# Successful Marketing Strategy for High-Tech Firms

THIRD EDITION

Eric Viardot

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# Contents

# Introduction

Since 2001, when the tech slowdown hit countries in the West, high-tech industries have experienced one of their most economically depressed periods. An upturn in all sectors began in late 2003, but the telecom industry and the computer industry were still lagging behind; their profitability owing more to cost cutting than to revenue expansion. The technology recovery is far from being solid and in any case, the projections of unlimited growth are over. Famous firms at the beginning of this decade, such as WorldCom, Qwest, Marconi, or NTL, or stellar dot-com companies, such as WebVan, 360networks, or Boo.com, have filed for Chapter 11 bankruptcy or imploded while thousands of lesser-known companies have disappeared from the market altogether. More or less, all of those high-tech companies had forgotten about the reality of the market and of their customers. Obsessed with technology, especially the Internet, they had unrealistic expectations about the market's acceptance of their products. Their business plans anticipated revenues and costs that were far too high for any company to attain or sustain. When sales failed to materialize, these high-tech firms were not able to cover their costs, and soon folded.

At the same time, many customers, notably large corporations, have started to take their revenge on high-tech vendors. They no longer accept innovations or updates like they did in the 1990s. Now they wait to replace existing equipment in an effort to reduce their investment in technology. Consequently, life has become very tough for a large majority of high-tech companies, whose revenues, profits, and number of employees have plummeted.

However, in the middle of this economic storm, some firms have managed to survive and even thrive by exploiting their competitors' failures. Companies such as Nokia, IBM, Cisco Systems, Samsung, SAP, Yahoo, Vodafone, Amazon, eBay, and many others are stronger and in some cases even more profitable than before the Internet crash and the following downturn. The third edition of this book explains to the reader how these companies managed to survive and to grow in this hostile economic environment. To put it briefly, those successful high-technology companies do

not necessarily have the best product, but they do have the best marketing strategy.

With the burst of the technological bubble, the majority has been more concerned with cost control than expansion. Successful companies know that their future lies in the ability to create new wealth through innovation, entrepreneurialism, and development of new markets. In order to maintain profitability they need to have some special edge, either through significant patents, a very fertile R&D program, or an overwhelming market position [1]. Ultimately the key factor for achieving success is to grow and keep a loyal base of customers through an efficient marketing strategy.

Many high-tech companies consider their technology and product to be the absolute best around, but this is not enough to make it in the marketplace. In order for a new technological innovation to make a significant impact, it should identify and satisfy a specific human need in a new and cost-effective way. According to Mario Mazzola, Cisco Systems chief development officer: "Innovation is more than just a new idea—it is about taking a new idea and developing it into customer value and positive business impact" [2].

This is not a new concept. After all, Marconi invented the technology for wireless communication, but it was in the 1920s while leading RCA that David Sarnoff, an untaught immigrant, imagined how the new technology could be applied to transmit news, music, and other kinds of entertainment.

However, the high-tech industry has a cemetery full of companies that thought they could win the world with their innovations. They failed because they did not have the marketing ability to connect their innovative offer with the actual needs of the markets. Just consider some examples of famous failures of high-tech firms, years before the Internet crash:

- EMI, one of Britain's leading defense companies, discovered the computer tomography technology that was the basis for a revolutionary medical tool, the CAT scanner, but EMI failed to protect its technology; archrival General Electric was able to produce this medical tool at lower cost and used superior marketing to develop strong connections with hospitals, the chief users of the technology. Between 1977 and 1979, EMI had a cumulative loss on computer tomography equipment and eventually withdrew from the market, selling its CAT scanner business to General Electric [3].
- In the 1980s the R&D division of Xerox invented ground-breaking technology, such as the graphical user interface and the laser printer [4]. However, Xerox lacked the marketing skills to make them a market success, which Apple did with the former and Hewlett-Packard with the latter.
- In the 1990s AMD created the K6 a faster chip than the one produced by Intel, but failed to penetrate Intel's market share because of being short of marketing and manufacturing skills.

The pressure to keep on being successful is only increasing. In 1993, for example, the typical company in the high-tech top 100 (as measured by market value) of the *Financial Times* stayed there for 7 years; by the end of the decade, the average tenure had dropped to 3 years. A similar turnover in market leadership continues today.

Successful high-technology companies do share some key factors of success [5]. They tend to market two or three times as many new products as their competitors, and incorporate two to three times more technical innovations into each new product bringing actual value to their customers. Also, they introduce their products to the market two times faster than their competitors thanks to operational excellence [6], one of the main weaknesses of so many dot-coms that underestimated the importance of manufacturing and logistics. This helps them to adapt their business model quickly whenever there is a significant change in the environment. In addition, the geographical size of their markets is double that of their competitors. They have also created and leveraged great brands, which are reflected in everything the company does, especially those that impact the consumer [7].

Overall, these companies make marketing their main objective. They know their customers intimately and track their demand in real time. Their main concern is the market and not the product; this is the key to their success. All research and development activities, manufacturing, sales, and after-sales services aim to satisfy customers better and faster. Their other common characteristic is that they aim for profit. They invest wisely even when they spend money on marketing-oriented programs. They do not fund their customers in order to boost their sales, for instance, and always make sure that any major marketing program will have a positive impact on the bottom line. By keeping budgets tight and controlling cash, they never face bankruptcy.

Marketing plays a fundamental role in this process. Actually, its goal is to determine the needs of the market and to assure that the products manufactured by the company correspond precisely to these needs with a competitive advantage and at a profit.

This is probably the ultimate key to success and resilience [8] as testified by IBM, one of the oldest high-tech firms on the market. Pondering the ability of IBM to reinvent itself over and over again, its current CEO Samuel Palmisano reflects that "we never defined ourselves as a clock and scale company, or a mainframe company, or a typewriter maker, even when we were the undisputed leader in those markets. We simply committed ourselves to being the leader in inventing state-of-the-art technology and helping customers apply it to solve their problems. When technology and the nature of customer problems change, we do, too" [9].

Some claim that high-technology products are so specific that the classic rules of marketing used for selling detergents or yogurt cannot be applied. In reality, this argument is often used to justify the absence of actual strategies oriented toward markets and customer needs. For certain companies,

blinded by the mirage of technological innovation, it is easier to continue manufacturing a technical masterpiece, even on the brink of bankruptcy.

Moreover, marketing managers of successful high-technology companies stress that there is not a large difference between marketing traditional products and high-tech products. They contend that the customer philosophy remains the same and that only the specific features of a high-tech product shape how the company markets it, and give it a distinctive twist. Such a statement is backed up by their ability to overcome the economic collapse of the recent years.

While the sky had fallen on the high-tech industry, smart marketing strategies helped them grow and prosper among the rubble. This book details some of their approaches, based on my consulting experiences with some of those firms, as well as on comments and documents from numerous scholars, consultants, and professionals. This book is addressed to all who wish to understand, set up, or better apply marketing principles in order to succeed in this fascinating and exciting world of high technology.

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- McKinsey
- Microsoft
- Motorola
- Nortel Networks
- Oracle
- Orange

- Philips Semiconductors
- Samsung
- SAP
- Sony
- Texas Instruments
- Thales
- Vodafone

CHAPTER

1

Contents



# The Meaning of Marketing for High-Tech Firms

It is clear that successful marketing strategies have been fundamental for all the high-technology firms that have managed to survive the technology crash of 2001 and even to thrive after it.

However, the words "marketing for high-tech firms" often hide confusion. First, consider the term "marketing." Regis Mac-Kenna, a leading marketing specialist who works with numerous high-tech companies, claims that "Marketing is everyone's job, marketing is everything, and everything is marketing" [1]. This overall view of marketing does not simplify the task of managers who feel the need (some strongly, others vaguely) to develop an efficient marketing policy.

Second, the label "high tech" or "high technology" refers to technology that stretches from stoves to nuclear power plants and from razor blades to satellites. This label has been used both appropriately and inappropriately and sometimes is nothing more than an empty phrase.

For the sake of clarity, first we recall the meaning of the term "marketing" and review its objectives before defining a high-technology product. We then explore the differences between the marketing of advanced technology products and that of traditional products.

## 1.1 What is marketing?

The practice of marketing is quite ancient. Greek philosophers such as Plato and Aristotle, medieval church fathers such as St. Thomas or Martin Luther, and later classical economists such as Adam Smith and David Ricardo have reflected on marketing behavior. However, the formal concept of marketing emerged only 100 years ago at the beginning of the twentieth century. Indeed, in 1901 the *Report of the Industrial Commission on the*

*Distribution of Farm Product* was first published, and today that seminal work is considered the first book on general marketing [2].

The definition of the word "marketing" can be found in its etymology. Marketing means "putting on the market." Therefore, the purpose of marketing is to act in such a way that a company places on the market products that correspond to demand and satisfy the needs and wants of customers at an acceptable return.

Marketing's philosophy reverses the traditional perspective toward the company, its needs, and its production capacity. Marketing considers its main task to be "determining the needs and wants of the appropriate markets and to profitably produce the desired product or services by being more efficient than the competition" [3]. The following, more detailed definition has been developed by the American Marketing Organization (AMA): "Marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational goals" [4]. Marketing focuses on making the product available at the right place, at the right time, and at a price that is acceptable to customers [5].

Given this perspective, marketing complements or replaces short-term views that give greater importance to the product, the manufacturing process, or the selling method (see Table 1.1).

**Table 1.1** From a Product Orientation to a Marketing Orientation

| *Orientation* | *Customer Purchasing Criteria* | *Assumptions* | *Objectives* | *Department Involved* |
|---|---|---|---|---|
| Product | Quality | Customers buy products for themselves | Find "good" products | R&D |
| | Product technology | Customers are able to identify a product's advantages | Produce quality products | Design |
| | | Customers are willing to pay more if justified by the product | Explain product functions | Production |
| Production | Availability and reasonable prices | | Produce sufficient quantities | Production |
| | | | Optimize logistics and distribution | Logistics sales |
| Sales | Stimulation of interest | Customers only purchase what is needed | Increase product and company awareness | Sales |
| | | Customers can be encouraged to buy more due to sales techniques | Encourage product purchase | Marketing |
| Marketing | Response to needs and motivations | Customer point of view is of utmost importance in long-term sales exchange | Know customer need's | Marketing |
| | | Customer interest in a product depends on the product's ability to solve a problem or satisfy a need | Satisfy customer needs | All departments |

Every company that believes that customers will buy its products if they are "good" (of good quality and with good performance) automatically has a product orientation. This implies that customers are able to recognize the product's quality and that they are possibly willing to pay more if the product justifies it.

This viewpoint is even stronger for high-technology companies that favor product development based on performance or state-of-the-art features that are often far from the customer's needs. From supercomputers to supersonic jetliners, some companies have conceived technological wonders at such a high cost that their markets never materialized.

Production orientation refers to the belief that if an acceptable product is available at a reasonable price, it will be purchased. In other words, if a sufficient quantity is produced and the logistics department distributes and supplies the product, the customers will do the rest. This philosophy, which is usually related to an excess of demand (common in postwar Europe and today's developing countries), can also be found in the high-tech sector.

Actually, this infatuation with new technology can be beneficial to a company that is capable of immediately flooding the market with large quantities of its product(s). Such a company, however, should beware of the day when the product no longer pleases the customers and sales suddenly start to plunge. The production-capacity surplus—the cost of inventory and distribution—can even kill a company. For instance, Sega had to exit the videogame hardware business after the failure of its Genesis 32x (called Mega Drive 32x in Europe) and then its Dreamcast consoles. Those product were loaded with state of the art technology but were not compatible with previous Sega models, meaning that the players could not run their existing videogames. Furthermore, the catalog of games for these new consoles was not very large at the time they were launched, which frustrates customers even more. At the same time, Sega had overproduced those models expecting a big demand, just because of the novelty of the technology. Ultimately, stuck with huge inventories, upset distributors, and significant financial loss, Sega walked out of the market leaving more room to Sony and Microsoft.

In order to sell products to customers, other companies have adopted a third approach, namely, the sales orientation. According to this approach, for the customer to make a purchase, his or her interest in the product must be stimulated through price reductions and special large-scale sales promotions, using gifts and contests or other more aggressive sales techniques such as high-pressure selling. The objective is to sell quickly by encouraging the customer to buy a product immediately, even if it does not correspond exactly to his or her requirements.

This approach is usually indispensable during the start-up stage where the "professionals-who-sell" [6] approach to customer is made directly by the founders, or the professionals who have invented a new product or service. This approach is effective for only a short period of time. First, it may quickly impede growth if the sales effort is limited to a few major executives. Second, and not only in the start-up period, it usually backfires. As a matter of fact, by selling products that do not really meet an actual

need, a company risks sacrificing its credibility. The product quickly disappears to a shelf, and the disappointed customer promises never to be taken again. This approach is even worse for services, because if a service is oversold in the first place, it will never be used again.

Finally a "sale approach" may jeopardize the bottom line by flooding the market with too many products at a time. In some cases the situation may even get worse when "sales oriented" companies overfinance some customers in order to facilitate the sales.

Such was the case during the boom of the telecom market when companies like Lucent and Nortel Networks expanded their vendor financing at nearly triple-digit compound annual growth rates (see Figure 1.1). In 2000, the books of the nine global telecom giants were loaded with about $26 billion worth of loans: Alcatel, Cisco, Ericsson, Lucent, Motorola, Nokia, Nortel, Qualcomm, and Siemens. About one-third of this credit has gone to telecom and dot-com start-ups, many of them now bankrupted. Consequently, the high rates of default had a substantial impact on the vendors' financial performance, most notably Lucent and Nortel [7].

Not only did most companies manage to recover only a small share of the original loan when debts went bad, but recovering the unpaid-for equipment hardly made up for the losses, since its value had considerably depreciated in the meantime. For instance, in 2001 a Cisco 7500 Series router, sold originally for $150,000 new and for $11,000 after being refurbished could be bought on the second-hand market for less than $2,000. Furthermore, as one would expect, the flood of used equipment on the market depresses sales of new equipment and drives the price down more substantially.

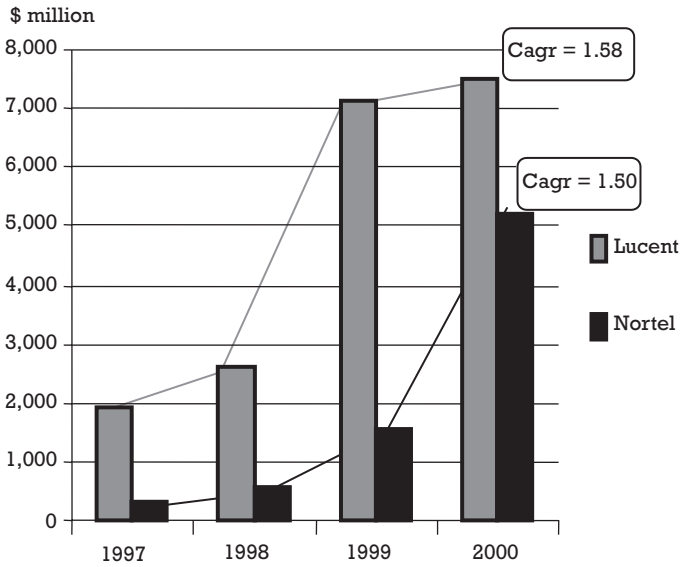


**Figure 1.1** Vendors credits given out by some telecommunication hardware suppliers during the Internet boom. (*After:* [7] and analysis compiled by Eric Viardot.)

