place, and LearningSmith – gained a toehold, but these innovative retail outlets were perceived as too small to threaten the market leaders.

The maturity mindset offered little insight into the impending industry change. By the late 1990s, toy retailing was transformed by new technology, new products, and new kinds of customer relationships. Companies like eToys and Amazon.com satisfied customer needs for quick, reliable, convenient, and inexpensive access to exciting new products. Old pricing and merchandising formulas no longer reflected competitive conditions. The new systems also affected toy *manufacturing* by making available extensive personalized information about customer preferences. The mass marketers had to preserve their surviving advantages while retrenching to compete effectively against the new retailers. By mid-2000, Toys-R-Us had announced a partnership with Amazon.com to unify convenient access with established distribution capability and manufacturer relationships.

#### **Why the S-curve and product life cycle models are difficult to use**

What was wrong with the idea that the industry was in maturity? Conventional wisdom held that maturity was driven by the aging of the baby boom and the stability of toy design. The reality of tough price competition at the retail level underscored this perception. Many industry leaders had a sense that new technology might some day support innovation but the possibilities appeared remote and futuristic. Why didn't people foresee that the industry was about to be transformed?

- *Life cycle phases are difficult to see.* First, it was hard to get the timing right on technology and demographic trends. While radical innovation was a theoretical possibility, it was hard to

imagine in practice. Upstart entrants that challenged the incumbents typically failed because of high costs and inadequate consumer response. The reality of the industry underscored the hard-edged economics of faddish toys and retail price competition.

- *Industry boundaries are hard to identify.* Second, the S-curve analysis did not capture subtle changes in industry boundaries. Indeed, it reinforced the incumbents' view that toy retailing required storefronts backed by complex distribution networks and tight manufacturer relationships. As toy e-tailing emerged, many incumbents saw it as a separate industry like catalog distribution. Catalogs had been limited in their effectiveness mainly because mailing costs were so high and response rates were so low. Unlike traditional retailing, catalogs offered no opportunity for pre-purchase play. Traditional retailers soon learned that the touch-and-feel requirement was not nearly as important to online retailers as they had thought, however.
- *The S-Curve and PLC models offer little help for adapting an organization across generations.* Third, the models did not offer toy-retailing executives a point of view on how to survive into the next industry generation when it did finally arrive. Many of the mass merchants kept their core revenue streams even when new entrants like eToys and Amazon began to attract customers. Questions arose about whether the upstarts could fulfil orders. Lingering concerns about the customer's need for touch-and-feel suggested that the traditional bricks-and-mortar retailers should not overreact to the threat. Organizational conflict made it confusing and difficult to go for clicks-and-bricks.

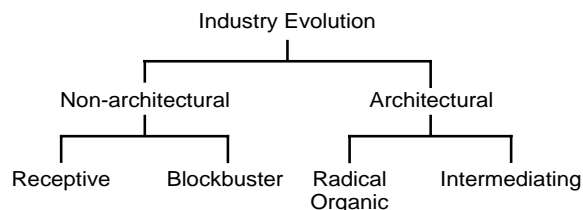
#### **The difficulties are widespread**

Across many industries, executives in leading firms have perceived their industries as mature and have later been blindsided by innovative rivals. The problems in applying the S-Curve and PLC frameworks in toy retailing are also common in other settings. Challenges of misplaced investment can also arise when executives perceive their industries as emerging or as declining. Field research on industry transitions shows that the most persistent challenges are organizational. Without a better view on how the environment is changing, firms cannot fully commit to organizational adaptation.

### Four Models of Industry Evolution

Figure 3 illustrates the four models of industry evolution: “receptive”, “blockbuster”, “radical organic” and “intermediating”. Among the two non-architectural models, the distinction is between those where the customer and supplier markets provide continuous feedback (Model 1, “Receptive”) and those where profitability is mainly determined by the outcome of major projects for which feedback is delayed and unpredictable (Model 2, “Blockbuster”). When industry evolution involves blockbuster change, firms sustain superior performance if they use long-term relationships to create more value from successful projects than can outsiders. In contrast, firms in receptive industries create value by systematically translating incremental improvements into formulas for success that can be replicated across their businesses. Discount consumer-goods retailing is an industry undergoing “receptive” change while ethical pharmaceutical manufacture is on a “blockbuster” path. Within a sector’s supply chain, the downstream industries (ie pharmacies, movie theaters and gas stations) often evolve receptively even if the upstream industries (ie pharmaceuticals, movie production, and oil/gas exploration) undergo blockbuster evolution.

Figure 3  
The Four Models of Industry Evolution



Architectural industry change is less common but may lead to major shifts in the overall character of an industry. It occurs in two ways. The third model, “radical organic” evolution, encompasses approaches that provide a quantum improvement in customer or supplier value (performance, ease of use, mode of use) big enough to disrupt existing customer and supplier relationships. A classic example is the personal computer, which appealed to a whole new set of customers and engaged a new cadre of components suppliers and employees. The personal computer quickly transformed both the horizontal industry structure (yielding winners and losers among computer manufacturers) and the vertical value chain (including

software suppliers, sales and distribution channels, purchasing processes, etc).

