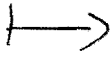
REQUIRED READING for Saturday 27.9

"The Innovator's Solution" by Clayton M. Christensen & Michael E. Rayor p31-39, 43-49

CHAPTER TWO

HOW CAN WE BEAT OUR MOST POWERFUL COMPETITORS?

Start here



How can we know in advance of the battle whether we're going to be able to beat the competition? Why has disruption proven to be such a consistently effective strategy for causing strong incumbent competitors to flee from their entrant attackers, rather than fight them? How can we shape our business idea into one of these disruptive strategies? Can we really predict the winners in a race for innovative growth? What if we could choose our competitive battles knowing we could win nearly every time? What if we knew in advance which growth strategies would succeed, and which would fail?

Managers have long sought ways to predict the outcome of competitive fights. Some have looked at the attributes of the companies involved, predicting that larger companies with more resources to throw at a problem will beat the smaller competitors. It's interesting how often the CEOs of large, resource-rich companies base their strategies upon this theory, despite repeated evidence that the level of resources committed often bears little relationship to the outcome.

Others have considered the attributes of the change: When innovations are incremental, the established, leading firms in an industry are likely to reinforce their dominance; however, compared with entrants, they will be conservative and ineffective in exploiting

breakthrough innovation.[1] We noted in the introduction that predictions based on attribute-based categories, as these are, prove frustratingly undependable.

Our ongoing study of innovation suggests another way to understand when incumbents will win, and when the entrants are likely to beat them. *The Innovator's Dilemma* identified two distinct categories—sustaining and disruptive—based on the *circumstances* of innovation. In *sustaining circumstances*—when the race entails making better products that can be sold for more money to attractive customers—we found that incumbents almost always prevail. In *disruptive circumstances*—when the challenge is to commercialize a simpler, more convenient product that sells for less money and appeals to a new or unattractive customer set—the entrants are likely to beat the incumbents. This is the phenomenon that so frequently defeats successful companies. It implies, of course, that the best way for upstarts to attack established competitors is to disrupt them.

Few technologies or business ideas are intrinsically sustaining or disruptive in character. Rather, their disruptive impact must be molded into strategy as managers shape the idea into a plan and then implement it. Successful new-growth builders know—either intuitively or explicitly—that disruptive strategies greatly increase the odds of competitive success.

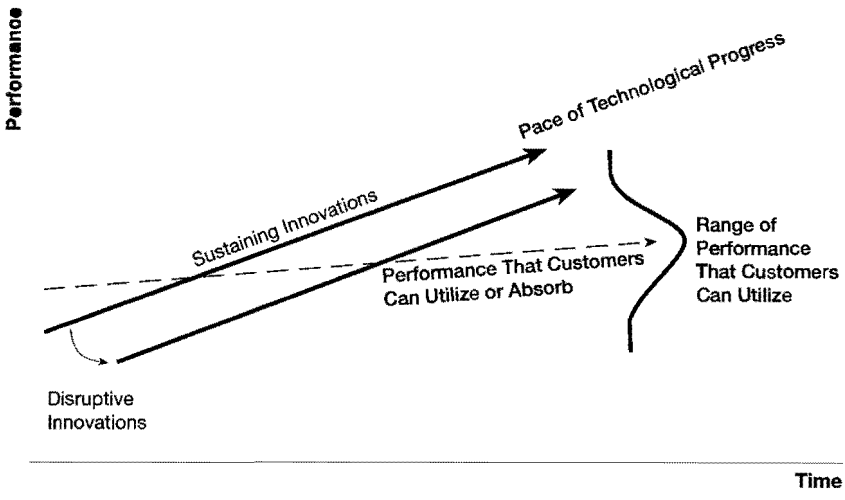
This chapter's purpose is to review the disruptive innovation model from the perspective of both the disruptee *and* the disruptor in order to help growth builders shape their strategies so that they pick disruptive fights they can win. Because disruption happens whether we want it or not, this chapter will also help managers of established companies capture disruptive growth, instead of seeing their companies get killed by it.

The Disruptive Innovation Model

The Innovator's Dilemma identified three critical elements of disruption, as depicted in figure 2-1. First, in every market there is a rate of improvement that customers can utilize or absorb, represented by the dotted line sloping gently upward across the chart. For example, the automobile companies keep giving us new and improved engines, but we can't utilize all the performance that they make available under

FIGURE 2-1

The Disruptive Innovation Model



the hood. Factors such as traffic jams, speed limits, and safety concerns constrain how much performance we can use.