**Case: Buy Now, Pay Later. Does It Work the Same Way for Computers and Cars?**

In October 2002, IBM introduced a new financing plan called Total Usage Financing, designed to stimulate spending for its on-demand computing services from cash-strapped businesses. The plan spread the cost of technology purchases over several months and included a revolving line of credit. Like a pitch from a car manufacturer, IBM announced a "triple zero" financing package, that offered large and mid-sized businesses zero down, zero payments, and zero interest until 2003.

Other technology companies followed suit. The same month, Microsoft unveiled a new program that allowed small businesses to take out loans to finance software purchases. It also launched a special 24-month zero-percent financing promotion targeting customers of Microsoft's Business Solutions division, which sells enterprise resource planning and customer relationship management software.

In November 2003, Hewlett-Packard introduced a program offering a 3-month deferral on any large purchase, including hardware, software, and services.

Question 1: What are the opportunities and threats of such policies?

Question 2: In which case can supply trigger demand?

The danger of these three approaches is clear. They focus on the company and forget that the sales exchange involves two parties. Without customers to purchase products, there is no justification for production. On the contrary, the marketing philosophy centers on the customer; it emphasizes that the key worth of a product lies in the value that it provides to the user. A company that concentrates too much on the physical attributes of a product, its logistics, or financial profit risks forgetting that the customer purchases a product only as a means to resolve or address a problem.

This customer orientation involves all the departments of a company, because customer satisfaction on all levels, from the product design to its (after-sale) maintenance, is the final measure of success for the company, as well as its long-term promise of success.

Being tuned in to customers in order to satisfy them better is more than a philosophy. It is a discipline that requires an organized and responsive company, not to mention everyone's involvement. All members of the organization, from researchers to CEOs, including switchboard operators and production workers, are involved and responsible for the quality of customer relations.

When the company's organization is turned upside down, the customer becomes the sturdy base of a long-lasting exchange relation between the company and its customers (see Figure 1.2). This management philosophy was made popular by Jan Carlzon, as CEO of Scandinavian Airlines (SAS) in the beginning of the 1980s. As SAS was losing money while facing a bigger competitor, Carlzon asserted that the company had lost its focus on

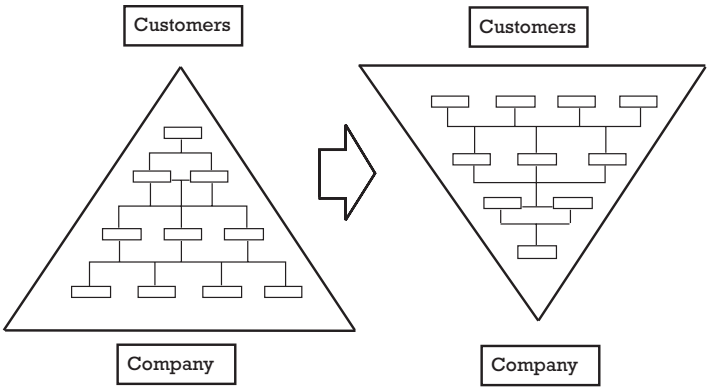


**Figure 1.2** Marketing state of mind: the inverted pyramid.

customers' needs: management was placing too much attention on the technicalities of flying airplanes and not enough on the quality of the customers' experiences.

Carlzon said, "We used to think our biggest assets were aircraft, overhaul stations, and technical resources. But we have only one real asset, and that is a satisfied customer prepared to come back to SAS and pay for our costs once more. That's why assets in our balance sheet should show the number of satisfied customers who flew SAS during the year and not the number of airplanes that are not worth one single cent as long as there is no second-hand market in the world for used aircraft and nobody wants to pay for a flight in those airplanes" [8].

His philosophy has not lost its validity and has survived other short-lived management theories. In the high-tech sector, companies such as Cisco, Dell, DoCoMo, Microsoft, or Nokia have been giving customers the attention they deserve for a long time. These companies have built their own success on this state-of-mind marketing.

## 1.2 What is a high-tech product?

The term "high technology" is a catchall category that includes any product manufactured with some type of an advanced technology, from razor blades or athletic shoes, to sports cars, to long-range missiles. Furthermore, high technology can also apply to many categories of services (see the box: "The Irresistible Rise of High-Tech Services").

The literature on this subject contributes to the continuation of certain confusion, because it rarely gives a clear definition for high-tech products. In any case, technology is not the only characteristic and discriminating feature of these products. When asked about the main characteristics of high-tech products, marketing managers are mostly concerned with some distinctive characteristics that pertain specifically to high-tech products (see Figure 1.3, which is based on interviews that I conducted). The three main

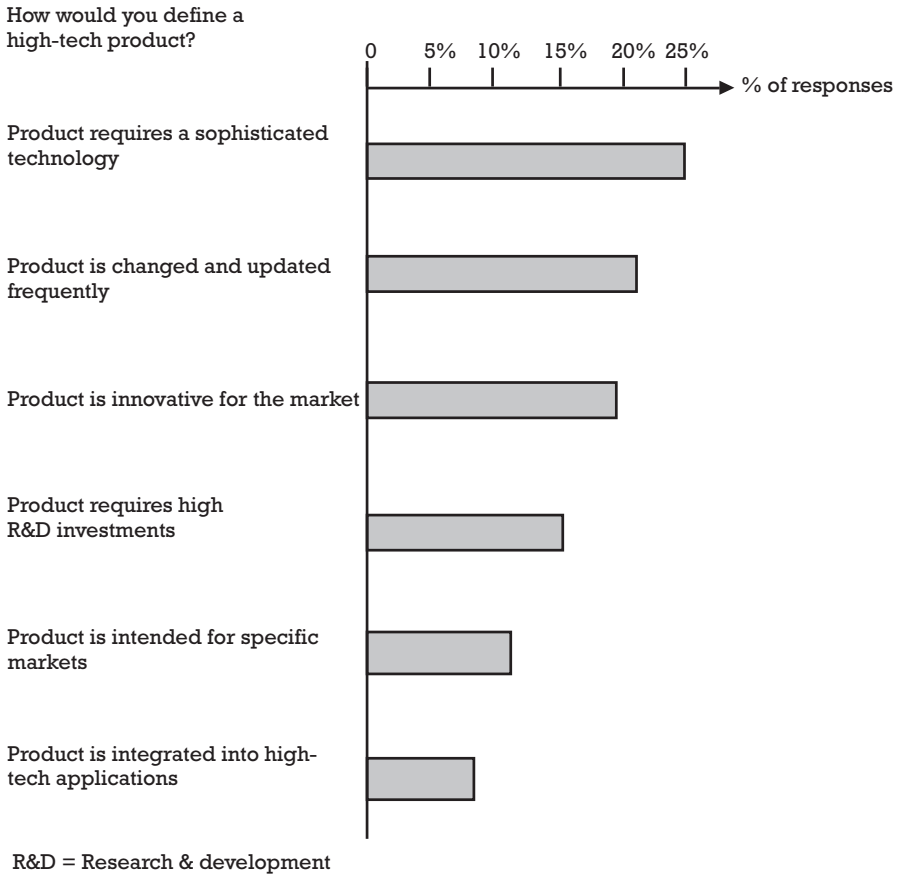


**Figure 1.3** Characteristics of high-tech products according to high-tech marketing managers. Tabulation of responses to the question: How would you define a high-technology product?

features are the incorporation of sophisticated technology, a short product life cycle on the average, and the integration of innovation.

As we will see when detailing the various elements of the operational marketing mix, those differences influence the way to market products and services to the customer, not only in terms of packaging, but also in terms of distribution and pricing.

### 1.2.1 The incorporation of sophisticated technology

Technology can be defined as scientific knowledge applied to useful purposes [9, 10]. This know-how is related not only to the product's functionality but also to manufacturing and marketing (most notably sales) expertise. Indeed, such a definition takes account of both product technology which is embedded in the product itself and process technology [11].

In the case of product technology, let us consider the example of a very common high-tech product: the cellular phone. As is very often the case

**The Irresistible Rise of High-Tech Services**

A revolution is at work in the high technology industry: the irresistible growth of business-to-business high tech services. Consider the case of IBM. In 1983 hardware revenues represented 83% of the company's total turnover, while its service revenues were only a meager 2%, three times less than software revenues. In 2001, services contribute to 40% of the total revenues while hardware now represents only 38% of its revenue stream. During the same period, services revenues have grown from $8 million to $35.3 billion, meaning a 25% annual compounded growth rate. IBM Global services, a new division created in 1997 and the leader in information services, has locations in 163 countries and employs 150,000 people.

IBM is leading the pack of firms offering a new range of sophisticated services to their corporate customers, quite different from the traditional hardware maintenance and repair services. Some firms are computer manufacturers like IBM or Hewlett-Packard, others are consulting firms like Accenture, and others are service companies like the American EDS, the French Cap Gemini, or the German T-Systems. Their business can be defined as offering value to their customers through services, based on innovative information technology (hardware and software) implemented by personnel who have the required expertise and who rely heavily on methodology.

A list of the most significant information technology (IT) based services [12] includes professional services such as consulting [13], systems engineering, systems integration [14], support [15], outsourcing, networks [16, 17], e-business services [18]. Similarly with the explosion of the Internet, consumer services companies have emerged. They are mostly on-line information, electronic-transactions, and electronic-business services. Amazon, eBay, and Yahoo are among the most successful service companies to achieve both growth and profitability.

Compared with high-technology products, high-technology services have some important distinguishing features:

- They are intangible.
- Their ownership is not transferred at the time of the purchasing.
- Customers are associated wit them.
- They are location independent but time dependent.
- They are relatively homogeneous so they can be stored and quality controlled.
- They cannot be easily demonstrated before purchasing.

with a lot of technology products, cell phones integrate different technology. For instance, a portable phone relies on microelectronics, transmission software, and battery technology [19].

Actually a cell phone contains different parts:

- A tiny microphone;
- A speaker;
- An LCD or plasma display;
- A keyboard;
- An antenna;
- A battery;
- A circuit board.

The circuit board itself—the central part of the system—includes various components:

- The analog-to-digital and digital-to-analog conversion chips.
- The Digital Signal Processor (DSP)—a highly customized processor—which handles all the signal compression and decompression at about 40 MIPS (millions of instructions per second).
- The microprocessor (Ericsson phones use an ASIC version of the Z-80) and memory handle all of the housekeeping chores for the keyboard and display, deal with command and control signaling with the base station, and also coordinate the rest of the functions on the board.
- The radio frequency (RF) amplifiers handle signals in and out of the antenna.
- The RF and power section handles power management and recharging, and also deals with the hundreds of FM channels.

Thirty years ago, all of that technology would have filled the entire floor of an office building. Today it fits into a compact device that fits in the palm of the person using it [20].

In the case of process technology, an interesting example is provided by the design and manufacturing of computer chips. Today electronic-design-automation tools play a vital role in helping manufacturers to design more complex chips and to produce them more quickly. More specifically integrated circuits (IC) are produced by transferring a pattern on a photomask, or a quartz template containing images of integrated circuits, to a silicon wafer. As ICs have become more complex, the photomasks used to produce them have become disproportionately more difficult to fabricate.

In 2003 Intel started making chips using circuits whose width is only 90 nm, or 90 billionths of a meter (the so-called nanotechnology). The company has begun development of the masks needed for optical lithography to produce chips only 65 nanometers wide, the production of which is scheduled to start in 2005. The company also is developing a new technology, extreme ultraviolet lithography, EUV, working for 32-nm masks.

Another significant improvement in chip manufacturing technology was pioneered by IBM, with a new process known as silicon-on-insulator

(SOI)—where transistors sit atop a glass layer instead of on traditional silicon chip. The use of glass prevents electrons that flow through a transistor from escaping, increasing efficiency and reducing power consumption. IBM introduced this new technology in 2003, and Hewlett-Packard, Texas Instruments, and Motorola will probably utilize SOI technology to develop chips in future.

### 1.2.2 A short life cycle

The second feature of high-tech products is that they are developed and replaced at a high rate. Such a cycle of replacement is driven by the exponential performance achieved by researchers in the improvement (and sometimes also the replacement, as we will see next) of existing technologies.

The archetypal and emblematic example involves microprocessors. Moore's Law—named after Gordon Moore, one of Intel's founders—clarifies the development of product performance: the number of transistors per memory circuit on integrated circuits doubles every 18 months (see Figure 1.4). This exponential growth and ever-shrinking transistor size result in increased performance and decreased cost. Engineers at Intel

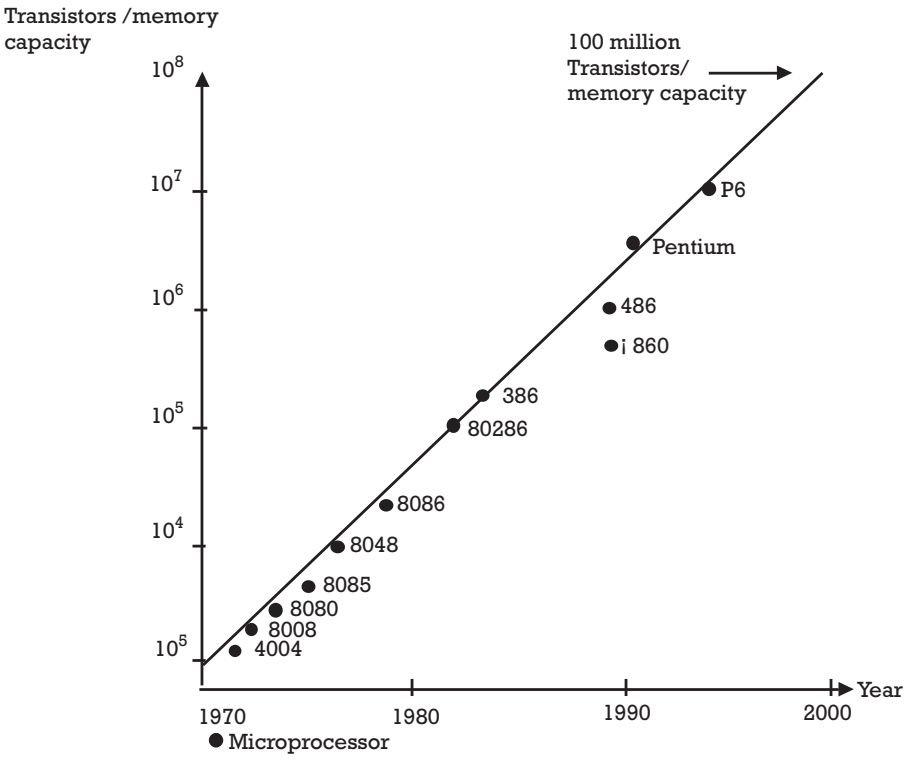


**Figure 1.4** Evolution rate of memory capacity of Intel microprocessors. (*Source*: Intel annual reports and press reports compiled by Eric Viardot.)

managed to store twice as much binary data in a single-flash memory chip, while researchers at IBM discovered a way to replace aluminum conductors in microchips with copper, which is faster and cheaper. In addition, another researcher has managed to create a prototype with a data storage capacity that is 300 times more powerful than the average chip using a bacterium that lives in a salty environment, the bacteriorhodopsin. In a surprising twist, biotechnology is encountering information technology.

Moore's Law does not seem to apply exactly to telecommunication technology, since speeds are doubling on optical fibers every 12 months, and are now approaching 1 terabyte per second (see Figure 1.5).