The fourth model of industry evolution, “intermediating” change, describes architectural innovation that originates within established relationships. Intermediating change occurred during the late nineteenth century in consumer-goods retailing, when Sears and Montgomery Ward pioneered mail-order catalogs to create new ways of buying and selling for households. Today, online auctions create intermediating change in the markets for used cars.

Each of the four models has distinctive characteristics in terms of industry structure, historic innovation paths, investment opportunities and performance drivers (figure 4). Every industry evolves by one of these models, although industries may move between evolutionary models over time (and especially over long periods of time). An industry may rapidly move from non-architectural change into radical organic change, as in the launch of electronic watches. In most cases, this kind of rapid change is preceded by a long period in which pressure for major change builds in the old industry structure. Similarly, an industry may move from a period of architectural change into a relatively stable period of non-architectural evolution.

#### Model 1: Receptive Evolution

Receptive innovation paths are more stable than other trajectories for industry evolution. Examples of receptive evolution commonly arise in the distribution, transportation, and manufacturing sectors. Firms with superior performance in these industries typically grow by expanding their activity systems outward steadily. The characteristic quality of receptive industries is that firms achieve returns on their investments incrementally as the investments are made. Information quickly arrives on whether the firm’s approach is viable in the market. In general, investment is less risky than under other evolutionary models. It is as if the industry’s leaders have conceived of winning formulas, and their success depends on the steady radiation of the formula into new contexts. In these industries, sustained outstanding performers are rare; but so also are sustained low performers. Incumbent firms typically become steady moderate performers that yield excellent long-run returns on investments, especially after accounting for the lower risks.

**Industry Structure.** Receptive evolution typically involves a different kind of industry structure from blockbuster evolution. Under receptive evolution, firm characteristics and firm performance tend to cluster around the industry average (McGahan 1998). However, the underlying structures of Model-1 industries do vary. Florists, local restaurants, and dry cleaning are fragmented while discount retailing, express delivery, and long-haul trucking are consolidated. In many situations, the attractiveness of the industry depends on whether established firms are being overtaken by the more efficient systems of their rivals. During most of the 1980s, the discount retailing industry in the US was unattractive largely because Wal-Mart was expanding its operations and creating excess capacity in the systems of many of its major rivals. Today, many Mom-and-Pop restaurateurs are exiting for similar reasons. Modern restaurant chains expand into their local markets and offer customers similar experiences at lower prices.

As these examples suggest, the profitability of Model-1 industries usually involves shorter and shallower periods of loss than among industries on other evolutionary paths. Under receptive industry evolution, disadvantaged firms normally have trouble surviving unless they can quickly adapt to more efficient approaches.

**Historic innovation path.** Industries undergoing receptive evolution may have very different histories. Often, however, a long initial period of fragmentation occurs and in some cases industries remain fragmented. (Even fragmentation is not normally associated with substantial losses, however.) Receptive industries tend to consolidate when particularly efficient competitors come to dominate the industry.

Dominating firms often have grown slowly over long periods. Steady radiation from a geographic base is common. Starbucks, Wal-Mart, and Federal Express

Figure 4

**The Four Models: Summary**

Evolutionary Model	Architectural Change	Defining Characteristics	Industry Structure	Historic Innovation Path	Investment Opportunities	Performance Drivers	Examples
1. Receptive	No	Incremental returns as investments are made	Firm performance may cluster around the industry average; firms develop integrated systems of activities	Long initial periods of fragmentation sometimes followed by consolidation around efficient leaders	Incremental at geographic boundaries or at product-attribute boundaries	Constant search for new efficiencies	Retailing before the Web, fast-food
2. Blockbuster	No	Risky projects with delayed feedback.	Firm performance may vary widely; firms seek to dominate niches	Early periods of loss followed by consolidation around leaders that hold complementary assets	Risky and rare over a single specialized asset	Constant risk management on big projects	Film production, pharmaceuticals, oil exploration
3. Radical Organic	Yes	Radical innovation in the capabilities that support both customer and supplier relationships	Often depressed average profitability with attractive pockets	Built-up resistance among incumbents to new technologies; lagging reinvestment by critical customers and suppliers	Risky and rare over many specialized assets	First-mover advantage through commercialization of new product and process technologies	News services, high-end leisure travel
4. Intermediating	Yes	Radical shift in the information available when transactions occur	Often depressed average profitability with attractive layers	Built-up compromises among incumbents in transactions; tough negotiations by critical customers and suppliers	Incremental over both customer and supplier transactions	First-mover advantage through reshaping ways of interacting with customers and suppliers	Auto-dealing, retail banking, agricultural supplies

all evolved this way. These successful firms grow by continuously investing in a number of core assets simultaneously. For example, Wal-Mart has added stores, distribution capacity, transportation systems, information-technology features, employee-recognition programs, and merchandise all at the same time. The company innovates by extending its system rather than by looking for a big-hit return on investment in a single capability. Wal-Mart's entire distribution system differs from that of Sears, K-Mart, and other competitors. In both fast food and discount retailing, differences in the formulas pursued by the major competitors extend across a broad range of activities. Companies become archrivals because of fundamental differences in their philosophies for approaching both customers and suppliers. The pattern of growth is distinctive from the blockbuster model because the company gets immediate feedback (and immediate return on its investment) as it builds out its network.