To simplify the chart, we depict customers' ability to utilize improvement as a single line. In reality, there is a distribution of customers around this median: There are many such lines, or tiers, in a market—a range indicated by the distribution curve at the right. Customers in the highest or most demanding tiers may never be satisfied with the best that is available, and those in the lowest or least demanding tiers can be oversatisfied with very little.[2] This dotted line represents technology that is "good enough" to serve customers' needs.

Second, in every market there is a distinctly different trajectory of improvement that innovating companies provide as they introduce new and improved products. This pace of technological progress almost always outstrips the ability of customers in any given tier of the market to use it, as the more steeply sloping solid lines in figure 2-1 suggest. Thus, a company whose products are squarely positioned on mainstream customers' current needs today will probably overshoot what those same customers are able to utilize in the future. This happens because companies keep striving to make better products that

they can sell for higher profit margins to not-yet-satisfied customers in more demanding tiers of the market.

To visualize this, think back to 1983 when people first started using personal computers for word processing. Typists often had to stop their fingers to let the Intel 286 chip inside catch up. As depicted at the left side of figure 2-1, the technology was not good enough. But today's processors offer much more speed than mainstream customers can use—although there are still a few unsatisfied customers in the most demanding tiers of the market who need even faster chips.

The third critical element of the model is the distinction between sustaining and disruptive innovation. A *sustaining innovation* targets demanding, high-end customers with better performance than what was previously available. Some sustaining innovations are the incremental year-by-year improvements that all good companies grind out. Other sustaining innovations are breakthrough, leapfrog-beyond-the-competition products. It doesn't matter how technologically difficult the innovation is, however: The established competitors almost always win the battles of sustaining technology. Because this strategy entails making a better product that they can sell for higher profit margins to their best customers, the established competitors have powerful motivations to fight sustaining battles. And they have the resources to win.

Disruptive innovations, in contrast, don't attempt to bring better products to established customers in existing markets. Rather, they disrupt and redefine that trajectory by introducing products and services that are not as good as currently available products. But disruptive technologies offer other benefits—typically, they are simpler, more convenient, and less expensive products that appeal to new or less-demanding customers.[3]

Once the disruptive product gains a foothold in new or low-end markets, the improvement cycle begins. And because the pace of technological progress outstrips customers' abilities to use it, the previously not-good-enough technology eventually improves enough to intersect with the needs of more demanding customers. When that happens, the disruptors are on a path that will ultimately crush the incumbents. This distinction is important for innovators seeking to create new-growth businesses. Whereas the current leaders of the industry

almost always triumph in battles of sustaining innovation, successful disruptions have been launched most often by entrant companies.[4]

Disruption has a paralyzing effect on industry leaders. With resource allocation processes designed and perfected to support sustaining innovations, they are constitutionally unable to respond. They are always motivated to go up-market, and almost never motivated to defend the new or low-end markets that the disruptors find attractive. We call this phenomenon *asymmetric motivation*. It is the core of the innovator's dilemma, and the beginning of the innovator's solution.

Disruption at Work: How Minimills Upended Integrated Steel Companies

The disruption of integrated steel mills by minimills, whose history was partially reviewed in *The Innovator's Dilemma,* offers a classic example of why established leaders are so much easier to beat if the idea for a new product or business is shaped into a disruption.

Historically, most of the world's steel has come from massive integrated mills that do everything from reacting iron ore, coke, and limestone in blast furnaces to rolling finished products at the other end. It costs about $8 billion to build a huge new integrated mill today. Minimills, in contrast, melt scrap steel in electric arc furnaces—cylinders that are approximately twenty meters in diameter and ten meters tall. Because they can produce molten steel cost-effectively in such a small chamber, minimills don't need the massive-scale rolling and finishing operations that are required to handle the output of efficient blast furnaces—which is why they are called *minimills*. Most important, though, minimills' straightforward technology can make steel of any given quality for 20 percent lower cost than an integrated mill.