Biotechnology is also experiencing the principle of exponential growth in performance within a shorter time frame. The case of the Human Genome Project is a prime example. The project began in the early 1990s in order to identify the genes responsible for hereditary diseases, as well as more common diseases, such as cancer and diabetes, and to design new therapies and new drugs. To do so required locating the 40,000 genes and 3 billion nucleotide bases (or combinations of genes) that form the human genetic structure. At the outset, that looked like a very complex task, because it required screening billions of bits of information, which could have fill one thousand 1,000-page phone books. The project was initially forecast to take until 2005, but the first map was actually completed in June 2000, 5 years ahead of schedule, thanks to the massive use of technology.

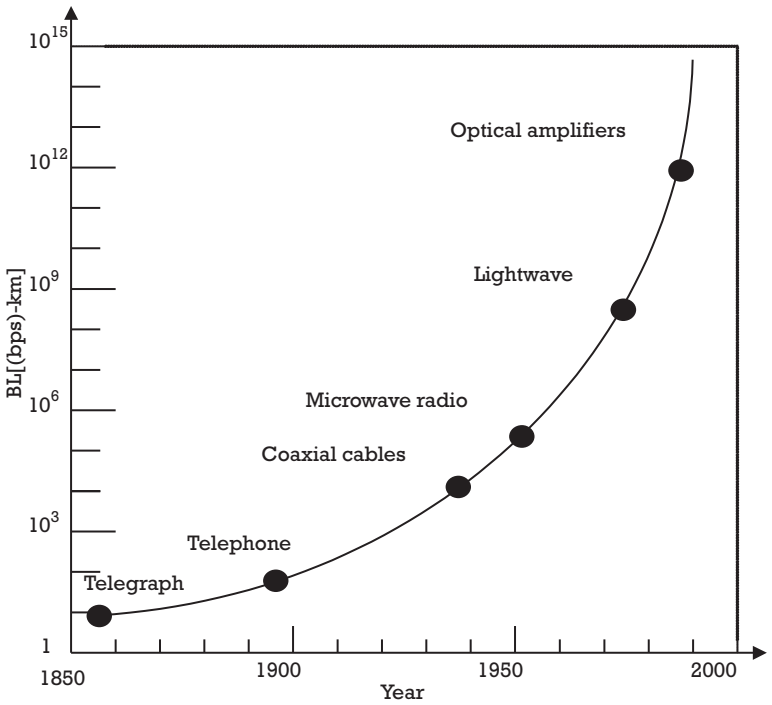


**Figure 1.5** Increase in bit rate-distance product during the 1850–2000. The emergence of a new technology is marked by a filled circle. (*After:* [21].)

In 1983 it took six people working a total of 3,300 man days to identify 4,000 bits of information, an average of 1.2 combinations a day. By 1998, it took one person 8 hours to identify 50,000 nucleotides, an average of more than 17 per second. Today it takes one person 2 minutes to identify 50,000 nucleotides, an average of more than 417 per second. And by 2005, it is estimated that it will take one person 10 seconds to identify 50,000 nucleotides an average of more than 5,000 per second (and the entire human genome in less than 10 seconds).

Scientists are now working on the Human Proteome Project. The goals and endpoint of the project remain undefined, but include the structural and functional determination of at least one protein in each protein family. Once a single protein from each fold family has been identified and structured, homology modelling can be used to predict the structure and potential functions of other proteins in the same family [22]. Revealing the mysteries of proteins will allow scientists to create customized drugs, which can meet the individual needs of each patient. One example of such an application is a current drug for HIV patients, which is based on the three-dimensional structure of the HIV-1 protease protein [23]. But this project is on a scale exponentially larger than the Genome Project, because the number of proteins is estimated in the hundreds of thousands, with trillions of combinations.

### 1.2.3 Innovation: evolution and revolution

The third characteristic of a high-tech product is its innovative quality. It should bring a (usually) radical change to a market where one new product will drive away others.

One of the main reasons why firms bring innovation and new products to the market is out of necessity, that is, they need to remain competitive. One leading German electronics manufacturer drew about 70% of its revenues in the late 1970s from products that were better than those of its competitors. Five years later, that share had fallen to 35%; 10 years later, the company did not have a single superior product and was losing market share. More generally, in a survey of 102 electronics firms worldwide made by the consulting firm McKinsey, innovation provided the majority of growth for the top third of the companies, in terms of profitability and increase in sales. Innovative products and processes also appear to be critical in achieving cost competitiveness; according to this McKinsey survey, innovation contributes approximately two-thirds of all unit cost reduction. In other words, high-tech firms must innovate or capitulate.

It is no secret that technologies undergo periods of evolution and revolution [24]. They emerge then grow before maturing and die. Every need is satisfied by a technology that has a "life cycle," characterized by introduction, growth, maturity, and decline. The need to communicate led to primitive arts, writing, printing, typewriters, and recently computers (which also meet the need to count). The need to know about space led ancient cultures

to build temple-planetariums, then astronomic telescopes, and currently satellites and other space rockets.

Every technology gives rise to products that then progress through their own life cycles with the same phases (introduction, growth, maturity, and decline). The product life cycle is the mirror image of the changing needs that the product satisfies, and reflects customer diffusion of the innovation curve. At its introduction, a product attracts people who like innovations. Then, as the product grows in popularity, a larger majority is interested in the product. Sales increase until a late majority adopts the product. Then the level of sales stabilizes, while decline is accelerated by the arrival of a new technology (see Figure 1.6).

In the consumer goods area, televisions in the 1940s, calculators in the 1960s, and microwave ovens in the 1980s introduced a breakthrough in consumption, banishing the radio, multiplication tables, and traditional ovens, which are now almost forgotten.

For industrial products, the case of electronics is characteristic: In the 1950s the input medium for information processing was first performed by vacuum tubes. These vacuum tubes were soon replaced by transistors in the 1960s. Striving toward miniaturization, manufacturers of electronics introduced integrated circuits, before they were replaced by microprocessor technology in the beginning of the 1980s. In each case, an innovative technological development chased its predecessor. Today it seems that microprocessor technology has arrived at certain limits (such as the balancing speed of gate arrays or the internal clock frequency of processors) related to its input medium, silicon. However, it won't be impossible to go beyond these limits in the future with new technology like supraconducting materials at ambient temperatures (see Figure 1.7). Similarly, in the pharmaceutical business, biotechnologies are replacing more traditional technologies to make new drugs.

As a matter of fact, any kind of technology will experience either sustaining innovations or disruptive innovations. Sustaining innovations can be defined as innovations that improve the performance of established

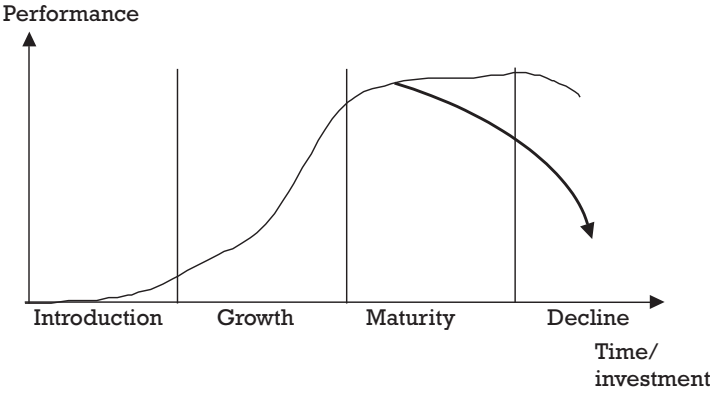


**Figure 1.6** The concept of a life cycle for products and technology.

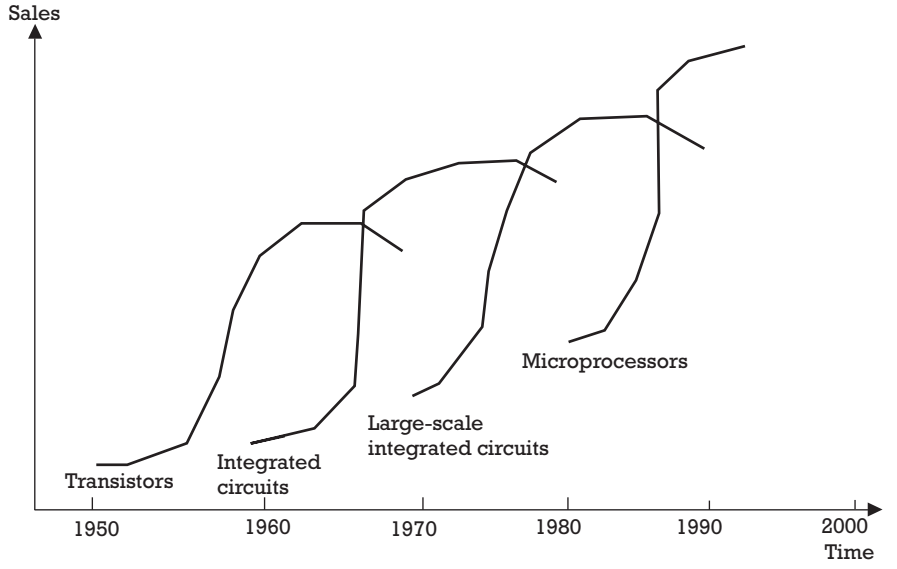


**Figure 1.7** Technology succeeding technology.

products and services in ways that mainstream customers in major markets have valued. Examples include continual development of faster microprocessors, flatter monitor screens for computers, or higher-resolution medical scanning devices, and SMS (Short Message Service) for cellular phones. Disruptive innovations offer a different, original and often untested solution to a larger category of needs [25]. They offer better performance than traditional solutions and provide to customers more convenient and/or cost-effective value and benefits. They can be "leading edge" technology or just creative ways to use existing technologies. For instance, examples of disruptive innovations include low-cost microprocessors (located in cars, washing machines and other appliances), on-line marketplaces, or DVDs.

Major or breakthrough innovations—like electricity, transistors, or machine tools in the past, and computers, networks, and robots, nowadays—are becoming diffuse throughout the economy. They often provide the basis for the emergence of new industries that create major new markets. Once computers were introduced and accepted, it made sense to expand their power, offer new application software, and connect them. Once they were connected, on-line services and electronic commerce naturally made their way into the economy and consumers' behavior.

Disruptive innovations create new markets and as we will see later on take root on the weakest segments of large companies that are already in the markets. While incumbents tend to stick with sustaining innovations for their traditional customers, challenging companies will take on competitors with disruptive innovations. Consequently, a key challenge for a high tech firm is how to structure the development activities before the full potential of one technology and of its market appeal is established.

For instance, within the next 5 years some very promising technologies could open new markets for high-tech firms [26]:

- IBM, Sun, Hewlett-Packard, and Microsoft push for autonomic computing: Enabling a computer system to diagnose and optimize its own performance and allocate its own computer and storage resources automatically should increase efficiency and boost an already mammoth market for information technology services [27].
- Giants in electronics such as Motorola, Xerox, and Lucent are collaborating with chemical powerhouses E. I. DuPont de Nemours, Dow Chemical, and Bayer AG to delop Organic Electronics. In portable electronics and flat-panel displays, plastic organic light-emitting diode (OLED) displays could replace liquid-crystal displays (LCD).
- Better search mechanisms and personal agents (dubbed as "Semantic Web") could automatically perform searches through the billions of pages on the Web and provide better and more effective results than today's searches [28]. Semantic Web research is led by the members of the World Wide Web Consortium.
- Light emitting diode (LED) is a light source applying the different energy conversion process, so-called electron-hole recombination luminescence, rather than conventional light sources, such as incandescent or fluorescent lamps. LED provides many benefits, such as a longer life span, measured in years not hours, vivid sunlight-visible colours and low power requirements. Introduced on the market in 1997, it could grab a significant share of the $12 billion-a-year market for sources of white light. The founder and leader, Nichia Corp., of Japan, is taking on Lumileds Lighting LLC, a joint venture of Philips Lighting and Agilent Technologies; GELcore, a joint venture of General Electric and Emcore Corp.; and Tokyo's Toshiba Corp., partnered with Toyoda Gosei C.
- Nanotechnology is about building things up by manipulating one atom at a time—first achieved in 1989 by physicists at IBM's Almaden Research Center, in San Jose, California. They used a microscopic probe to move with painstaking precision a series of xenon atoms on a nickel surface to form a Lilliputian version of the IBM logo. This one-off experience was performed at around –270°C; today scientists can do this at room temperature and industrial labs are transforming nano-dreaming into real technology. Nanotechnology was first used to create nanomachines—nanotech robots and motorized tools so small they can manipulate individual cells and molecules. These devices have many different applications, such as precision engineering, as well as electronics; electromechanical systems, as well as mainstream biomedical applications in areas as diverse as gene therapy, drug delivery and novel drug discovery techniques.

**Finding New Use for a Technology: The Case of Aerogel**

In the aeronautics and automotive industries, highly fire-resistant resins have replaced heavier, more expensive and less effective metals. Aerogel is a silicon-based solid with a porous, sponge-like structure in which 99.8% of the volume is empty space. By comparison, aerogel is 1,000 times less dense than glass, another silicon-based solid. Discovered in the 1930s by a Stanford University researcher, aerogel is the world's lightest solid. NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, altered the original recipe to come up with a radical new way to use aerogel for space exploration. To protect the Space Shuttle from the heat generated during reentry into Earth's atmosphere, a layer of aerogel is put inside the ceramic fiber tile's air spaces of the windshield. For instance, JPL used aerogel to insulate the electronics box on the Mars Pathfinder Sojourner rover, which explored Mars in 1997.

Researchers at Jet Propulsion Laboratory are still working to improve on the insulation properties and performance of aerogel. By making aerogel more versatile, it might become competitive as a commercial material.

Question 1: Map out the possible business and consumer applications of aerogel. To get further understanding of this technology, you can go to http://www.jpl.nasa.gov/technology/features/aerogel.html.

Question 2: Will any aerogel solution be available on the mass market? Why?

### 1.2.4 High investments in research and development

All these reasons translate to the fact that the fourth characteristic of a high-tech product is the requirement of high investments in research and development. These investments finance large teams of successful and knowledgeable researchers, which is very costly. On a worldwide basis in 2002, it was estimated that industry spends more than $500 billion per year on research and development. The 100 private biggest R&D spenders are all companies of the OECD (Organization for Economic Co-operation and Development), with 45 hailing from the United States, 22 from Japan, and 11 from Germany. Table 1.2 provides the ranking of the major R&D spenders.