**Investment opportunities.** Competition tends to occur at the boundaries between systems in product or geographic space. Over the past three decades, McDonald's and Burger King became famous for basic differences in the way they make burgers, with McDonald's adopting a batch process and Burger King cooking to order. (Recent announcements indicate that McDonald's may be moving to a cook-to-order system, which may reflect convergence in strategies as the industry consolidates.)

When industries on a receptive evolutionary path consolidate, they tend to encompass economies of scale and scope based on relationships across specific activities, with continuous feedback from markets. They do not engage in major bets on new technologies in isolation from market forces. Receptive industries are substantially more favorable to mid-course corrections than blockbuster industries, with more market testing of new ideas and less background research and development.

**Performance drivers.** The highest-performing firms in Model-1 industries continually develop new efficiencies. They are rigorous, disciplined and clear in their willingness to turn away opportunities that may compromise the existing approach. Leading firms also find ways to extend themselves incrementally without directly confronting competitors with equally efficient approaches. High performers avoid price wars

as they come into contact with competitors through incremental growth.

Industries on receptive paths are vulnerable to price wars because customers and suppliers tend to be less loyal than in blockbuster industries. Starbucks, Wal-Mart, and Federal Express offer more-or-less standardized products and services. The companies generally avoid customizing their approaches to remain efficient and to offer low prices. (Although these firms may be differentiated, the absolute standards for efficiency in their industries are high.) As a result, customers and suppliers (including employees) have low switching costs. When two leaders come into contact, they often face powerful incentives to win customers by cutting price because they cannot rely on customer loyalty. These conditions have plagued the airline industry for years.

### **Model 2: Blockbuster Evolution**

Examples of industries on a blockbuster trajectory include pharmaceuticals, applications software, cellular-telephone service, oil-and-gas extraction, and movie production. The characteristic quality of a blockbuster industry is that nearly all the costs of developing new products and technologies are incurred before the sponsor learns whether markets will respond favorably. Critical resources are created through risky investment over long periods before they generate profits. Once the new project is developed, it is commercialized in concert with complementary assets that are already in place.

A film studio cannot truly resolve its uncertainty about a film's market value until the project is finished. However, big box-office hits rarely come from independent film-makers. Established studios use their relationships with key actors and their distribution systems to secure important advantages in bringing their films to market. In this context, the innovation occurs within the framework of these complementary assets. Great new value may be created by innovative film projects like *Titanic*, but the industry is not changed architecturally.

The structural platform for innovation is similar in the pharmaceutical industry, where companies must invest for years in R&D before obtaining reliable estimates of a product's viability. Once a drug passes through the approval process, however, the company may make hundreds of millions. Typically, the

innovating company brings the approved drug to market through an established salesforce and distribution system. These complementary assets are critical to the stability of the industry.

**Industry structure.** What are the structural characteristics of blockbuster industries? It depends on whether incumbents are currently engaged in significant development expenditures or whether dominant designs have emerged. For decades, the cellular-telephone industry was unattractive as firms built out their networks. The payoff is occurring now, as firms begin to achieve above-average returns on their invested capital.

After a dominant design emerges, blockbuster industries typically generate above-average returns. A five-forces analysis normally reveals a low threat of entry, low buyer or supplier power, low rivalry and moderate threats of substitution. What makes buyers and suppliers tolerate high profits on average among industry incumbents? What keeps the industry's rivals from gravitating to similar competitive positions?

First, firms in the industry bear significant operating risk. Film profits are notoriously volatile. Occasionally film companies go out of business by overfunding ill-fated projects. Similarly, the high profits of pharmaceutical leaders may be significantly threatened when drugs go off patent. Buyers and suppliers tolerate the industry's profit as a reward to innovation.

Second, blockbuster industries typically create enormous value for both buyers and suppliers. Firms often adhere to high standards in customer service and in supplier partnering. Successful blockbuster firms create so much value in partnership with buyers and suppliers that all are satisfied with returns on their investments.

Third, the industry's incumbents tend to pursue projects that are distinctive by repeatedly reinvesting in basic technologies. Leading companies generally try to avoid imitating one another because the stakes in blockbuster investment are so high. This taste for distinctiveness in project definition tends to support ongoing differentiation once commercialization occurs.

Blockbuster industries remain stable when the industry's incumbents, its customers, and its suppliers

earn more from exchange than through the best alternatives that emerge over time. What can jar these industries into architectural change? The underlying technology no longer delivers enough value to keep customers and suppliers interested, or the incremental innovation no longer makes buyers willing to compensate the industry for the risks undertaken in development. For a blockbuster industry to remain stable, customers and suppliers have to perceive more value by continuing to deal with the industry than by pursuing the best alternatives.

**Historic innovation path.** There are no simple rules for the historical innovation path in blockbuster industries, but many of these industries share common experiences. They tend to have had an early period of extensive development, fragmentation, and losses as inventors experiment with new technology. With successful development, firms acquire the complementary assets necessary to realize the commercial potential of their innovations. A shakeout often occurs, and the surviving leaders become positioned for significant returns on their investments.