Steel is a commodity. You would think that every integrated steel company in the world would have aggressively adopted the straightforward, lower-cost minimill technology. Yet as of 2000 not a single integrated steel company had successfully invested in a minimill, even as the minimills had grown to account for nearly half of North America's steel production and a significant share of other markets as well.[5]

We can explain why something that makes so much sense has been so difficult for the integrated mills. Minimills first became technologically

viable in the mid-1960s. Because they melt scrap of uncertain and varying chemistry in their electric arc furnaces, the quality of the steel that minimills initially could produce was poor. In fact, the only market that would accept the output of minimills was the concrete reinforcing bar (rebar) market. The specifications for rebar are loose, so this was an ideal market for products of low and variable quality.

As the minimills attacked the rebar market, the integrated mills were happy to be rid of that dog-eat-dog commodity business. Because of the differences in their cost structures and the opportunities for investment that they each faced, the rebar market looked very different to the disruptee and the disruptor. For integrated producers, gross profit margins on rebar often hovered near 7 percent, and the entire product category accounted for only 4 percent of the industry's tonnage. It was the least attractive of any tier of the market in which they might invest to grow. So as the minimills established a foothold in the rebar market, the integrated mills reconfigured their rebar lines to make more profitable products.

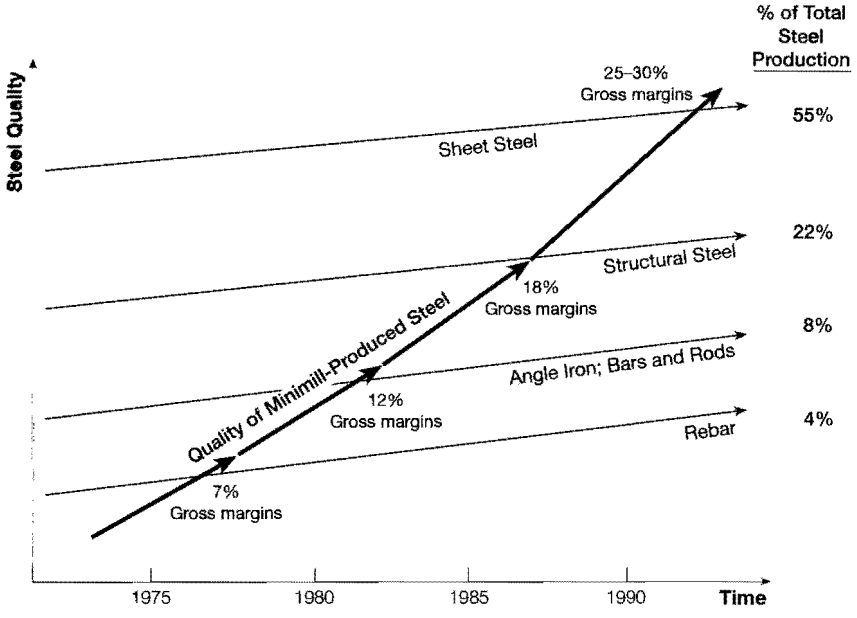
In contrast, with a 20 percent cost advantage, the minimills enjoyed attractive profits in competition against the integrated mills for rebar—until 1979, when the minimills finally succeeded in driving the last integrated mill out of the rebar market. Historical pricing statistics show that the price of rebar then collapsed by 20 percent. As long as the minimills could compete against higher-cost integrated mills, the game was profitable for them. But as soon as low-cost minimill was pitted against low-cost minimill in a commodity market, the reward for victory was that none of them could earn attractive profits in rebar.[6] Worse, as they all sought profitability by becoming more efficient producers, they discovered that cost reductions meant survival, but not profitability, in a commodity such as rebar.[7]

Soon, however, the minimills looked up-market, and what they saw there spelled relief. If they could just figure out how to make bigger and better steel—shapes like angle iron and thicker bars and rods—they could roll *tons* of money, because in that tier of the market, as suggested in figure 2-2, the integrated mills were earning gross margins of about 12 percent—nearly double the margins that they had been able to earn in rebar. That market was also twice as big as the rebar segment, accounting for about 8 percent of industry tonnage. As the minimills

figured out how to make bigger and better steel and attacked that tier of the market, the integrated mills were almost relieved to be rid of the bar and rod business as well. It was a dog-eat-dog commodity compared with their higher-margin products, whereas for the minimills, it was an attractive opportunity compared with their lower-margin rebar. So as the minimills expanded their capacity to make angle iron and thicker bars and rods, the integrated mills shut their lines down or reconfigured them to make more profitable products. With a 20 percent cost advantage, the minimills enjoyed significant profits in competition against the integrated mills until 1984, when they finally succeeded in driving the last integrated mill out of the bar and rod market. Once again, the minimills reaped their reward: With low-cost minimill pitted against low-cost minimill, the price of bar and rod collapsed by 20 percent, and they could no longer earn attractive profits. What could they do?