However, the total spending does not reflect fully the relative intensity of the investments made to develop new technology. Indeed the four top R&D spenders are car companies, which can hardly be considered as high-tech. The ratio of R&D expenses to sales figures is definitely a more significant indicator for a company producing advanced technology products than the total amount spent. This ratio is the one used by the National Science Foundation [29]. The OECD considers a similar ratio and defines high-tech firms on the basis of their level of R&D intensity (R&D expenditure

**Table 1.2** Top R&D Expenditures in 2001

| *Industry Rank* | | | *R&D Expenditures in Millions of Dollars* | | | *R&D as Percentage of Sales* | | *R&D Expenses Per Employee* | |
|---|---|---|---|---|---|---|---|---|---|
| *2001* | *2000* | *Company* | *2001* | *2000* | *Percentage of Change* | *2001* | *2000* | *2001* | *2000* |
| 1 | 1 | Ford Motor Company | 7,400 | 6,800 | 8.8 | 4.6 | 4.0 | 20,879 | 19,654 |
| 2 | 2 | General Motors | 6,200 | 6,600 | (6.1) | 3.5 | 3.7 | 16,986 | 17,098 |
| 3 | 4 | Siemens | 6,028 | 5,403 | 11.6 | 7.8 | 7.1 | 12,455 | 12,088 |
| 4 | 3 | Daimlerchrysler | 5,312 | 5,855 | (9.3) | 3.9 | 3.9 | 13,995 | 14,058 |
| 5 | 12 | IBM Corp | 5,290 | 4,345 | 21.7 | 6.2 | 4.9 | 16,538 | 13,737 |
| 6 | 40 | Bristol Myers Squibb | 5,003 | 1,939 | 158 | 25.8 | 10.6 | 108,671 | 44,068 |
| 7 | 10 | Pfizer Inc. | 4,847 | 4,435 | 9.3 | 15.1 | 15.0 | 53,856 | 49,278 |
| 8 | 13 | Cisco Systems | 4,777 | 4,077 | 17.2 | 21.4 | 21.5 | 125,711 | 119,912 |
| 9 | 11 | Toyota Motor | 4,745 | 4,348 | 9.1 | 3.9 | 3.6 | 19,234 | 20,163 |
| 10 | 7 | Matsushita Electric | 4,529 | 4,927 | (8.1) | 8.2 | 7.1 | 16,949 | 16,826 |
| 11 | 9 | LM Ericsson Telefon | 4,516 | 4,587 | (1.6) | 20.1 | 15.3 | 53,002 | 43,636 |
| 12 | 18 | Microsoft | 4,379 | 3,775 | 16 | 17.3 | 16.4 | 91,996 | 96,457 |
| 13 | 8 | Motorola | 4,358 | 4,769 | (8.6) | 14.5 | 12.7 | 39,261 | 32,442 |
| 14 | 14 | Intel | 3,994 | 4,006 | (0.3) | 15.1 | 11.0 | 47,980 | 46,527 |
| 15 | 16 | Glaxosmithkline PLC | 3,817 | 3,830 | (0.3) | 12.9 | 14.0 | 35,378 | 35,398 |
| 16 | 24 | Johnson & Johnson | 3,696 | 2,980 | 24 | 11.2 | 10.2 | 36,306 | 30,254 |
| 17 | 6 | Lucent Technologies | 3,520 | 5,023 | (29.9) | 16.5 | 14.9 | 45,714 | 39,865 |
| 18 | 17 | Sony Corp | 3,469 | 3,775 | (8.1) | 5.7 | 5.7 | 20,650 | 20,765 |
| 19 | 5 | Nortel Networks Corp | 3,380 | 5,203 | (35) | 18.7 | 17.0 | 63,061 | 54,943 |
| 20 | 15 | Hitachi Ltd | 3,327 | 3,946 | (15.7) | 5.2 | 5.2 | 10,837 | 12,183 |

*Source:* [30].

compared to value added) [31]. Opinions differ on which research investment figure to use when classifying a company as a manufacturer of advanced technology products, but the average percentage ranges from 4% to 5%. Another way to evaluate the R&D intensity is to consider the number of researchers and technology-oriented workers to identify high-tech firms. For instance, for the U.S. Bureau of Labor Statistics, high-tech intensive industries are those that have at least 15 research and development workers per thousand workers and 190 technology-oriented workers per thousand workers. These ratios are at least five times the average for all industries [32]. In this perspective, Figure 1.8 shows the percentage of turnover that is spent on R&D by industry.

When considering this ranking, we can identify six different high-tech industries—biotech, telecom, and information technologies, electrical equipment, automative, and aerospace—and some utilities. The first one is the pharmaceutical and biotech industry. While the pharmaceutical industry is more than one century old, biotechnology is much younger. Biotechnology is the use of biological processes to develop products or create

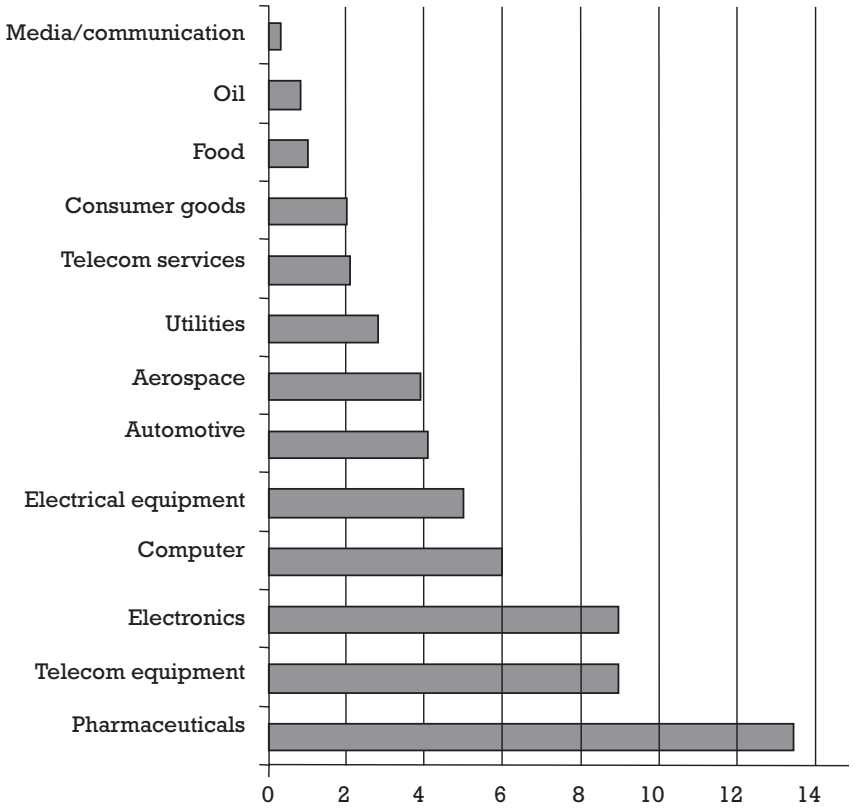


**Figure 1.8** Percentage of turnover spent on R&D by industry. (*Source:* LIR, 2003.)

technological solutions. The first uses of biotechnology were beer making, wine making, cheese creation, and bread production. Today biotechnology is used to create antibiotics, insulin, and interferon. Biotechnology is widely used to manufacture simple chemical compounds, such as lysine and glutamate, or more complex compounds, such as antibiotics (microbiologists have discovered more than 5,000 substances with antibiotic activities), enzymes, vitamins, or hormones. Biotechnology is also becoming a big part of the agriculture industry, inasmuch as it is used to engineer new categories of agrochemicals or seeds.

Biotechnology has recently materialized as an exceptionally important part of the world economy, though it was close to nothing as a technology 10 years ago. In 2001, 179,000 people were employed in 1,379 biotechnologies companies, which were investing $15.7 billion on R&D. There are fewer companies in Europe, about 800 (mostly in the United Kingdom, Germany, and France), which were spending $1.33 billion on R&D in 1999, according to an Ernst and Young survey. In 2001, a report by the U.K. government estimated the size of the biotechnology market at £30 billion (i.e., $51 billion). In America alone, the biotechnology industry has more than tripled in size since 1992, with revenues increasing from $8 billion in 1992 to $27.6 billion in 2001 [33].

Telecom equipment and information technologies (IT—including hardware, software, and services) certainly are the most visible of all high-tech industries. IT spending was estimated at $436 billion in the United States and at $161 billion in Asia, while total worldwide IT spending was estimated at about $981 billion in 2002 [34]. The global telecommunication market is about the same size as the global IT market.

These figures reflect the growing demand for more abundant, more flexible, and more adaptable communication and information. Many companies use large or small interconnected computers running computer-aided design (CAD) software, artificial intelligence (AI) applications, and relational databases (RDBs). Many of these computers are connected to networks that will eventually communicate with robots, programmable tools, and sophisticated measuring instruments. At the same time, successive technological revolutions have led to constant improvements in the price-performance ratio.

Increasingly, technology is moving beyond the business arena and has reached consumer markets, which is causing significant changes in the marketing strategy of many IT firms, as we will see later on. Today the general public owns technology products as diverse as personal computers, laser disks, cable television, and portable telephones.

The electrical equipment industry consists of firms mainly engaged in manufacturing electric motors, generators, electricity transmission or distribution equipment, switchgear, transformers or other electrical machinery, equipment, supplies or components. With the growing use of intelligent systems such as Programmable Logic Controllers (PLCs) and Industrial Control and Automation Systems, the industry uses a great deal of technology. Key companies include ABB, Siemens, Schneider, Mitsubishi Electric, Hitachi, General Electric, Legrand, Toshiba, Alstom, Eaton, and Cooper Industries. The global electric power equipment industry generated $62 billion in revenues in 2002.

More and more the automotive industry is moving in the high-tech arena, as reflected by the relative and absolute value of its investment in R&D. Today's automobiles are being referred to as "smart cars." With one or more on-board computers on current model vehicles, automobiles, SUVs, trucks, and vans have become very sophisticated pieces of equipment. Electronic devices now control 85% of all vehicle functions including fuel management, ignition, electric shift transmissions, ABS brakes, and climate control, to mention a few. According to one manager of STMicroelectronics, a leading European semiconductor manufacturer, the VW Golf contained about $70 of semiconductors in the mid-1990s while by 2003, it had more than $220, three times more, and tomorrow, steering and braking will be fully electronic, using techniques pioneered in fly-by-wire aircraft cockpits. Furthermore, with the development of more environmentally friendly cars, all the major carmakers have embarked on developing new technologies, such as fuel cells like those used in the orbiting space station.

The estimated output for the aerospace industry in 2001 was about $142 billion in the United States, employing about 500,000 people. Besides the

traditional business of military and civil airplanes, recent industry developments of late within the United States have been the International Space Station, new generations of rockets such as the Evolved Expendable Launch Vehicle in the United States and Ariane 5 in Europe, and various communications, environmental, and military observation satellites.

In utilities, we must give special consideration to the nuclear industry and the solar industry, which are investing heavily in technology. Now mostly a maturing sector with no more development of nuclear power plants, the nuclear industry works on recycling and nuclear reprocessing, as well as the treatment of uranium. Closer to the final consumer, the first equipment using solar energy (for heating and road signals) has slowly started to appear. It is estimated than the size of the energy market is from $3 to $5 trillion annually. According to the World Energy Council, in 2003 solar sources provided around 10% of the energy used worldwide, while nuclear power was supplying 16% of the world's total electricity.

### 1.2.5 Market specificity

A certain number of marketing managers also indicate that when dealing with an advanced technology product, specific markets should be approached first, particularly, markets that consider performance to be the most important criterion when purchasing a product. This is valid for several industries from aeronautics to defense; they are always looking for innovations to improve performance or spur the development of new features. Furthermore, this massive transfer of technology has fueled a specific market for licensing out patents whose value was estimated at $170 billion in 2003. Recently these industries have increased their valuation of R&D, mostly by licensing technology. IBM's licensing program generates more than $1 billion a year, and other companies are trying to extract more value from their R&D efforts [35]. A key success factor on this market is to use marketing strategy actively to leverage their intellectual properties and patents, as we will see later on.

What is true in business markets is also valid for consumer markets. Some categories of customers are only interested in innovation and in increased performance for calculations, communication, or sound, whatever the price (see Chapter 3). As we will see later, however, these specific markets only represent part of the potential target market.

### 1.2.6 Product diversity in high technology

Finally, some of the managers we interviewed underlined that all high-tech products are not identical by nature. First, components should be distinguished from systems. Components are just raw materials that contribute to the building of other products. This is the case with components that are integrated in washing machines, automobile engines, and children's toys. Systems are finished products in which the technology is clearly obvious and that are sold directly to the final user. Examples include robots and AI programs.

Second, standard products should be distinguished from differentiated products, which are adapted to the customer's wants. Standard products are defined by a limited number of precise characteristics and, therefore, allow for mass production. Examples include computer memories, microcomputers, standard application software (spreadsheets, word processing), and laser disc readers.

Differentiated products allow for flexibility in order to satisfy changing demands. These demands could be for sophisticated resins that produce separation membranes for gases, fire-resistant materials, specialized robots (specifically assembled and programmed for each customer), or specific software developed for the particular needs of a customer.

This distinction between the different types of high-technology products is of importance for a company's marketing method, which will be explained in Chapter 9.

### 1.2.7 Government involvement in the high-tech sector

One last characteristic of high technology to notice is the strong influence of the public sector. Actually, since technology can become a dangerous weapon in the competition between nations, countries cannot afford not to be interested in technology. The industrial policies of MITI in Japan, the Department of Defense in the United States, the XIII Direction in the EEC, and the Ministry of Industry in France seek to influence certain technological choices and to further their national industries.

Consequently, government involvement is also another characteristic of certain high-technology products that respond to the needs of the state directly, through governmental research programs such as Eureka, an industrial R&D collaboration program comprised of 31 European countries and the European Union (EU), in Europe, or HPCCI (High Performance Computing and Communications Initiative) in the United States. Those programs are funded and managed by various governmental agencies. In the United States they are the ARPA, the Department of Energy, EPA, NASA, NIH, National Institute for Standards and Technology, and the NSF. The total for the HPCCI was budgeted at $1.1 billion in FY 1995 [36].

This governmental influence is not mentioned very much by managers, because it is not in line with the type of go-it-alone hero entrepreneurs they think they are. But it is a fact that without the Department of Defense (DOD) many Internet companies would have never existed. The U.S. government funded the Internet as a way to protect information from a nuclear strike or terrorism by creating an unrefined network to distribute information and data among research labs and university campuses. Furthermore, it created most of the first Internet companies, either by providing the technologies and staff, training people with the technology skills necessary to create the new markets, or funding startups as direct spin-offs of government institutions or through government contracts. For instance, in 1995 the National Science Foundation gave to MCI a 5-year, $50 million contract to develop the very high-speed

Backbone Network Service (dubbed as Internet II) to create a new generation IP network to connecting supercomputing centers to the first backbone. This allowed MCI to develop key competences on the government's budget.

More recently the involvement of the U.S. government has gotten involved in information technology in a new way. The aftermath of the 9/11 attacks has shown the growing inability of the various agencies of the federal government to share and analyze information. The main issue is connecting all the existing databases to make sense of all the various data spread around the different information systems of each agency. Consequently, in 2003 while corporate investments in IT were almost nothing, the U.S. government was spending $53 billion on information technology, up 8% compared to 2002.

Governments also have a significant impact on the development of new technologies indirectly through their military budget. For instance, in 1991 in the United States, defense R&D accounted for almost 60% of total government R&D expenses. In 2003, more than half the U.S. government's R&D budget still went to defense (54%) for the total value of $36.5 billion, out of a global military expenditure of $380 billion. Defense R&D expenditure is increasing; it rose by 11% in 2003, and indications are that research budgets will increase by up to $40 billion during the 2004–2009 Defense Plan. This trend is the reverse of the European Union where R&D expenditure has remained unchanged or declined over the decade in real terms to reach 8.9 billion Euros out of a total military budget of 159 billion Euros in 2002 [37].

Science has always given new opportunities for military exploitation, either to solve military problems or to offer new opportunities. Consider the case of the laser: Because it can instantaneously detect the range to a target it has solved a very old gunner problem, which is to estimate the target range. Thanks to laser systems, it is no longer necessary to fire an initial round and then adjust subsequent rounds to achieve a direct hit, so it saves time and money, and increases the chances of a surprise attack. However, the laser could also be used as an illuminator device and it opened new opportunity for the terminal guidance of a bullet or missile for accurate impact. There was no such capability before the laser and it significantly changed how commanders plan and direct battles.