In the film-production industry during the early decades of the twentieth century, firms experimented with approaches to delivering feature films. Should movies be personalized for individual viewing? How long should they be? Would new documentaries dominate fiction? What production values would be acceptable? After a few big feature-film successes, producers began to develop structural rules that continue to influence the industry today: films are usually between one-and-a-quarter and three hours long; exhibitors pay producers according to a standard formula related to box-office receipts and typically cannot preview a film before committing to show it; all viewers are charged about the same price for admission; previews of forthcoming films are shown before the featured presentation; and theater lobbies contain candy stands. Once this basic structure was established, the industry launched a major program to develop complementary assets in distribution and actor relationships (Verter 1997).

**Investment opportunities.** To find out whether architectural change is imminent, look at the current investments. Are firms continuing to invest in blockbuster technology? Are customers and suppliers renewing the platforms for their interaction with the industry?

The big studios are still developing feature films by decades-old rules. Actors, directors, and other talent suppliers continue to hone their skills over long periods and to follow the industry's norms for delivering value to the producers. Despite diminishing financial performance, the exhibitors continue to build out multiplex theaters in new locations. Why? By some accounts, the exhibition industry is engaged in a war of attrition. Through consolidation, exhibitors hope to exert countervailing power against the producers in negotiations over film rights. Exhibitors may not be satisfied with their financial returns, but their next-best alternatives still do not swamp their incentives to reinvest. These conditions suggest that film production is likely to remain relatively stable over a five- to ten-year time horizon.

*Performance drivers.* For blockbuster firms, the most common route to superior returns is by innovating within a specialized niche while also owning the complementary assets necessary for successful commercialization. High-performance film producers develop specialized skills in particular categories (animated features, documentaries, or action films). Leading pharmaceutical firms dominate therapeutic categories. High-performance cellular operators dominate specific geographic regions. Within each of these categories, the leading firms also own and deploy the complementary assets critical for quick commercialization of new technology.

While domination of a niche is prevalent, a second blockbuster approach involves the sale of supporting activities to industry incumbents. In some cases, the support may even cover core resources. For example, independent film makers may sell innovative scripts or even finished films to mainstream film producers.

Yet another approach involves partnering with leading firms to maintain and extend complementary assets. Consultants and agents often assist film producers in identifying promising new actors. Lobbyists work with cellular-telephone providers to assure their representation in regulatory hearings that affect their geographic coverage.

What does this mean for a potential entrant that seeks industry leadership? Most established industries resist entry by outsiders. Despite this fact, the potential for massive returns often attracts new entrants anyway. Often, upstart firms begin by trying to innovate within

an established niche. Traditional biotechnology firms are a classic example. If an organization beats the odds and is successful at development, it then faces extraordinary challenges of commercialization because it does not hold the complementary assets necessary to bring products to market. At this stage, firms often sell or link up with industry leaders to gain access to critical resources. In cellular-telephone service, for example, entrants with key licenses were often bought by larger firms with established customer relationships. Companies tend to perform poorly when they underestimate the power of the established firms' complementary assets.

### **Model 3: Radical Organic Evolution**

Under radical organic industry evolution, change is driven by radical innovation in the capabilities that support both customer and supplier relationships. The entire system of old capabilities may be dismantled and a new system rebuilt. Although some old capabilities may retain their relevance, major architectural change occurs in the ways that firms interact with both customers and suppliers. What firms do is changing radically, and, as a result, how they interact changes too. Intermediation may be part of the change, but, in Model 3 evolution, intermediation itself is driven by the availability of innovative new technologies for creating value. One consequence is that the new industry's boundaries may be quite different from the old industry's. Indeed, old industry boundaries may be barely distinguishable after the change fully takes hold. As a result, former leaders may lose position and new leaders often emerge.

In high-end leisure travel, for example, old systems for booking traditional vacations are giving way to new options that may make old assets obsolete. New forms and styles of travel that merge leisure with business blur the old boundaries of the industry. Fully integrated provider-agents offer customized packages tailored to the interests of the vacationer. Just enough of the old services may retain their relevance to induce a transition from established incumbents. Even if they make the transition, though, industry boundaries are likely to be very different over the long run.

At present, the news-services industry is undergoing organic industry evolution. In news services, unprecedented technologies – and especially the Internet – create opportunities to provide more accurate, relevant, and timely information to

customers. Information is transmitted so quickly to so many people that demand is growing for services to help us cope. Cultural and community organizations are emerging to service this demand. New information-processing vehicles are developing to generate sifted information for news organizations. Some of the news services' old reporting, editing, and broadcasting capabilities are relevant in the new environment, but there is no doubt that they must change in character to retain their relevance. Why are news services classified as "organic" rather than as "intermediating" (Model 4)? Because this industry's *product* is information. In this case, the core assets, all oriented around information flows, are what is being changed.

Model 3 industries offer significant opportunities for penetration by new entrants. Although CNN was established as a news service in the mid-1970s, it gained attention during the Gulf War as viewers came to value its distributed news-gathering capabilities. Analysis suggests that no dominant design has developed for many of the industry's important capabilities. Continuing component and architectural change will likely reshape the news-services industry for decades.

*Industry structure.* Industries undergoing architectural change are often less attractive than stable industries. Excess capacity, blurring industry boundaries, and races for first-mover advantage all depress profitability. Unlike intermediating industry evolution, however, organic evolution hosts the potential for new approaches that bring together new customers and new suppliers. As a result, pockets of very high profitability may arise, especially among new entrants.