FIGURE 2-2

The Up-Market Migration of Steel Minimills



Source: American Iron and Steel Institute; interviews with company executives. Note that the tonnage percentages do not sum to 100 percent because there are other specialty categories of steel.

Continued up-market movement into structural beams appeared to be the next obvious answer. Gross margins in that sector were a whopping 18 percent, and the market was three times as large as the bar and rod business. Most industry technologists thought minimills would be unable to roll structural beams. Many of the properties required to meet the specifications for steel used in building and bridge construction were imparted to the steel in the rolling processes of big integrated mills, and you just couldn't get those properties in minimills' abbreviated facilities. What the technical experts didn't count on, however, was how desperately motivated the minimills would be to solve that problem, because it was the only way they could make attractive money. Minimills achieved extraordinarily clever innovations as they stretched from angle iron to I-beams—things such as Chaparral Steel's dog-bone mold in its continuous caster, which no one had imagined could be done. Although you could never have predicted what the technical solution would be, you *could* predict with perfect certainty that the minimills were powerfully motivated to figure it out. Necessity remains the mother of invention.

At the beginning of their invasion into structural beams, the biggest that the minimills could roll were little six-inch beams of the sort that undergird mobile homes. They attacked the low end of the structural beam market, and again the integrated mills were almost relieved to be rid of it. It was a dog-eat-dog commodity compared with their other higher-margin products where focused investment might bring more attractive volume. To the minimills, in contrast, it was an attractive product compared with the margins they were earning on rebar and angle iron. So as the minimills expanded their capacity to roll structural beams, the integrated mills shut their structural beam mills down in order to focus on more profitable sheet steel products. With a 20 percent cost advantage, the minimills enjoyed significant profits as long as they could compete against the integrated mills. Then in the mid-1990s, when they finally succeeded in driving the last integrated mill out of the structural beam market, pricing again collapsed. Once again, the reward for victory was the end of profit.

The sequence repeated itself when the leading minimill, Nucor, attacked the sheet steel business. Its market capitalization now dwarfs

that of the largest integrated steel company, US Steel. Bethlehem Steel is bankrupt at the time of this writing.

This is not a history of bungled steel company management. It is a story of rational managers facing the innovator's dilemma: Should we invest to protect the least profitable end of our business, so that we can retain our least loyal, most price-sensitive customers? Or should we invest to strengthen our position in the most profitable tiers of our business, with customers who reward us with premium prices for better products?

The executives who confront this dilemma come in all varieties: timid, feisty, analytical, and action-driven. In an unstructured world their actions might be unpredictable. But as large industry incumbents, they encounter powerful and predictable forces that motivate them to flee rather than fight when attacked from below. That is why shaping a business idea into a disruption is an effective strategy for beating an established competitor. Disruption works because it is *much* easier to beat competitors when they are motivated to flee rather than fight.

The forces that propel well-managed companies up-market are *always* at work, in every company in every industry. Whether or not entrant firms have disrupted the established leaders yet, the forces are at work, leading predictably in one direction. It is not just a phenomenon of "technology companies" such as those involved in microelectronics, software, photonics, or biochemistry. Indeed, when we use the term *technology* in this book, it means the process that any company uses to convert inputs of labor, materials, capital, energy, and information into outputs of greater value. For the purpose of predictably creating growth, treating "high tech" as different from "low tech" is not the right way to categorize the world. Every company has technology, and each is subject to these fundamental forces.

The Role of Sustaining Innovation in Generating Growth

We must emphasize that we do *not* argue against the aggressive pursuit of sustaining innovation. Several other insightful books offer management techniques to help companies excel in sustaining innovations—and their contribution is important.[8] Almost always a host of similar

do so from within an autonomous business with a cost structure that offers as much headroom as possible for subsequent profitable migration up-market.