Military organizations worldwide are always searching for better overall performance from technologies ranging from genetic experiments, to exploring the use of new materials in fighter jets, satellites, or tanks; and from controlling nuclear energy, to optimizing information management for attack systems (missile guiding systems, smart bombs), defense systems (optronics, antimissile missiles), and battlefield coordination (satellite spotting, battlefield communication). The superiority of high technology in modern-day warfare was exhibited during the Iraqi conflicts; it underlined the importance of high-tech products in military markets, including products as common as microcomputers, although there has been some major evolution of the technology between Gulf War I and Gulf War II.

In 1991, the most important line of military communication was the radio and there were almost no computers on the battlefield; they were put in planes, vehicles, or campsites behind the front lines. In 2003, information technologies and Global Positioning System (GPS) technology were everywhere around the theater of operations. High-speed networks, videoconferencing and e-mail improved communications across the battlefield and changed military strategy and tactics. Another system, the Joint Surveillance Target Attack Radar System (Joint STARS), had a tremendous impact in the field. Joint STARS is an aircraft-based system that uses sophisticated radar sensors to detect and stalk slow-moving vehicles in hostile territory. A high-powered computer server processes and analyzes data, then transmits the information to ground stations and command systems for planning and assessing strikes [38].

Nevertheless, the occasional or direct government support of commercial R&D developments is not a necessary condition, nor sufficient for success. Many European state-owned high-tech companies such as the French Bull Computers, the British ICL or the Dutch operator KPN have failed dramatically. One of the reasons of their failure was certainly the weakness of their marketing strategy, which they had not really worked out because they were relying too much on the governmental markets.

## 1.3 What is high-tech marketing?

Outside of its strong technical content, its sometimes hectic life cycle, and its innovative aspects, a high-tech product is first and above all a product that can satisfy a need or a want of a customer, should it be an individual consumer or an organization. The "high-technology" dimension comes only as an extra layer that is added to a product, which is actually defined by its tangible or service aspect and the nature of its consumer or industrial market. As a consequence, the marketing of high-tech products is no more than a subset of marketing consumer goods; of industrial marketing; or of services marketing, whichever the case may be. It is contingent on the technological context [39].

Marketing managers agree with this analysis and emphasize that their objectives are not very different from those of their colleagues who work with more traditional products (see Figure 1.9, which are based on interviews that I conducted). Both types of managers seek to increase their market share with higher profits while optimizing their available resources according to the product range, the price, the promotion, and the distribution.

Even if the ingredients of the marketing recipe do not change, their composition and respective importance will have to take into account the distinctive characteristics of high-tech products (Figure 1.10).

First, technology generally has a tendency to worry many customers—some are intimidated by the task of learning how to use a high-tech product, some are risk-averse to any novelty, and others are afraid that the

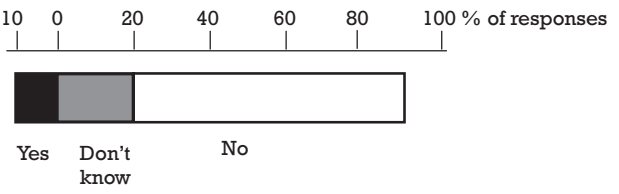


**Figure 1.9** Tabulation of responses to the question: Do you believe that your objectives are different from those of a marketing manager for more standard, traditional products?

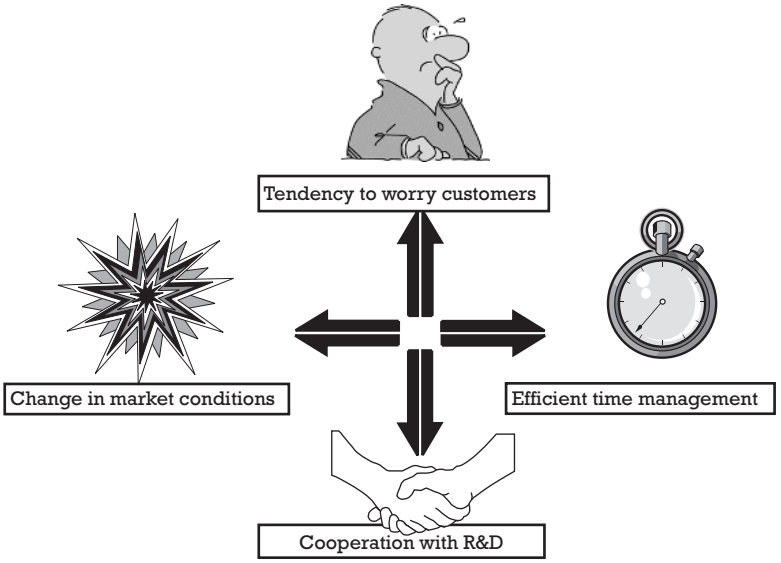


**Figure 1.10** The four distinctive characteristics of high-tech products.

current technology available will become obsolete quickly; all are always postponing their decision.

Let's take the example of genetically modified products. It certainly looks great from the producers' viewpoint, in terms of greater pest resistance and bigger yields. However, a lot of consumers are anxious to purchase products that seem no longer natural, but completely artificial. Because genetics is a very complex science, very few will read about DNA splicing before shopping at the supermarket. They are going to wait for the next generation that may provide the consumer with a solid benefit, but the next generation of products will never happen if the current generation is stopped. Ultimately, it comes down to marketing to explain this new technology, so that the people can make an educated choice [40].

What is true for consumers is also true for organizations. Many managers fret about innovative solutions and use various strategies to reduce risks in purchasing high-technology products. They try to assess the balance on the risk/return relationship of such investment much more than

considering the novelty of a technology [41]. The role of marketing is to educate consumers to innovation, to make them more comfortable with technology and to help them to figure out precisely the return on their investment.

Second, the short product life cycle requires efficient time management (development of schedules, marketing time limits). Today, the average life cycle of a personal computer, a mobile phone, and many consumer electronics, is under 1 year while the number of models or SKUs (short for Stock Keeping Unit) is increasing dramatically. In a way the consumer high-tech business is similar to the fashion business, where more than 90% of SKUs change every 6 months [42]. Consequently operational excellence and agility becomes a priority, not only in development and manufacturing, but also in marketing. Missing a sale means dropping a contribution margin from 25% to 30% of the producer's sale price in the mobile phones industry. In the mid-1990s Apple underestimated demand for two of its best-selling products; by the time it could gear up supply, it had lost around $300 million in potential sales. Worse still, the market for these products had disappeared. Apple learned the lesson and today it can now make and deliver a computer ordered on-line within 3 days.

More recently, in 2001, the European telecommunications operator Orange seriously underestimated demand for "Charlie's Angels" Nokia's handsets. The phone, modelled in the film *Charlie's Angels*, had huge sales before Christmas, leaving stock warehouses empty. Supplies of Nokia's 8210 were severely depleted and the delay cost Orange a fortune in customers (and dealers) goodwill. Orange certainly did lose customers and credibility because of this shortage.

Industrial products also have a short-term life cycle. In application software, the life-cycle duration is at most 2 years. Similarly, in the firewall market, a new product can become obsolete in as little as 12 months, and that makes time to market a critical issue for any firewall vendor, such as Cisco Systems, Nokia, IBM, and others.

Third, product innovation requires direct cooperation between research and development and other services. Numerous studies by academics and practitioners have explored the R&D-marketing interface and its role in the new product development (NPD) process. Their main conclusion is that the integration of R&D and marketing have a significant impact on the success or failure of NPD projects, both at the project and the company levels [43]. But this close collaboration is not limited to the development of new products. It is also of primary importance in all the different stages of product management, from the launch to its exit from the market, as well as in the management of the different components of operational marketing. Actually, some academics [44] and practitioners believe that the most important driver of a high-tech firm's performance is the interaction of marketing and R&D capabilities.

Finally, sometimes technology will drastically change the conditions of a market by creating an exceptional attraction for a product. For instance, consider broadband technology. Consulting firm McKinsey estimates that

on a worldwide basis in 2003, more than 40 million households and businesses had subscribed to broadband, and more than 100 million people around the world had access to it. In the United States, at the current pace of growth, broadband will achieve 25% penetration within 6 years of its commercial launch. PCs reached this level in 15 years, mobile telephones in 13 years, and the World Wide Web in 7 years [45], but this is nothing compared to radio or television. According to Bob Coen, a senior VP at the advertising agency McCann-Erickson, in 1925, only one in 10 households had a radio, but by 1930 more than 45% of households were tuning in. In 1950, slightly fewer than 10% of U.S. households had a TV, but scarcely 5 years later that number jumped to 65%.

Interestingly, one has to notice, that the marketing of high tech products crosses the boundaries of B2B and B2C. Some people tend to believe that the marketing of technology is essentially important for market organizations. The truth is that technology is penetrating the consumer markets extremely rapidly, as well, mostly through the adoption of information technologies, such as the personal computer, the cellular phone, and the Internet. This is also apparent in the strategic moves of the largest high-tech firms. Companies such as HP, IBM, Microsoft, and Nokia are marketing solutions both for business customers and consumers. Some B2B companies have managed to enter the consumer market very successfully, like HP with its digital cameras or Samsung, which is today the second leading producer of cell phone handset. Other firms have come from the other side of the technology bridge, like Microsoft or more recently Dell Computer, which have made substantial inroads into the professional markets.

Finally, it appears that traditional marketing concepts and tools should be adapted to the specific requirements imposed by high-tech products. This adaptation also applies to marketing strategy (Chapters 2 to 6), its application (Chapters 7 to 10), and the organization of the marketing department (Chapter 11).

## 1.4 Summary

The purpose of marketing is to act in such a way that a company puts products on the market that correspond to demand, that is, satisfy the needs and wants of its customers with a significant and sustainable competitive advantage and at a profit. This approach complements and replaces short-term approaches that favor the product, the manufacturing method, or the sales method. By relying on long-term customer satisfaction and by allowing the company to organize itself so that it can respond to this long-term satisfaction, marketing contributes to the company's success and its longevity.

Marketing managers in high-tech companies confirm that marketing plays this role and emphasize that their objectives are not different from those of their colleagues who work with less technologically sophisticated products in both mass consumption and in industrial goods and services. The differences appear mainly in the operational management of marketing

and, in addition, in risk evaluation due to the specific characteristics of high-tech products.

These products—which may be either goods or services—are characterized by the incorporation of a sophisticated technology, a high rate of development and improvement (i.e., a short life cycle), as well as a high innovation value for the market. For these reasons, high-tech products require large investments in research and development, and are often intended for specific markets. These products belong mostly to six industries: biology, telecom equipment and information, electrical equipment, automotive, aerospace, and energy. Products should also be differentiated as simple components or complex systems and according to their degree of standardization or customization. One last characteristic of high technology to notice is the strong influence of the public sector, either directly, through governmental research programs, or indirectly, through the military budgets.

In any case, the technological dimension is only an addition (to its value); a high-tech product is above all—depending on the case—a consumer good, an industrial product, or a service. However, the marketing strategy has to take into account the four distinctive characteristics of high-tech products, namely, a tendency to worry many customers, the need for efficient time management, the direct cooperation with the R&D department, and the ever-changing conditions of the markets.

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CHAPTER

2

# Corporate and Marketing Strategies in the High-Tech Industry

Contents



All the firms that managed to navigate successfully in the techno storm at the beginning of this decade did not survive or thrive by chance. They knew how to articulate their marketing strategy with their corporate strategy.

Indeed, the goal of a marketing strategy is to respond to the needs and wants of customers with a solution—product or service—that has a significant competitive advantage, at a profit. However, the development of a marketing strategy lies within the framework of a company's corporate strategy. Strategy may be defined as "the direction and scope of an organization over the long term which achieves advantages for the organization through its configuration of resources within a changing environment in order to fulfill stakeholder expectations" [1].

Just consider the case of one of the most significant success story in the recent years of the otherwise stagnant computer industry—Dell Computer. Although part of Dell's success is its ability to offer customized configurations at low prices to a wide variety of customers, the key success factors of the company go beyond its direct sales model, whether through the Internet, sales teams, or on-line—but never through indirect channel partners. The "Dell model" builds on three other elements that none of its competitors have been able to match fully.

First, Dell's "build-to-order system" translates into almost no inventory, 4 days of DSI (Day Sales in Inventory), and benefits from the advantage of a negative float: Its customers pay Dell before parts are ordered, which gives the firm between 11 to 26 days to collect interest on the money that it must eventually send to suppliers like Intel at the end of the month.

Second, Dell's computers are based on standard technology. Dell has chosen to piggyback on the R&D budgets of suppliers like Intel Corp. and Microsoft as they developed the faster chips and easier-to-use software that drove consumer demand. As a consequence, Dell spent far less than its competitors on product innovation. In 2002, it spent only $455 million on R&D while its larger rival, Hewlett-Packard, invested $4 billion.

Automation and standardization make for an inexpensive and commoditized product, which is emphasized by a vision of the founder M. Dell to have a "low-cost leadership" and to keep every cost, not only R&D but overhead, too, down. Finally, within the organization, a "single point of accountability" makes quality control easier and provides customers with a sense of reliability.

Competitors, most notably Gateway and HP, have tried to duplicate the Dell model but to no avail. It requires a sound strategy to integrate fully all the elements of the model in operational excellence that delivers value to the customer and profit to the company. Smart marketing is not enough.

The overlap between corporate and marketing strategy is obvious. Actually the marketing strategy contributes to the definition of the corporate strategy through the analysis of the environment and of the customers, as we will see in Chapter 3. Furthermore, marketing strategy helps the company identify its competitive advantage through a careful observation of the competitors, as we will see in Chapter 4. Nevertheless, this marketing strategy is designed to fit with the overall direction or mission of the firm. It must also build on the resources and competences available within the firm; chief among them is technology. Those competences can be "stretched" by seeking out markets where such competences have special value, or creating new markets on the basis of such competence. Finally, it has to contribute to the long-term development of the firm, which can be achieved either by organic growth or by external growth.

An absence of vision, a lack—or an underestimation—of resources available, or an inappropriate fit with the growth strategy may kill the best designed marketing strategy. This may happen either at the conception stage or, more often, at the implementation phase.

Consequently, it is of prime importance for the marketer to understand fully the big picture of the firm's marketing strategy. More specifically, the marketing team must appreciate the factors that are not always in their sphere of responsibility, namely, the definition of the overall purpose of the firm, its portfolio of resources, and its methods of development to access new technology, which are so important in this business.

## 2.1 The company's mission and vision in the high-tech industry

A mission statement [2] is a wide-ranging statement of the dominant justification of an organization, its raison d'être. The mission is defined by its skill

(What is our business?), its market segments (Who are our customers?), and its added value (What do we do for our customers?). Such a statement is usually completed with an articulation of the company's vision [3], or strategic intent [4], which encapsulates the aspiration of the firm for a significant period of time.

Successful companies know their mission in a continuously changing environment, and this knowledge gives them the necessary discipline and efficiency with which to focus their efforts on their primary task of correctly serving the identified customers. High-tech companies are not exempt from the need for a defined mission, especially because the firm's strategic orientation has an impact on its innovation performance [5].