*Historic innovation path.* Organically-evolving industries are often populated by firms that have resisted the adoption of new technologies for long periods, typically because of strong incentives to preserve established resources. In many cases, the marginal cost of operating from established platforms is lower than the fixed cost of implementing a new approach, giving new entrants a strong advantage over incumbents. These advantages may be partly offset, however, if some of the incumbent's resources can be translated into the new environment. This possibility may create difficult questions about the optimal timing of migration.

*Investment opportunities.* Firms often announce major new investment programs that have big implications for the industry. For example, the invention of fiber-optic cable in the 1970s made obsolete copper cable and other technologies for carrying long-distance telephone calls. Current examples include e-mail and express mail, which promise to change the face of the mail-delivery business.

*Performance drivers.* High performers develop first-mover advantages by bearing the considerable risk of introducing new technologies before they know if customers are going to buy the product which results. Incumbent firms take on massive new investment programs that may involve interacting with new kinds of customers as well as new suppliers.

#### **Model 4: Intermediating Evolution**

Under Model 4 evolution, architectural change alters the way transactions occur. Intermediating change describes industries in which there are discontinuities in the value chain itself. This sort of change is topical because information technology is lowering transaction costs in some industries and creating potential for disintermediation/reintermediation.

The characteristic quality of intermediating change is a radical shift in the overall information available in the industry's transactions. These transactions may take place either within established firms or between the industry and its customers or suppliers. Better information tends to reduce transaction costs and diminish the benefits of vertical integration as new layers of intermediate customers and suppliers emerge. In some situations, established firms find new efficiencies through subcontracting. Lower transaction costs can also create incentives to develop new capabilities.

The emergence of eMarketplaces and business-to-business (B2B) commerce on the Web often represents intermediating change. A new B2B exchange in PC devices has emerged to support local resellers and assemblers. No longer do resellers stockpile hard drives, CD-ROM drives, and other peripherals: through the B2B exchange, a reseller can obtain a precisely-specified peripheral within 24 hours, often at lower prices than direct from the manufacturer. The new exchange represents architectural change because it shifts the level at which the transaction occurs. The exchange's owner has a chance to build new

capabilities for handling transaction volume and for assuring fair access across buyers and sellers; resellers can build new capabilities that will allow seamless ordering and inventory control; peripheral manufacturers can create value by becoming more efficient. Of course, the PC-peripherals B2B exchange also creates challenges for established customers and firms because it makes many of their old capabilities obsolete. Other industries going through intermediating change at present include retail banking and agricultural supplies.

*Industry structure.* Again, the characteristics of industry structure may vary widely. In many cases, however, changes in the distribution of information make old capabilities obsolete. As the industry structure shifts, excess capacity arises and firms scramble to dominate new layers of transaction. If transaction efficiency is compromised, then customers and suppliers may turn to new entrants. Eventually, several new industries may emerge to displace an old industry. As these changes take place, industries often are unattractive.

Auto dealing is currently undergoing major changes in the transaction costs that had linked activities. Formerly, auto dealerships performed a broad range of activities that included stocking new cars, preparing cars for sale, advertising, reselling used cars, informing prospective customers, market research, negotiating price, and financing. Intermediating change began in auto dealing even before the worldwide Web. Specialized services emerged for financing, market research, and even price negotiations. With the Web, more and more activities that were traditionally performed by dealers are now organized in separate entities. What makes intermediation possible in this context? The exchange of credible information on the Web allows activities to be co-ordinated in arms-length relationships where once they would have been integrated. As the system evolves, a number of separate new industries are likely to emerge for auto financing, inventory management, credible quality verification, and perhaps even price negotiation. During the transition, the traditional auto-dealing industry is likely to continue to be unattractive.

*Historic innovation path.* Industries on an intermediating evolutionary path typically have accumulated compromises in transactions between the industry's incumbents, their customers, and their

suppliers. In many cases, these compromises reflect efforts to balance incentives for investment with bargaining strength on either side of the exchange. Companies may have tried to induce their customers to accept low prices by partially integrating forward, for example.

Over time, the accumulation of compromises creates pressure. Customers, suppliers, and some dissatisfied incumbents may seek alternative mechanisms for governing how they interact. Old assets that support both customer transactions and supplier relationships become obsolete. In the case of auto dealers, the reputational capital built up between the auto dealers and the auto manufacturers has become obsolete, at least in part. Some manufacturers have sought to break many of their dealer franchise agreements. At the same time, relationships between auto dealers and customers have suffered. Just a few years ago, customers were typically more loyal to dealerships than to car brands. This loyalty is quickly eroding as intermediating change occurs.

*Investment opportunities.* Under Model 4 change, innovation often starts with experimentation in different mechanisms for organizing transactions. Upstart firms may enter at low scale to test market acceptance for new ways of interacting. Leading firms also may shed activities in an effort to become more efficient, although these efforts may be plagued with difficulty. General Motors' efforts at intermediation led to a major strike in the summer of 1998 (McGahan 1999d).

*Performance drivers.* High performers rely on new technologies to reshape ways of interacting with customers, suppliers, and newly-emerging intermediate suppliers. Companies must design mechanisms for decoupling traditional relationships, and especially complex internal transfer-pricing mechanisms that insulate activities from market pressure. The highest performers in this environment find ways to integrate established resources with new transaction mechanisms.