Moving up the trajectory into successively higher-margin tiers of the market and shedding less-profitable products at the low end is something that all good managers must do in order to keep their margins strong and their stock price healthy. Standing still is not an option, because firms that stop moving up find themselves in a rebaresque situation, slugging it out with hard-to-differentiate products against competitors whose costs are comparable.[12]

This ultimately means that in doing what they must do, every company prepares the way for its own disruption. This is the innovator's dilemma. But it also is the beginning of the innovator's solution. Disruption does not guarantee success, but it sure helps: *The Innovator's Dilemma* showed that following a strategy of disruption increased the odds of creating a successful growth business from 6 percent to 37 percent.[13] Because the established company's course of action is mandated so clearly, it is also clear what executives who seek to create new-growth businesses should do: Target products and markets that the established companies are motivated to ignore or run away from. Many of the most profitable growth trajectories in history have been initiated by disruptive innovations.

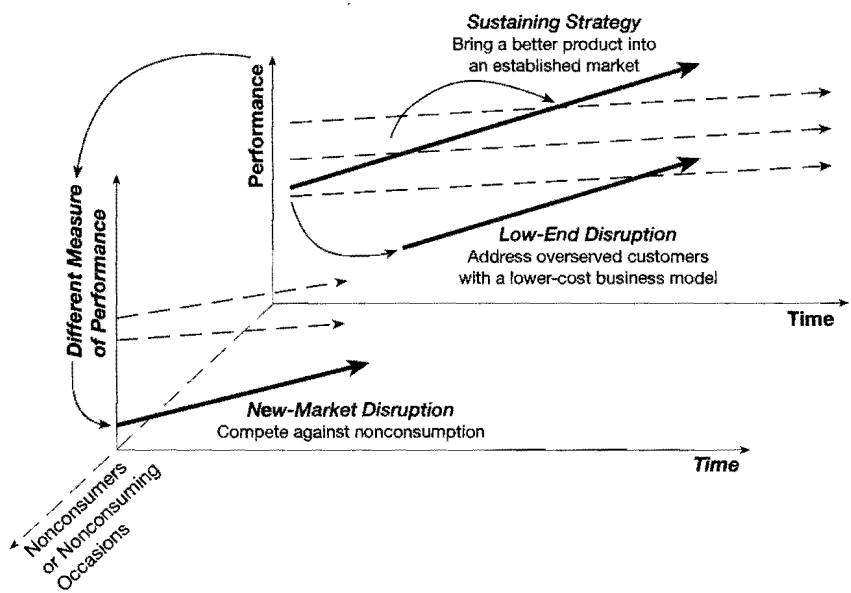
Two Types of Disruption

For the sake of simplicity, *The Innovator's Dilemma* presented the disruptive innovation diagram in only two dimensions. In reality, there are two different types of disruptions, which can best be visualized by adding a third axis to the disruption diagram, as shown in figure 2-3. The vertical and horizontal axes are as before: the performance of the product on the vertical axis, with time plotted on the horizontal dimension. The third axis represents new customers and new contexts for consumption.

Our original dimensions—time and performance—define a particular market application in which customers purchase and use a product or service. In geometric terms, this application and set of customers reside in a plane of competition and consumption, which

FIGURE 2-3

The Third Dimension of the Disruptive Innovation Model



The Innovator's Dilemma called a *value network*. A value network is the context within which a firm establishes a cost structure and operating processes and works with suppliers and channel partners in order to respond profitably to the common needs of a class of customers. Within a value network, each firm's competitive strategy, and particularly its cost structure and its choices of markets and customers to serve, determines its perceptions of the economic value of an innovation. These perceptions, in turn, shape the rewards and threats that firms expect to experience through disruptive versus sustaining innovations.[14]

The third dimension that extends toward us in the diagram represents new contexts of consumption and competition, which are new value networks. These constitute either new customers who previously lacked the money or skills to buy and use the product, or different situations in which a product can be used—enabled by improvements in

simplicity, portability, and product cost. For each of these new value networks, a vertical axis can be drawn representing a product's performance as it is defined in that context (which is a different measure from what is valued in the original value network).

Different value networks can emerge at differing distances from the original one along the third dimension of the disruption diagram. In the following discussion, we will refer to disruptions that create a new value network on the third axis as *new-market disruptions*. In contrast, *low-end disruptions* are those that attack the least-profitable and most overserved customers at the low end of the original value network.