However, high-tech companies must be careful not to define their mission in terms of the product ("we are an advanced robotics company") or the technology ("biotechnology is our specialty"). They must instead focus on the market and the customers, because products and technologies will pass but the needs and wants of the customers will continue to exist. Therefore, for instance, a company's mission is not to manufacture computers, resins, or lasers but to offer the possibility of faster calculations, increased fire resistance, or a more precise cut of steel.

To focus on markets and not technology has a very important strategic consequence regarding the entry market strategy. Some companies will try to push radical technology to reap the profit of innovation and market leadership [6]. For instance, in 2002 Nokia's strategic intent was to "take a leading, brand-recognized role in creating the Mobile Information Society by combining Mobility and the Internet while stimulating the creation of new services." Similarly, Kunitake Ando, Sony's president, thinks that "Sony's mission is to make our own product obsolete. Otherwise somebody else will do it."

Others firms will go for a less risky strategy of "innovative imitator," by incorporating the key element of the "dominant design" or standard in their products, as Dell computer does (see the discussion of Dell at the beginning of this chapter) [7]. A third category of firms will just try to project a high-tech corporate image in order to impress their customer [8]. So, in the defense industry some service firms fashion themselves as being innovative just because the environment emphasizes technological innovation and scientific research [9].

Furthermore, because of the quick evolution of technology and the environment in the high-tech sector, the time frame for the definition of a strategic intent, and sometimes for staying at the top of a firm, is always much shorter than in more traditional businesses. This point is confirmed by S. Tchuruk, CEO of Alcatel, the giant European telecom equipment maker, who joined Alcatel in 1995, after more than 30 years in the oil and chemical industry: "When I was in the oil industry, it was much easier. You knew what demand was and could easily predict your output." Still S. Tchuruk is one of the great survivors of the telecom equipment industry. From 1995 to 2004, there have been six chief executives at Ericsson, four at Nortel, and three at Lucent.

**Business Case: Samsung**

For years, South Korean Samsung Electronics was known as a cheap manufacturer of electronic goods and as one of the world's largest maker of memory chips. Howevers at the end of the 1990s, the company repositioned itself by offering original home appliances and sleek handheld devices, such as voice-activated mobile phones, PDAs, and MP3 players. Now its brand name is as famous as Sony, Nokia, or Philips. The company was valuated at $8.31 billion in 2002, up from $6.37 billion in 2001, and was recognized by Interbrand Corporation as the fastest growing global brand. In the cellular phone business, Samsung switched to the mid- and upper-tier segments instead of focusing on the low-end market. Today, in western countries, the average selling price of Samsung phones is higher than that of Nokia products.

According to Eric Kim, one of the firm's executive vice presidents for marketing, the main reasons for this success are twofold. First, the company has exploited new opportunities provided by the "market discontinuity" caused by new digital technology making consumers more open to consider new brands. Second, there was a determined marketing strategy to move up market very aggressively.

Samsung Electronics defines its strategic vision as "Leading the Digital Convergence Revolution" and its mission to carry out this vision is to be a "Digital-$\varepsilon$ Company."

This vision is split in two elements. First, being "Digital" means producing not just digital products, but products that inspire digital integration across the entire company. Second, being an "$\varepsilon$" company requires using $\varepsilon$-processes to connect R&D, production, and marketing to customers, partners, and the market. This disciplined approach relies on Enterprise Resource Planning (ERP) to bring value to every part of the supply chain.

Consequently, Samsung Electronics pledges to network its core components (i.e., memory chips and system LSI and LCDs as well as audio/video, computers, telecommunication devices, home appliances, and other stand-alone products) into a total solution ushering in an era of of digital convergence.

Question 1: How are Samsung Electronics' mission and vision reflected in its product strategy?

Question 2: What are the implications of Samsung Electronics' mission and vision in terms of business portfolio strategy?

## 2.2 The strategic dimensions of technology

Due to the nature of the high-technology business, companies in the high-tech sector have to spend more time strategizing than in more traditional businesses. To assess its importance as a core competence or key resource, first we will introduce the concept of technology life cycle. Then we will see

why so many companies are usually unable to anticipate the market impact of radical technologies, and may die as a result. However, to move beyond the introduction phase of a technology is not enough for a firm to succeed. So we will examine how to establish a technological standard during the growth phase of a technology, and what contribution the marketing department can make on this subject.

### 2.2.1 The technologies' life cycles

Paralleling the concept of product life cycle is the concept of technology life cycle. Any technology will go through different steps, which are important to be understood by strategists and marketers.

The concept of the technology life cycle characterizes the development of technology in a way that is similar to the evolution of organisms. Various forms emerge at the beginning; then the rate of new development declines, extinction sets in, and only a few major alternative forms persist at the end. Once the technology reaches the market, we can correlate the efficiency of its applications and the resources invested in developing its potential (see Figure 2.1).

In the introduction phase, when the company invests heavily, the earnings are slow and not very significant. This is the time when radical technologies are introduced, such as nanotechnology, for example (see Chapter 1 for other examples). It is often a painful process for customers who are experiencing the "bleeding edge" of leading edge technology. Fortunately

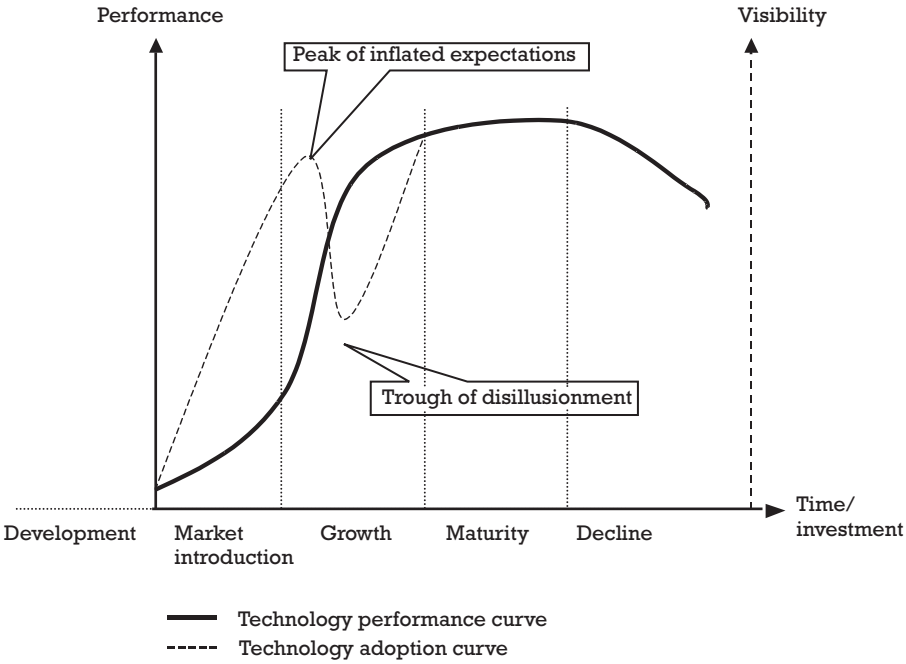


**Figure 2.1** Technology life cycle.

those customers are usually technology specialists who long for this kind of situation, as we will see in detail in Chapter 3.

In the growth phase, the accumulation of knowledge and competence leads to significant earnings. At this stage, one may find a wide range of early experiments with radically different designs aimed at improving the technology.

Very often, the growth phase in performance is not mirrored in the adoption rate by the market. Indeed, the early success of technology tends to create hype and unrealistic expectations. Technology reaches a peak of perception that the Gartner group [10] adequately names the "peak of inflated expectations." This is usually followed by a time of disenchantment, because the new technology's performance does not match the expectations of customers. This was the reason why so many dot-com companies like Webvan, Boo.com, and others, imploded at the beginning of 2000: They were not able to deliver quickly and nicely what they had trumpeted to the world. However, technology keeps improving and once the gap between fad and reality is bridged, the real value of the technology appears to the market.

"Pervasive computing" or "extended Internet" technologies illustrate the point. Today the whole model that a personal refrigerator would dial Webvan and order groceries for the consumer is clearly dead, but pervasive computing applications are taking root slowly in industrial settings, far from the consumer market. Chips, sensors, and wireless and software applications are improving constantly in order to collect and interpret data remotely and instantaneously. Small companies, such as emWare, a software firm, or Ubicom, a chips manufacturer, as well as large firms, such as IBM or Accenture are working hard on those technologies and consider it as their second chance at the e-commerce revolution. EmWare makes low-cost, easy-to-implement, built-in software that automate the management of new and existing intelligent remote devices, such as industrial controllers in water treatment plants or remote control of home heaters. Ubicom offers low-cost wireless network processors (between $7 to $9) that enable users to connect all kinds of devices from cooling systems to overhead projectors, which can be supervised remotely [11].

As better designs are found, it becomes progressively harder to make further improvements, so variations become more modest, leading to the next phase, the maturity period. This is the time of incremental innovations. During this period, the growing returns undergo a constant improvement of performance (this is now the case for microprocessors in the computer industry or 35-mm film in light-proof canisters in the photography industry). As producers and customers agree on product characteristics, and as the market expands, a transfer might occur from product to process innovation. As an industry becomes more stable, greater confidence is placed on the use of specialized and expensive equipment. This is the case for PCs, where the challenge for firms is to build faster and cheaper and to produce a larger volume of hardware boxes with a limited number of features selected by the customer. American Dell Computer, Taiwanese Acer, and the Chinese

Legend appear to be the champions in mastering the mass manufacturing process required at that stage. In the software industry, Java and XML are two typical examples of mature technologies whose performance is reaching a plateau.

The last phase, a decline or saturation, arises when the physical limits of a technology have been reached, and/or when additional spending and efforts in R&D do not increase penetration or sales, such as in the fixed phone business today for instance.

As seen in Chapter 1, the technology life cycle is similar in phasing to the product life cycle; however, it is different because a product is an output of technology at a given time. This translates to the fact that in each step of a given technology there may be various products with their own life cycles (Figure 2.2). For instance, mainframe technology is at the maturity stage. In 2003 mainframe computers constituted 13% of the computer market, and IDC estimates that they will decline to 8% by 2006, but companies still launch new mainframes, such as the IBM z990, which comes equipped with the latest software available such as WebSphere, Java, and Linux.

More than an absolute physical limit, companies should evaluate a technology's relative limit compared to other technologies. In general, competing technologies are linked together along a growing spiral, which indicates that a new technical procedure requires a higher investment, but with a starting performance much closer to the maximum that it replaces (see Figure 2.3).

This positioning of different technologies is not always easy to carry out. Emerging technologies are often difficult to identify, and performance levels cannot be determined easily because the products still are not well known

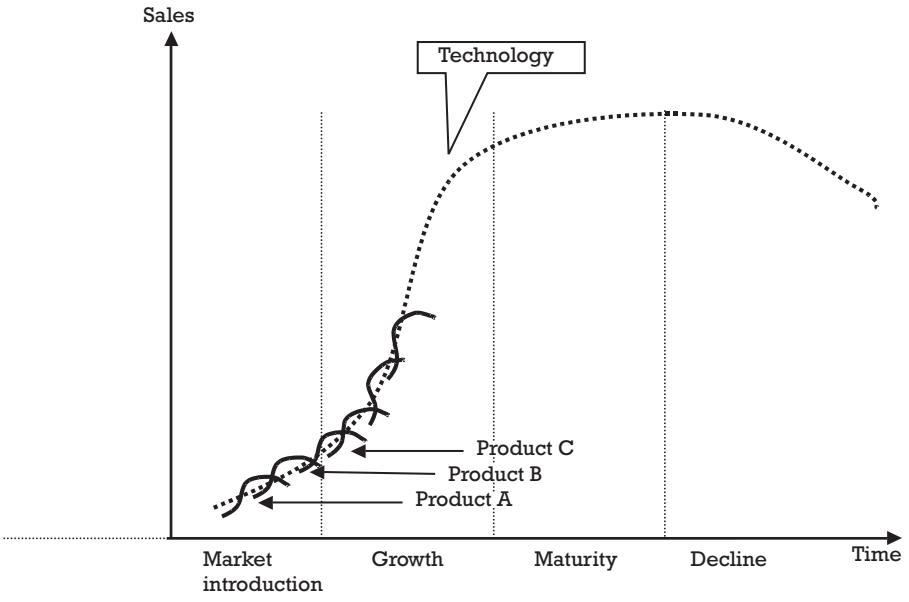


**Figure 2.2** Technology life cycle and product life cycle.

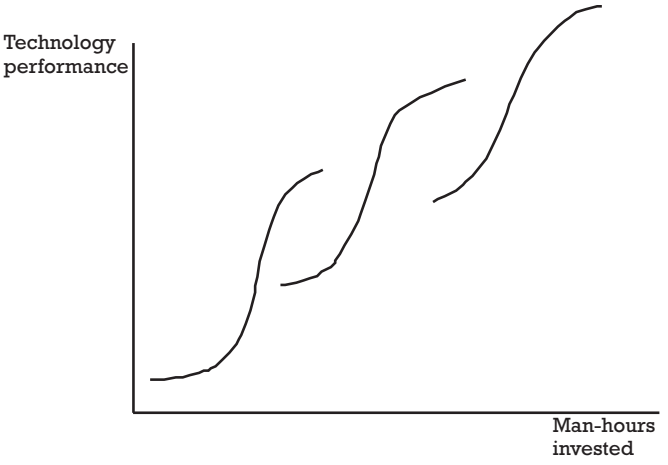


**Figure 2.3** Competitive evolution of technologies.

(see Section 2.3.3). On the other side, the competitive pressure of a new technology tends to provoke a vigorous improvement in the old technology. Everyone knows that wooden sailing ships enjoyed a renaissance between 1860 and 1880, shortly after the invention of the iron hulls and compound steam engines that were to supersede them by the beginning of the twentieth century. Similarly, the gas lamp for interior lighting was enhanced tremendously just after the appearance of the incandescent electric light bulb.

More recently, in telecommunications, some improvements often achieved with only minor modifications have produced order-of-magnitude gains that have effectively, postponed the introduction of a new generation of transmission technology. Time-division multiplexing, for instance, now allows a pair of wires to carry 24 voice channels instead of just one; consequently, this made fiber optics and cable more expensive and less attractive as a solution for local and low-volume connection.

Similarly, in the 1980s the prospects for communication satellites declined in Europe with the introduction of a new generation of fiber optics, which offered a massive and secure increase in channel capacity at a transmission rate of 500 megabytes per second (versus 50 megabytes per second at the end of the 1970s). However, it is important, for a marketer and for a company, not to believe in the invulnerability of a technology's life expectancy on the supply side.

### 2.2.2 The introduction phase of technology: why are companies usually unable to anticipate the market impact of technologies?

Sometimes, it takes a very long time for a new technology to emerge. Just consider the case of Speech Recognition software, whose goal is to replace keyboards, pushbuttons, and knobs with speech input. The prospective potential has attracted both big and small firms—IBM and ScanSoft, as well

as Voice Signal Technologies and Sensory, Inc. However, even after 50 years of basic research, this is still a market in the making.

Even in the case when the technical feasibility of an innovation has been confirmed, it seems that very frequently people are unable to anticipate the future business impact of auspicious innovations. For instance, the inventor of the radio, Marconi, believed it would mainly be used by steamship companies, newspapers, and navies needing to transmit private messages over long distances where communication by wire was impossible. No one originally conceived of communicating to a large and dispersed audience of listeners, rather than to a single point. The first public broadcast imagined was the transmission of Sunday sermons—the sole event where one individual would address a mass public [12].