### **How to Analyze Industry Evolution**

Which type of industry are you in? It is worth approaching this question rigorously. Analysis of industry evolution involves taking three different perspectives, and then putting them together. The perspectives are:

- assessment of the current environment,
- evaluation of historical trends, and
- evaluation of prospective returns.

The entire process focuses on the industry's durable, specialized, and economically-important investments, because they shape the incentives of the relevant players (Ghemawat 1991). A comprehensive analysis also assesses investments by the industry's customers and its suppliers. The next step is to take a view on whether the industry is undergoing architectural change. The final step is an assessment of the implications for the firm.

Who should do the analysis? The process within the firm can be as important as the results. Analyzing industry evolution can generate compelling insights about emerging opportunities, which may reveal critical weaknesses in the firm's old approaches. This means that the most successful attempts to analyze industry evolution are those which involve full attention over several weeks (or even months) of senior managers from different functions across the company. So the first rule is to assign a senior, cross-functional team which brings together wide-ranging information on customer preferences, supplier technologies, and competitive behavior. The process also requires intellectual flexibility and a capacity to imagine alternative paths of industry evolution, and of the role that the firm might play. Choosing the right team members is a critical preliminary step.

### **1. Map the existing industry structure and competitive environment**

The first analytical step involves taking a snapshot of the current environment. This becomes the foundation for the rest of the study. By looking back from this vantage point, the team later assesses whether accumulated compromises create an incentive for large-scale, punctuated change. By looking forward, the team later evaluates the potential of new kinds of investments.

Begin with an examination of the financial performance of the industry's incumbents. What accounts for current returns on invested capital in the business? Is the industry structurally attractive (Porter 1980)? What approaches have been used to balance buyer power and supplier power? How do partnerships and strategic alliances influence

relationships? Are there significant switching costs for customers, incumbents, or suppliers? Has rivalry generated excess capacity in key activities?

After analyzing industry structure, evaluate the competitive position of the firm relative to its direct rivals. Does the firm hold a competitive advantage or disadvantage? Which activities account for differences between the financial performance of the firm and its rivals? Are some competitors saddled with excess capacity? Is the firm locked into specific activities?

In the end, the purpose of this step is to generate a list of strategically-important resources across the industry and within the firm. Each of the resources relies on an underlying technology, and each was acquired to allow a firm to be more efficient at delivering value to customers or suppliers.

### **2. Look back at how critical resources have developed**

Once the team identifies the durable resources created by customers, incumbents, and suppliers, the next step is to look historically at how they developed. The relevance of the industry's resources is often revealed through close inspection of customer and supplier behavior. If customers are making specialized investments that are tailored to specific competitors, then there is evidence that their approaches are still relevant. When customers minimize their exposure to long-term relationships, then they are signaling a desire to lower switching costs. Even if customers (and suppliers) are locked in, the team should assess whether their preferences have shifted since the industry's resources were initially designed and established. Are customers and suppliers seeking fresh approaches?

The team should also assess whether the resources that support scale economies are outdated. When was the technology established? When did scale economies first arise? Have customer tastes and supplier preferences shifted so that the efficiencies are no longer realized in the same way? Has the industry been able to adapt its approach to efficiencies so that established resources are preserved as they are updated? Have some firms in the industry sought trading partnerships that have siphoned volume from firms that pursue efficiency approaches? Mature efficiency approaches may be especially vulnerable to firms that lead with partnership opportunities for customers and suppliers.

In sum, this part of the analysis allows the observer to understand how specific resources developed historically within the industry. Which are most important? Which are mature and vulnerable to radical innovation? Which resources are still in development? Ultimately, the objective is to identify whether customers, incumbents, and suppliers have an incentive to transform the underlying business models that shape their interaction.

### **3. Identify major investment initiatives**

After looking historically, the team should look forward to understand the *prospective* economic impact of newly-formed investments both by incumbents and outsiders. The objective is to look at new investment activity with a clean slate. What major investments in both tangible and intangible assets have been created to meet needs that are currently served within the industry? It is important to consider investments that may originate outside conventional industry boundaries.

The team should also assess the nature of the investment risk associated with innovation. Risks occur whenever the return on investment is deferred. It is risk that creates the prospect of future profitability, however. Without risk, the cost of investment would reflect the entire net-present-value of the return. How much risk are entrepreneurs taking as they pursue major investments? How much investment has to occur before the entrepreneur learns whether the innovation will create value in the marketplace? What early signals are available for assessing market acceptance? Does the investing entrepreneur have contingency plans for redeploying investment if market acceptance is low?

### **4. Decide whether innovation is architectural**

Industries tend to be slow to change. Compromises accumulate because the parties are locked in by their prior commitments. The fourth step involves integrating the historical and prospective points of view to evaluate the accumulated compromises in value-creation strategies. These compromises stimulate innovation because they create incentives for change in the economic relationships between the industry, its customers, and its suppliers. When an industry is profitable, and when its customers and its suppliers are also earning high returns on their invested capital, then the incentive for architectural change can be quite low. Occasionally, however, architectural innovation

occurs. In this step of the analysis, the team must assess whether the investment activities identified through the analysis amount to architectural change over a five- to ten-year horizon.