New-Market Disruptions

We say that new-market disruptions compete with "nonconsumption" because new-market disruptive products are so much more affordable to own and simpler to use that they enable a whole new population of people to begin owning and using the product, and to do so in a more convenient setting. The personal computer and Sony's first battery-powered transistor pocket radio were new-market disruptions, in that their initial customers were new consumers—they had not owned or used the prior generation of products and services. Canon's desktop photocopiers were also a new-market disruption, in that they enabled people to begin conveniently making their own photocopies around the corner from their offices, rather than taking their originals to the corporate high-speed photocopy center where a technician had to run the job for them. When Canon made photocopying so convenient, people ended up making *a lot* more copies. New-market disruptors' challenge is to create a new value network, where it is nonconsumption, not the incumbent, that must be overcome.

Although new-market disruptions initially compete against nonconsumption in their unique value network, as their performance improves they ultimately become good enough to pull customers out of the original value network into the new one, starting with the least-demanding tier. The disruptive innovation doesn't invade the mainstream market; rather, it pulls customers out of the mainstream value

network into the new one because these customers find it more convenient to use the new product.

Because new-market disruptions compete against nonconsumption, the incumbent leaders feel no pain and little threat until the disruption is in its final stages. In fact, when the disruptors begin pulling customers out of the low end of the original value network, it actually feels good to the leading firms, because as they move up-market in their own world, for a time they are replacing the low-margin revenues that disruptors steal, with higher-margin revenues from sustaining innovations.[15]

Low-End Disruptions

We call disruptions that take root at the low end of the original or mainstream value network *low-end* disruptions. Disruptions such as steel minimills, discount retailing, and the Korean automakers' entry into the North American market have been pure low-end disruptions in that they did not create new markets—they were simply low-cost business models that grew by picking off the least attractive of the established firms' customers. Although they are different, new-market and low-end disruptions both create the same vexing dilemma for incumbents. New-market disruptions induce incumbents to ignore the attackers, and low-end disruptions motivate the incumbents to flee the attack.

Low-end disruption has occurred several times in retailing.[16] For example, full-service department stores had a business model that enabled them to turn inventories three times per year. They needed to earn 40 percent gross margins to make money within their cost structure. They therefore earned 40 percent three times each year, for a 120 percent annual return on capital invested in inventory (ROCII). In the 1960s, discount retailers such as Wal-Mart and Kmart attacked the low end of the department stores' market—nationally branded hard goods such as paint, hardware, kitchen utensils, toys, and sporting goods—that were so familiar in use that they could sell themselves. Customers in this tier of the market were overserved by department stores, in that they did not need well-trained floor salespeople to help them get what they needed. The discounters' business

model enabled them to make money at gross margins of about 23 percent, on average. Their stocking policies and operating processes enabled them to turn inventories more than five times annually, so that they also earned about 120 percent annual ROCII. The discounters did not accept lower levels of profitability—their business model simply earned acceptable profit through a different formula.[17]

It is very hard for established firms *not* to flee from a low-end disruptor. Consider, for example, the choice that executives of full-service department stores had to make when the discount retailers were attacking the branded hard goods at the low end of department stores' merchandise mix. Retailers' critical resource allocation decision is the use of floor or shelf space. One option for department store executives was to allocate more space to even higher-margin cosmetics and high-fashion apparel, where gross margins often exceeded 50 percent. Because their business model turned inventories three times annually, this option promised 150 percent ROCII.

The alternative was to defend the branded hard goods businesses, which the discounters were attacking with prices 20 percent below those of department stores. Competing against the discounters at those levels would send margins plummeting to 20 percent, which, given the three-times inventory turns that were on average inherent in their business model, entailed a ROCII of 60 percent. It thus made perfect sense for the full-service department stores to flee—to get out of the very tiers of the market that the discounters were motivated to enter.[18]

Many disruptions are hybrids, combining new-market and low-end approaches, as depicted by the continuum of the third axis in figure 2-3. Southwest Airlines is actually a hybrid disruptor, for example. It initially targeted customers who weren't flying—people who previously had used cars and buses. But Southwest pulled customers out of the low end of the major airlines' value network as well. Charles Schwab is a hybrid disruptor. It stole some customers from full-service brokers with its discounted trading fees, but it also created new markets by enabling people who historically were not equity investors—such as students—to begin owning and trading stocks.[19]