Similarly, at the end of the 1940s, the computer was considered useful only for carrying out rapid calculation in limited scientific and data-processing contexts. The dominant judgment, shared even by Thomas Watson, Sr., then the president of IBM, was that world demand could be met by a very limited number of computers.

Likewise consider the case of the laser, another major innovation of the twentieth century, whose range of uses has expanded in so many directions since its invention. Lasers are used for precision cutting in the textile, metallurgy, and composite materials industries as well as in various surgical procedures. They produce high-quality sound in compact disc players and high-quality text and drawings through laser printers.

Furthermore, combined with fiber optics the laser has revolutionized telecommunications. In the 1960s, the best transatlantic phone cable could carry only 140 conversations concurrently. In 1988, the first fiber-optic cable could convey 40,000 conversations concurrently, and in 1997, CNET, the research and development laboratory of France Telecom, the French telecommunication carrier, failed to saturate the transmission capacity of the last generation of fiber-optic cable, meaning that the transmission capacity is almost limitless (Figure 2.4). Despite this achievement, the patent lawyers at Bell did not apply for a patent to the laser, believing it could not attract interest in the telephone industry. All of these examples, among many others, of failure to foresee the future business impact of technological innovations tell of our inability to overcome the uncertainties associated with new technology. This failure can be explained by four factors.

First, very often, new technologies come into the world in a rudimentary condition, and it is not always easy to predict the trajectory of future progress in performance, size, price, and economic consequence. The first electronic digital computer, the ENIAC, was unreliable and consisted of more than 18,000 vacuum tubes that filled a huge room. It was difficult to imagine in the 1940s that one day a computer more powerful than the ENIAC would be the size of a laptop (or even smaller). Similarly, when the transistor was invented, few people would have believed that one day the integrated circuit, a component in itself, would eventually become a computer with the creation of the microprocessor in 1970.

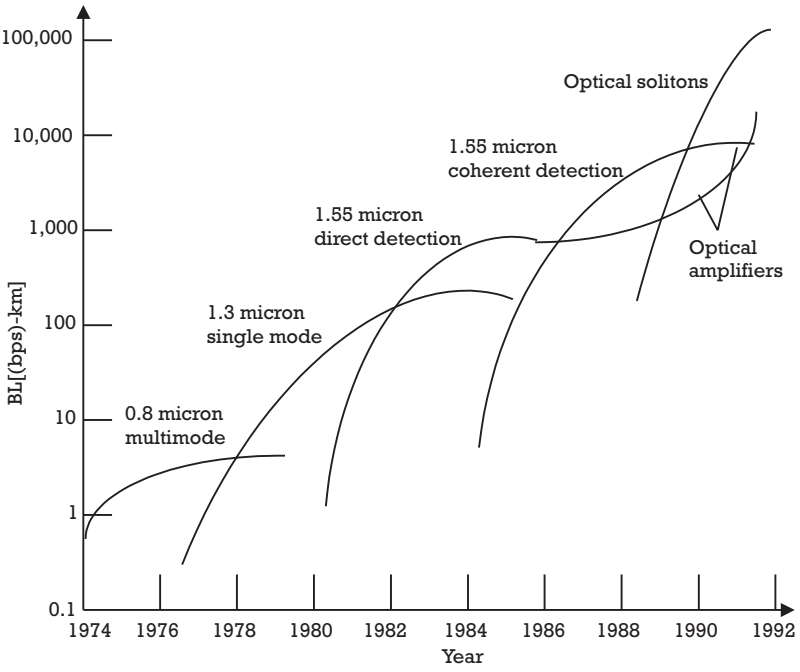


**Figure 2.4** Increase in the bit rate-distance product for five generations of fiber-optic communication systems. (*After:* [13].)

Second, identifying uses for new technologies is difficult and takes time, especially when they emerge from pure scientific research. Faraday discovered the principles of electromagnetic induction in 1831, but it took many decades to find applications for electricity.

At the same time in 1947, when the transistor was invented, it was first proposed that this new device might be used to develop better hearing aids for the deaf. None envisaged the future connection with computers.

The third reason why it is difficult to beat the uncertainties associated with new technology is that, frequently, the impact of an innovation relies on complementary inventions, which contribute to a full system solution that will add to its performance and, consequently, its demand. For instance, Edison's system of incandescent lighting required the simultaneous development of lamps, generators, sockets, and wiring.

Similarly, the telephone has existed for more than 100 years, but only recently has its performance been improved by facsimile transmission, voice mail, conference calls, data transfer, and on-line services, for example. In the telecommunications industry, the laser was useless on its own. Associated with fiber optics, however, lasers are revolutionizing telephone transmissions.

Though optical fiber was available in a primitive form in the 1960s when the first lasers were developed, it took many years to discover that fiber-optic technology allow a tremendous augmentation in bandwidth, because the light spectrum is a thousand times wider than the radio spectrum. In

addition, fiber-optic technology provides a better quality of transmission because of its lack of electromagnetic interference.

The recent explosion of demand for PCs has been fueled by network system add-ons, such as modems, LANs, and connections to the Internet, as well as by the integration of various software applications in one package, chief among them being Office by Microsoft and SmartSuite by IBM.

The development time for these complementary innovations can fluctuate very significantly. For example, after the dynamo was invented in the early 1880s, electrolytic techniques were created contiguously, giving birth to a prosperous electrochemical industry, but it took more than 50 years to see the arrival of the electric motor.

Similarly, the transistor and, later, the integrated circuit were introduced into computers years behind their invention to transform the computer industry. Ultimately, the integrated circuit itself became a computer with the advent of the microprocessor in 1970.

One must note that the development of such interconnected innovations integrated into a system solution creates barriers to aspiring competitors because of the complexity of the offer to build. As we will see later, the existence of complementary inventions intensifies the need for technological standards and alliances.

The fourth reason that makes predicting the uses of a new technology difficult is that many inventions proceed to solve a specific problem, but often turn out to have unexpected uses in unexpected conditions.

Consider the role of the computer in the car industry. Computers are used:

- For the aerodynamic research and design of cars and components;
- For manufacturing through robots and automatic assembly lines;
- For controlling the car's systems (such as the braking system, fuel consumption monitoring, and maybe someday the automatic pilot);
- For determining optimal driving paths;
- For ticketing and controlling access to highways;
- For monitoring traffic lights (and minimizing traffic jams) in major cities.

While many companies are left behind at the introduction phase of a radical innovation, the ones that go through have yet to impose their technology on the market in order to stay in the game during the growth phase of technology.

### 2.2.3 The growth phase of technology: how do you establish a technological standard?

High technology is a "winner-takes-all" industry. It is well known that Microsoft controlled 97% of the global desktop OS market, compared to just 2% for Apple Macintosh and 1% for Linux in 2002. Intel controls 82.8% of

the worldwide market for PC processors, leaving most of the rest to AMD, which holds 15.6% of the market; Taiwan's Via Technologies and Transmeta accounted for the remainder. Similarly, in the PDA market, the two leaders represent 81%of the total market; in video game stations, three firms control virtually the entire market. Similarly, in the computer database software area, the top five relational database software companies represent nearly 90% of sales worldwide. Dynamic random access memory (DRAM), the most common kind of random access memory (for personal computers and workstations), reflects slightly less dominance, with four leading companies representing 73% of the market. Finally, the five biggest players in the PC market represent 40% of the market.

Standardization usually appears during the growth phase, when a technology starts to reach its peak and new competitors want to offer solutions or products to a growing number of customers. For instance, in the on-line service industry, after initially pursuing a nonstandard strategy, late entrants into the field, such as Microsoft and AT&T, followed the standards in foundation technologies first adopted by Prodigy and AOL.

Contrary to what a lot of technologists think, the "best" technology does not always manage to become the de facto standard. A large catalog could be filled with the list of firms that developed a superior technology but which failed to establish their technology as a standard. In the field of PCs alone, one may think of Apple, IBM, and Next, which have lost a battle against the so-called Wintel alliance. Today, Microsoft is fighting hard with Nokia to impose its operating software as the standard of the new generation Web-friendly phones.

Actually, experience shows that in growth markets where two or more incompatible technologies compete, any modification, even a small one, in the original situation may help one technology secure a lead big enough eventually to lock in the market and become the de facto industry standard. Consequently, competing technologies are locked out even if the dominant technology is clearly inferior.

A classic example of a market locking in an inferior technology is the QWERTY format for typewriter (and now computer) keyboards. The QWERTY format was originally developed in the 1860s to slow down typing speed by separating keys whose letters frequently appeared next to each other in words. This design helped to diminish the inclination of type bars to collide and jam when keys were struck rapidly, which was a persistent problem on the first generation of manual typewriters.

The technical problem of having the type-bar jam was fixed in the 1890s, and new keyboard formats were developed for faster typing. However, they were a flop on the market, because the first touch typists had been trained on QWERTY keyboards and did not want to change even for better keyboards. By the 1910s, the QWERTY keyboard was locked in as the standard and still is nearly a century later.

Traditional theory states that industries are inclined to diminishing returns as a result of firms competing for scarce resources. However, according to the law of increasing returns, returns from marginal investments go

up rather than down. As some firms continue investing, their profitability grows, and eventually one or two firms end up dominating the market, because the other firms are unable to match their level of investment.

Archetypal examples of increasing returns are utilities, which are consequently regulated as de facto monopolies. Still, the law of increasing returns plays a large role in the high-technology and knowledge-based industries of today. Interestingly, there are at least six different and complementary ways to stimulate the creation of a standard.

*1. Provide an open architecture* The first condition of success pertains to marketing. It depends on the willingness of the industry to expand opportunities for other participants.

Keeping a proprietary technology exclusive is a must, but is extremely difficult. Some firms have managed to build powerful patent and/or copyright walls around their original technology coupled with aggressive legal enforcement to prevent copying by potential competitors, such as Xerox did with its proprietary dry-toner xerographic technology, or Intel with its X86 and Pentium microprocessor series.

However, thanks to the use of reverse engineering techniques, in many industries patents can be quickly circumvented. As a rule, patents ordinarily delay but do not stop competition. They may even push efficient competitors to invent in-house technology that may be better, like in the photocopier business where Xerox's competitors developed their own liquid-toner xerographic technology.

Consequently, in order to become a winner, one has to make its technology ubiquitous, readily accessible, and widely available not only to customers but also to "complementors" [14]—companies that provide the products and services around the technology. Complementors and users will grow the total market.

The classic example involved the strategic decisions made by Matsushita and Sony at the dawn of the age of the videocassette recorder (VCR). Matsushita licensed its VHS technology to other consumer electronic enterprises, including Hitachi, Sharp, Mitsubishi, and Philips NV, and formed an original equipment manufacturer (OEM) agreement with GE, RCA, and Zenith. In doing so, Matsushita put together a large network of firms eager to push the same technological solution to the end-user, while Matsushita continued to compete against these companies in the consumer market place under the JVC brand name. Consequently, it managed to win over its main competitor, Sony, whose product was based on a different technology called Betamax, and which refused to open its technology to any other players in the market. The lesson was not lost on Sony when it launched the 3.5-inch computer disk drive in 1984. First, Sony sold or licensed its new technology to leading PC producers, including IBM, Apple, Compaq, and NEC. Consequently, the 3.5-inch disk drive quickly became a worldwide standard in this global industry and Sony achieved a 50% market share.

Likewise, by choosing to license its operating system to a large number of vendors, Microsoft has expanded its revenues from $3.75 billion in 1993

to $28.4 billion in 2002. During the same period, Apple, which refused to license its operating system to a large extent, has seen its market share decline dramatically.

Similarly, when Novell made the decision to divest its LAN hardware business and to focus exclusively on software, it opened opportunities for other companies to launch products and lessened worries that it might use its network operating system unfairly to benefit its hardware business. As a consequence, the LAN business exploded and Novell increased its revenues from $120 million in 1986 to $2 billion in 1994. Novell's revenues declined, however, to $1 billion in 1997, after Microsoft entered the competitive arena with Windows NT.

In the jet-engine business, CFM International, the joint venture between General Electric and Snecma, managed to make its CFM-56 engine a success story by enlarging its market continually. The first sales were small and difficult: the first customers were the United States and French armies in the late 1970s. CFM worked hard to improve its technology and, in 1981, Boeing made the decision to equip all of its B737 airplanes with CFM engines exclusively. Next, CFM developed a new version of the engine to be installed on the Airbus A320 and A321, and then the A340, constantly improving the cost/quality ratio through an aggressive management of the experience curve. In the end, the growing number of customers provided a de facto monopoly position for the CFM engine in the medium-sized aircraft range. By the early 1990s, CFM received more than 6,000 orders from 160 different airline companies.

We see the same outcome in a completely different technology-dependent industry—media and entertainment. Mental Images, a German software firm, has managed to control more than 90% of the market for movie visual-effects. Its core product is Mental Ray, a complex software using powerful algorithms to interpret instructions describing a three-dimensional scene and turning these instructions into images that look realistic on screen. Mental Ray was not conceived as a product for end-users, but as a module that other software makers such as AutoDesk or Softimage, or visual effects companies such as Industrial Light & Magic, or Sony's Picture Imageworks, incorporate into the programs they made for the film industry.

However, to create a standard, a company must own a key platform technology. In the beginning of the 1980s, IBM decided to create an attractive standard for the desktop computer by offering an open architecture. IBM relied on Microsoft and Intel to provide the core technology and mobilized various firms behind it, but failed to hold ownership of this platform technology and lost its ability to control the evolution of standard to Microsoft and Intel.

*2. Be compatible to generate increasing returns* The value to a customer of many high-tech solutions is a function of the availability of complementary solutions, like software applications for a PC, or the coverage of the telephone network for a cellular handset. In order for all those complementary solutions to work well together, compatibility is essential.

In the personal computer industry, compatibility is required to ensure that computers, software, modems, printers, and other peripherals interface easily. In the cellular telecommunication market, compatibility demands a common set of technological standards for the design of cellular base stations, digital switches, and handsets, to ensure maximum geographical coverage for users. The larger the coverage, the greater the value for customers and the bigger the future demand, leading more customers to invest in the expansion of the network [15].

Increasing returns explain why the cellular phone caught on more quickly in Europe than in the United States in the 1990s. In Europe, more than 900 telecom vendors and operators backed only one technology, the Global System for Mobile Communications (GSM), while there were four different and noncompatible technologies in the United States. The value for the cellular phone users clearly was much bigger in Europe than in the United States. The value of increasing returns varies according to the different categories of networks (see Figure 2.5).

The simplest communication networks are the "one-to-many" broadcast networks like television. Their value is proportional to $N$, the size of the audience: the more the audience, the greater the value of the network (and the more you can charge advertisers). This is sometimes known as Sarnoff's law, named after one pioneer of the broadcast industry.

A second type of network is the "many-to-many" telephone network, where everyone can communicate with everyone else. AT&T's long distance network, Yahoo or AOL provide good examples of this second category. In this case, the total value of a communications network grows with the square of the number of devices or people it connects ($N2$), as pointed out by Bob Metcalfe, inventor of the Ethernet.