It is easy to overestimate the prospective impact of technological change over a moderate time horizon. Technological change is almost certain to create architectural change in an industry over the very long run, but architectural innovation can occur only if the results of the historical analysis point to incentives for change for the industry's customers and its suppliers.

### **5. Evaluate the implications**

The final step is to evaluate the implications for the firm. There are several ways in which the organization may be challenged. The firm may be investing in projects that are either behind or ahead of their time. Invariably, incentives arise to preserve the value of established capital. Executives may be struggling with whether to abandon profitable old approaches in order to develop unprofitable new ones. An organization may find it optimal to invest minimally to preserve old capital at the same time as it invests for the future. Managing the path of innovation requires deep knowledge of economic incentives as well as technology requirements. By looking historically as well as prospectively, the team can assess how quickly customers and suppliers will respond to new opportunity.

The challenges of industry evolution are even more complex if the firm is engaged in close rivalry over the opportunity. A war of attrition may arise over the old approach. These wars are pernicious because they often lead the firm into an unprofitable battle to serve outdated customers. They are also dangerous when they drain capital and keep attention fixed on the old paradigm. A similar kind of war can emerge if the firm competes too closely with a rival for dominance in a new industry structure. Too much competition can rush investment in technologies that may not be optimally suited to long-run opportunities. Worse yet, the rivals may become committed to similar strategies, and may consequently invest inefficiently once the new technologies become established.

Organizational resistance to change can arise regardless of whether innovation is architectural. Companies have devised a broad variety of

mechanisms for dealing with this kind of resistance: aligning incentives, making arms-length financial investments, and adjusting formal hierarchical structure. By examining how resources and relationships are changing, the team can identify a range of potential approaches for reorganizing, and then recommend which carries appropriate levels of risk and reward.

### Implications

What does all this mean? Understanding industry evolution is important because firms are much more likely to survive and to earn high rates of return if their investment strategies are aligned with industry evolution than if they resist it. Extensive analysis on broad patterns of performance suggests that industries evolve on one of the four major models: receptive, blockbuster, radical organic, or intermediating. Companies typically fail when they attempt to jar the path of industry evolution from one model to another. Evolution is driven by powerful incentives that affect an industry's customers and suppliers as well as its incumbents. When an industry is architecturally stable, change follows either a "receptive" or "blockbuster" path. Architecturally unstable industries undergo redefinition, and may offer greater opportunities to displace industry leaders. The risks of pursuing first-mover advantage are also great. Organic and

intermediating industries host many more casualties than successes.

Rigorous, disciplined analysis of industry evolution is necessary to anticipate when different kinds of opportunities are likely to emerge over time. Begin with a comprehensive map of existing industry conditions, and then look retrospectively and prospectively to understand how technology may take hold. Assess the accumulated pressure on industry structure that may have emerged as customers, incumbents, and suppliers have compromised to preserve the value of established capabilities. Careful analysis frames the viable opportunities for successfully commercializing new technologies. Understanding industry evolution sets the stage for evaluating competitive threats and organizational challenges. Thus, understanding industry evolution is just the first step toward building a comprehensive plan for an organization's development.

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## Appendix: The Statistical Evidence

How can the intuitive appeal of the S-curve model be reconciled with the difficulty of using it to manage better? One important place to look for answers is in detailed industry studies and in statistics on industry evolution. This Appendix reports on fieldwork in over 25 industries, and on the statistical analysis of a broad cross section of firms traded on US financial markets from 1981 to 1998 (McGahan 1998, 1999a, 1999b, 1999c, McGahan and Porter 1997a, 1997b, 1998, 1999, McGahan and Silverman 2000). The dataset includes information on accounting profit and financial-market performance in the agriculture, manufacturing, transportation, wholesale, retail, entertainment, lodging, and service sectors. Findings from the statistical analysis were further investigated through detailed case studies (see McGahan 1999b,c). The results of both the large-scale statistical work and the detailed industry studies indicate important

patterns that resolve some of the puzzles associated with the S-curve literature.

***Almost every industry is diverse in its products.*** When new analysts are asked to investigate an industry's economics, they often struggle with how to set industry boundaries. Regardless of the method, most analysts agree that industries are broader than product sets. In almost any industry, different S-curves can be identified for different products. Related life cycles may also exist at other levels. For example, the S-curve for popular beer is the agglomeration of the cycle for glass bottles, aluminum cans, unfermented brew, rice-based products, etc. The brewing industry – like every other industry included in the study – contains a diverse group of related and overlapping S-curves. This finding is important because it means that industry evolution may not track specific product life cycles closely.

*Many firms with large current market shares have for many previous years posted low performance.* The S-curve framework suggests that industries begin with fragmentation, and then move into phases of shakeout in which industry leaders emerge. The evidence on industry evolution is consistent in some important ways with this theory. Statistical analysis indicates that leaders often have histories of investment over long periods, although firm ownership often changes hands during the investment period.

There are also some important differences in patterns of investment among a significant subset of firms in the economy. Consider the cellular sector of the telecommunications industry. During the 1980s and 1990s, a few of the cellular providers were large and publicly traded rather than small entrants. They were not involved in the hit-and-run activity normally associated with entry of a test product. Rather, they had to build out their networks before they could obtain reliable feedback about customer responses to their models. Indeed, executives in many established telecommunications companies continue to view cellular service as an industry distinct from traditional landline local service. Others view wireless technology (ie cellular) as a long-run substitute for landline. Thus, even though many analysts would view wireless innovation as radical, the life cycle for wireless technology clearly coexists and involves major investment simultaneously with traditional service. In general, investing firms may coexist with traditional industry leaders, which suggests that their innovations may not always be radical in the sense that they do not make the industry leaders' positions obsolete immediately. There can be decades of overlap in S-curves.