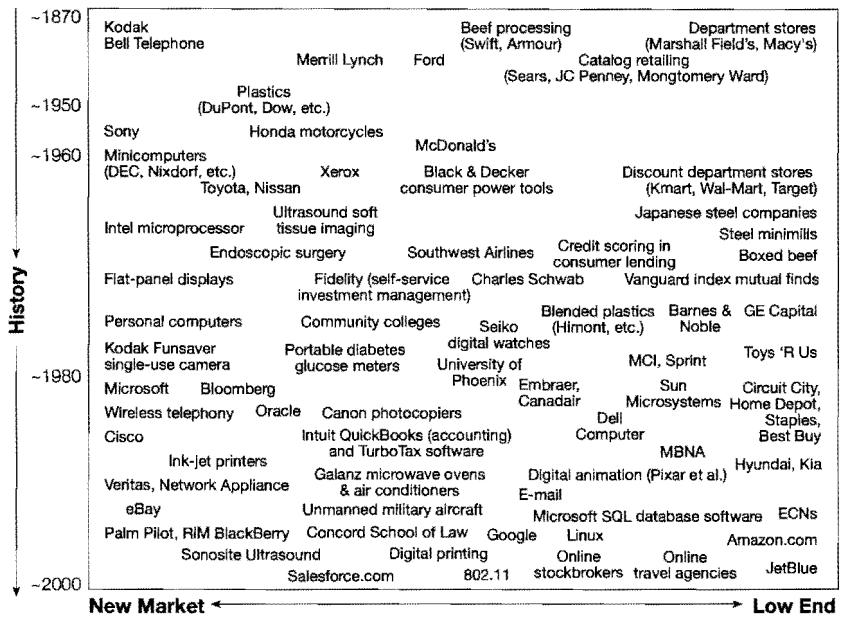
Figure 2-4 shows where some of history's more successful disruptors were positioned along the continuum of new-market to low-end

disruption at their inception. The appendix to this chapter offers a brief historical explanation of each of the disruptive products or companies listed on the chart. This is not a complete census of disruptive companies, of course, and their position on the chart is only approximate. However, the array does convey our sense that disruption is a primary wellspring of growth. The prevalence of Japanese companies such as Sony, Nippon Steel, Toyota, Honda, and Canon in the period between 1960 and 1980 and the absence of disruptive Japanese companies in the 1990s, for example, explain a lot about why Japan's economy has stagnated. Many of its most influential companies grew dramatically by disrupting others; but the structure of Japan's economic system inhibits the creation of new waves of disruptive growth, in part because they might threaten those companies today.[20]

The chart also shows that disruption is an ongoing force that is always at work—meaning that disruptors in one generation become

FIGURE 2-4

Examples of Companies and Products Whose Roots Were in Disruption



disruptees later. The Ford Model T, for example, created the first massive wave of disruptive growth in automobiles. Toyota, Nissan, and Honda then created the next wave, and Korean automakers Hyundai and Kia have now begun the third. AT&T's wireline long distance business, which disrupted Western Union, is being disrupted by wireless long distance. Plastics makers such as Dow, DuPont, and General Electric continue to disrupt steel, even as their low end is being eaten away by suppliers of blended polyolefin plastics such as Himont.

Shaping Ideas to Become Disruptive: Three Litmus Tests

At the beginning of this chapter, we mentioned that few technologies or product ideas are inherently sustaining or disruptive when they emerge from the innovator's mind. Instead, they go through a process of becoming fleshed out and shaped into a strategic plan in order to win funding. Many—but not all—of the initial ideas that get shaped into sustaining innovations could just as readily be shaped into disruptive business plans with far greater growth potential. The shaping process must be consciously managed, however, and not left to the dispersed and instinctive decisions of those who write business plans.

Executives must answer three sets of questions to determine whether an idea has disruptive potential. The first set explores whether the idea can become a new-market disruption. For this to happen, at least one and generally both of two questions must be answered affirmatively:

- Is there a large population of people who historically have not had the money, equipment, or skill to do this thing for themselves, and as a result have gone without it altogether or have needed to pay someone with more expertise to do it for them?
- To use the product or service, do customers need to go to an inconvenient, centralized location?

If the technology can be developed so that a large population of less skilled or less affluent people can begin owning and using, in a more convenient context, something that historically was available only to more skilled or more affluent people in a centralized, inconvenient