These observations raise questions about the S-curve model. Are there major and predictable differences in the length of the first phase of life cycles? Is there a greater tendency for old leaders to survive across generations when investment is lengthy and costly, as in cellular telephone service? The evidence suggests that industries differ in the depth of the investment required before a dominant design can emerge.

*The same industries that host entrants with long-term investment paths also host the highest performers in the economy.* In the statistical analysis, three industries stand out: prepackaged software, pharmaceuticals, and oil/gas extraction.

These industries host more firms with sustained low performance than any other industries. They also host more firms with sustained *high* performance. Case studies suggest that the low performers are not always languishing on their way to exit. Rather, they are often engaged in long-term investment programs with the intention of future industry dominance. This is a risky bet, however. Few firms succeed in the transition from low to high performance.

Something seems to be missing from the S-curve framework for characterizing the similarities between prepackaged software, pharmaceuticals, and oil/gas extraction. Investing firms in these industries are seeking to replenish a specific kind of capability within their portfolio. The leaders in pharmaceuticals survive through product generations by moving their newly-approved blockbusters into patients' hands through established, efficient systems involving trial management, marketing, and selling activities. A satisfying perspective on industry evolution must account for systematic advantages that sustain firms through multiple-product generations.

*A second group of chronic low performers hang on for years before exiting.* Not all firms with chronic low performance are investing for long-term industry dominance. Many are former industry leaders that have suffered performance problems as customer tastes or underlying technologies have shifted. In many cases, the chronic low performers retain great efficiencies for producing at large scale, but demand for relevant products has diminished below the scale threshold.

How do these firms compare with the S-curve's "mature" firms? Why does it take so long for many of the old leaders to exit? Why do firms persist in their commitments to flagging positions? In many situations, the reasons have to do with higher costs of exit than of persistence. Fixed assets may be fully depreciated, and there may be just enough residual demand to cover variable costs of production. On top of the economic incentives, the firm's management may have an emotional commitment to sustaining the firm's survival. All these factors may drive old leaders to remain in business for many years after the new S-curve takes shape.

*In some industries, the investment hole is not as deep, and the payoff is not as high.* Some industries host a high proportion of steady moderate performers:

discount retailing, express-mail delivery, coffee retailing, fast-food restaurants, long-haul trucking, and many others. Case analysis suggests some important differences between these industries and pre-packaged software, pharmaceuticals, and oil/gas extraction. The middle-of-the-road industries involve incremental investment, with returns occurring shortly after the investment cycle begins. The pattern of development in these industries departs somewhat from the classic S-curve model because the investment phase overlaps with the dominant design phase. Product- and process-innovation may occur simultaneously as firms build out their networks.

Discount retailing, with Wal-Mart as the industry leader, follows this pattern. Decades ago, Wal-Mart and several other discounters were relatively small chains. As the discounters experimented with format, logistics systems, and merchandising strategies, they grew geographically over time. New kinds of discounted services were integrated into the networks over time.

Many other industries share these characteristics of gradual geographic expansion with product- and process enhancements occurring simultaneously. It is as if the S-curve were stretched out in these industries, with blurring of the different phases. Companies invest incrementally, get market feedback, and then adjust their approaches in real time. The dominant design becomes a sort of formula for success that may differ across firms in the industry. For example, the approaches of McDonald's, Burger King, and Wendy's all differ but have all been successful for relatively long periods.

*In almost all industries, leaders survive through product generations.* In almost all industries in the US and other industrialized economies, the leading firms survive through multiple-product generations.

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Entry occurs almost all the time, with high rates of exit among recent entrants. Even when product life cycles are relatively clear, the pattern of entry does not typically conform to the predictions of the model. In most cases, the firms that survive entry then grow only gradually. There are only rare instances of companies achieving industry leadership over periods of less than a decade or so. Exit does not conform to the S-curve's implications either. Exit by leaders is usually staggered, and does not occur in waves as suggested by the theory.

Case studies confirm that the fragility of the S-curve's predictions for entry and exit. The US brewing industry, for example, is considered mature by most metrics: demand is not growing substantially; the rank of industry leaders has been stable for decades; and the underlying technology of production has not changed fundamentally since the 1960s. Yet the brewing industry was subject to a spate of entry during the 1980s as microbrewers and brewpubs tested their wares. These upstarts never gained much market share (even collectively). Many subsequently exited. In brewing as in many other settings, the rates of entry and of exit tell little about the full dynamics of competition.

*Risk-return profiles differ systematically across industries.* As a whole, this evidence suggests some important patterns that are not reflected in the S-curve framework. Industries seem to have systematically different risk-return profiles. Some industries require big, risky investment either before or after the establishment of a dominant design. These industries are particularly well suited to sustained low and sustained high performers. In other industries, investment occurs with feedback from the markets about the viability of new products. The amount of required investment and the lag before market acceptance is substantially lower.

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