A third category of networks provides the ability to interconnect independent networks, such as Group Forming Networks (GFNs) on the Internet, whose conferencing capabilities allow more than just two-way conversations. Chat rooms, discussion groups, auction hosts such as eBay,

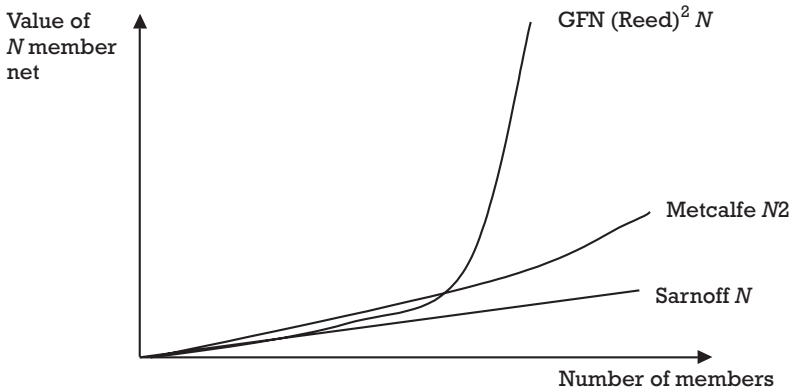


**Figure 2.5** The different increasing value returns of the different categories of networks.

user groups buddy lists, trading rooms, and marketplaces allow groups of network users to combine and communicate around a common interest, topic, or purpose. In that case, David Reed, a former research scientist at Lotus, proved that the value of the network scales exponentially with $N$ ($2N$).

*3. Minimize production cost* Increasing returns occur because of the marginal cost of production, as with many knowledge-based products, such as software, information, or drugs, which can be produced for next to nothing. Therefore, any additional market share has a tremendous impact on profit. For example, the first product by Netscape was a browser based on the Mosaic Technology developed by one of the company's founders at the University of Illinois; and it exploited the vast (free) resources available on the Internet. This marriage of browser technology to a wealth of content, combined with its controversial marketing strategy to give the browser away, enabled Netscape to enter the market quickly and capture a market share of 75%.

On the Internet, standards have emerged around basic foundation technologies (but not yet for sound, graphic, video, and animation software) as connectivity protocols like TCP/IP offer more flexibility at far lower cost than equivalent nonstandard technologies. Soon TCP/IP won over Open System Integration (OSI), which likewise is a technical standard but too costly to introduce widely.

Similarly, being free of charge is one of the reasons why KaZaA has become the most popular file-sharing service on the Internet. In the first semester of 2003, its 60 million worldwide PC users downloaded more than 90 million copies of files.

However, cost control is also mandatory for products in order to cut price and increase market share, thus achieving or conferring a leadership position. In the electronics industry, for instance, product costs—measured by the cost of goods sold (COGS)—are critical to profitability, because of their proportion of the total revenues, which is about 80%. Most of the differences in profitability between the more and the less successful companies are attributable to COGS, rather than operating expenses. A 5% savings on COGS may have a positive impact of between 50% and 200% on the profitability before taxes. This is one of the reasons why many industry leaders are transferring production (assembly) to China: since the labor element of most electronic products accounts for 10–15% of the total cost, it can have a direct, bottom line improvement of 7% in COGS, and even taking into account added logistics costs [16].

Let us consider the success of Kodak in the photography industry. One may wonder how a small provincial American firm became the global market leader instead of the mighty German firms that were mastering the sciences and technologies of optics, fine chemicals, and camera design. A likely explanation lies in the fact that German products frequently were very expensive and hence manufactured in small quantities, while George Eastman, the founder and president of Kodak, targeted his resources on an

international mass market, with a large-volume production at low cost. So, for example, he did not hesitate to substitute his original camera with what would be his famous number-one model, because the former shutter system was too onerous to produce.

*4. Go global* In our global economy, increasing returns on investment follow the firms that penetrate one large geographical market after another. In the software industry, the swift growth of the German SAP relied on the increasing acceptance of its Enterprise Resource Planning (ERP) software as the governing standard for running every aspect of a company including managing orders, inventory, accounting, and logistics in various part of the western world. In 2003, 17,000 companies in more than 120 countries ran more than 44,500 installations of SAP software.

Similarly, in telecommunication, Nokia was a Finnish company in the 1980s; it was a European company in the early 1990s and by the late 1990s it was truly global [17]. In 1997, Nokia shipped just over 20 million units; in 2001 Nokia shipped 140 million units, about one out of every three cell phones in the world and less than 3% of Nokia's revenues come from Finland.

KaZaA, the world leader of file sharing software application, went global from scratch. It is registered in the South Pacific island nation of Vanuatu. Its domain is registered in Australia. The servers are in Denmark and the software is in Estonia.

*5. Invest more than your competitors* Increasing returns happen when competitors are unable to match each other's investments, like in the microprocessor industry or in the software industry. For instance, in 2002, Intel invested more than $200 million in more than 100 companies worldwide. Through its venture capital division, Intel has invested in more than 1,000 information technology companies in more than 30 countries. In the second case, one thinks immediately of Microsoft, whose $43 billion cash and investment capacity dwarfs its competitors in the domain of operating systems and application software for PCs. Less widely known is the case of Oracle, which stands alone in the database business for exactly the same reason.

*6. Create a supportive network* Increasing returns turn up because in the high-tech sector firms tend to work together to ensure the success of a joint product or service by forming a business net. The addition of more firms to a group creates an incentive for other firms to join, thus providing the necessary momentum and critical installed base to make a technology successful enough to become a de facto standard and wipe out other competitors' technology. Wintel (the alliance of Intel and Microsoft), SAP, and Lotus (which now belongs to IBM) have made and forged an entire industry around their solutions, namely Windows, R/3, and Notes, with application developers, system integrators, trainers, and hardware companies working together to provide solutions to end-users.

Similarly, the regrouping of various aircraft companies like Aerospatiale, British Aerospace, MBB, and Casa within the Airbus consortium has provided the critical size and the credibility to convince airline companies to buy Airbus aircrafts. Success leads to success, and Airbus has managed to develop its customer installed-base continuously. In 1997, for the first time in its 30-year history, Airbus received as many orders as its arch rival Boeing—425 new planes—and 2002 it had a bigger market share of 54% versus 46% to Boeing.

More recently computer industry heavyweights such as Ericsson, IBM, Intel, Microsoft, Motorola, Nokia, Philips, 3Com, Toshiba and hundreds of smaller companies have agreed to back and promote a new communication standard, Bluetooth. This is an evolving short-range networking protocol for connecting different types of digital devices by wireless signals within a 35-foot range. The goal of the standard is to overcome the difficulty of getting different devices "to talk to each other." With Bluetooth as a common standard, users will be able to connect a mobile phone with a computer, or access the Internet via their mobile phone. The first Bluetooth Products from Hong Kong companies went into mass production during 2002 and they still have to pass the test to become the standard, since many customers have been disappointed because of lack of interoperability among different vendor implementations.

Likewise, RealNetworks, the digital media software company that enables consumers to download video and audio from the Web has struck deals that will make its media player the de facto standard in mobile phones made by Nokia, Samsung, Siemens, and Panasonic, operating on Symbian software.

The lesson is clear: In high-tech industries where increasing returns exist and standards are important, the guideline for success is to maximize the installed base of users by offering them solutions to fit their needs. To achieve such a goal, market-oriented firms are definitely better positioned than technology-oriented firms.

## 2.3 Technology as a strategic resource competence

A clear and strong mission must be backed by some unique and sustainable competence in order to create value for the customers and gain a significant competitive advantage for the company. Competences come either from people or technology or very often from a combination of people and technology.

Consequently, one goal of corporate strategy is to assess the various competences it has, or is required to have, to realize its vision [18]. The value chain analysis is the most powerful analytical tool to do that.

Regarding competences, former IBM CEO Lou Gestner used to say that technology has limitations on what it can accomplish while people do not. He was certainly right and probably would not have succeeded in turning IBM around in the 1990s had it not been for the exceptional skills and value

**Business Case: Linux**

The Linux operating system for servers and PCs is gaining ground. It is now pushed by big firms such as IBM, Intel, HP, and Dell, and is used by large companies such as DaimlerChrysler and Morgan Stanley. Starting from zero in 2000, it represented 14% of the $51 billion market for server computer and should reach 25% of the market in 2006, reaching second place behind Microsoft, according to market researcher IDC.

Linux has all the qualities to become a new standard. Its open architecture makes it compatible enough to run everything from a Fujitsu or Silicon Graphic mainframe to a Nokia cell phone.

It comes with almost no production cost, because it can be downloaded off the Web for free. Linux was also born global. Written in Finland by a young programmer, Linus Torvalds, it was quickly adopted by universities and lab researchers all over the world. Its global reach is mirroring the geographical growth of the Web itself. Recently Linux has made significant inroads with governmental services in the United States, but also in the United Kingdom, South Africa, and Costa Rica.

Because it is an open architecture widely available on the net, developers all around the world can contribute freely to any development or improvement of the program. This represents an investment in time and people than even a cash-flush giant as Microsoft cannot match.

However, the real push for Linux came from its backing by the major computer manufacturers, which want to use it as a competitive tool against Microsoft. Linux got a big boost the day Intel unfastened its close association with Microsoft and started making chips for Linux. Such a backing was perceived as a commitment to the long-term viability of this new operating software by major corporations, which desperately wanted freedom from the Microsoft monopoly.

All the major players of the industry have been very careful to support Linux as a new standard. They are anxious to leave behind the trouble of Unix in the 1980s, an earlier attempt to install an open architecture on microcomputers and servers, which failed miserably because each vendor developed its own version of Unix. Consequently, they pledged to release any advances that they develop in the Linux kernel back to the open-source community.

Question 1: Since Linux is free, how can software companies make money with it?

Question 2: If you were Microsoft, what would be your marketing strategy to counter this rising standard?

of IBM employees. However, because technology is a determinant factor of the high-tech business, top management must focus most specifically on technology as a way to achieve a core competence.

### 2.3.1 The physical and virtual value chain model

Value chain analysis helps to describe the various separate activities within a firm and to assess their performance when combined into a system in producing value for money solutions.

According to the now-traditional model introduced by M. Porter [19], there are five categories of primary activities and four categories of support activities. This model helps top managers to pinpoint the key activities of the firm and their interrelations with others to yield maximum value for customers in comparison with competitors. It allows them to identify the core competencies required to perform in a given business.

The primary activities are the following:

- Inbound logistics receive, store, and distribute the inputs.
- Operations transform inputs into the final product or service through manufacturing, assembly, and packaging. Solectron has developed a unique competence as a manufacturer of computer hardware, for instance.
- Outbound logistics store and physically distribute the solution to the customer. Many Taiwanese firms such as Acer or Quanta, the largest notebook PC producers in the world, have built a strong competence on logistics thanks to the global business infrastructure of Taiwan.
- Marketing and sales make customers aware of the solution and provide them with the way to buy it. Dell has developed a competence in direct marketing while Microsoft has a strong competence in brand building.
- Services maintain or increase the value of the solution through installation, maintenance, or training. WilTel Communications, an American network services provider for heavy bandwidth users, such as global telecommunications and media and entertainment companies, has won many awards recognizing the company's focus on customer service tools.

Each of those essential activities is linked to support activities of four different kinds.

- Procurement, whose mission is to acquire all the primary resources according to processes like purchasing. For example, Cisco's e-procurement system has allowed the company to grow while keeping its number of employees and costs under control.
- Technology development, which may concern either product development or process development. As we will see later, the technology development activity is driven by the technology investments made either internally through funding the R&D organization or externally to outsource or buy new technologies.
- Human resources management, to recruit, to manage, and to develop firm personnel. Typically all the major information-based service

vendors, such as IBM, Accenture, or Cap Gemini Ernst and Young, are nurturing their best engineers or project managers. As one executive of Accenture declared: "Our skills are our people and our assets are their knowledge in conception, developing and implementation of solutions for our customers" [20].

- Infrastructure, which sustains the organization and the firm culture, including departments like accounting and finance, legal, and quality control. For instance, Texas Instruments (TI) has strengthened its legal competence, in order to assert its patent rights more aggressively. In 1999, a U.S. district court ruled that Hyundai must pay $1 billion over 10 years to license TI DRAM. Over the last 15 years, it is estimated that the semiconductor manufacturer has collected a total of more than $4 billion in royalty payments.

The value chain model was developed originally in the 1980s. It needs to be complemented, because today we are increasingly living in a world of information, sometimes called the marketspace, where products and services exist as digital information. This is the world of electronic commerce and information-based services, where the raw material is information that can be turned into new services and can be delivered through phone lines, cables, TV, or the Internet.

It is important to understand that information-based solutions obey different rules than physical solutions. Most notably, they allow radical economies of scale because, unlike physical assets, information is not depleted by their consumption; it can be duplicated at almost no variable cost and thus can been offered through an almost infinite number of transactions. Furthermore, the transaction costs keep decreasing steeply as the processing capacity per unit of microprocessors doubles every 2 years. Today, it costs less than 1 cent to keep information about a single customer as compared to about $1 per customer in the mid-1960s.

However, the value chain model treats information as a supporting element in the value adding process, not as a source of value in itself for the customer. In order to understand and to pinpoint the various technological competences required to create value with information, as well as to build a sustainable competitive advantage, top managers need to build a virtual value chain model that mirrors the physical value chain (Figure 2.6) [21].

First, firms must view physical operations more effectively through large-scale information systems, which coordinate activities in the physical value chains. A good example, also available for consumers, is electronic tracking of packages or material from one place to another, all over the world and in real time.

The second step is to substitute virtual activities for physical ones, thus creating a parallel value chain in the marketspace. For instance, when Rockwell developed its new K56 modem, it moved one key element of the value chain—product development—into the marketspace. Rather than create national product teams, Rockwell established a virtual team to develop the

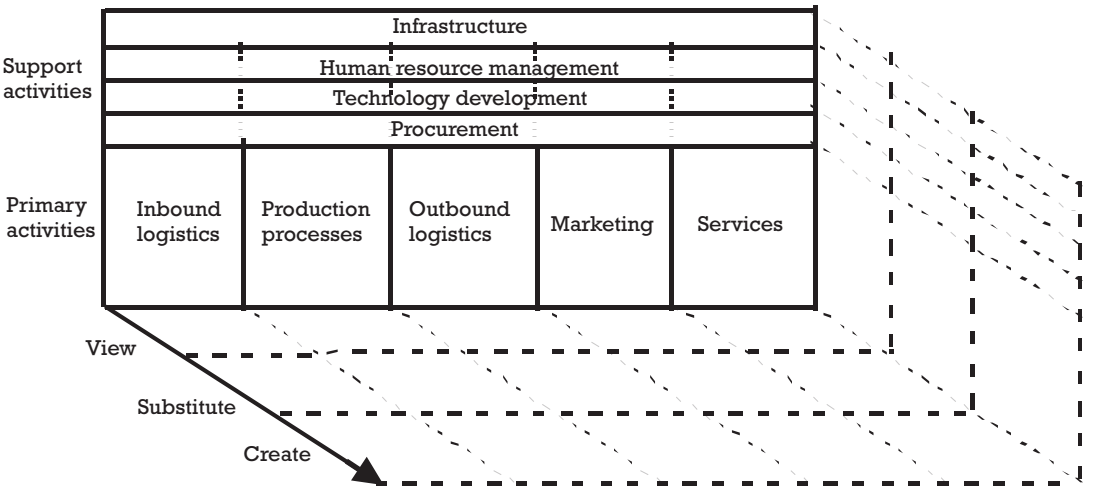


**Figure 2.6** Combining physical and value chain analysis. (*After:* [21].)

modem, located in three different locations, communicating and working together through a highly powerful and sophisticated CAD/CAM global network.

In the virtual world, the design team can transcend the limitations of time and space that characterize management in the physical world. They build and test prototypes, share design and data with colleagues around the world over a computer network 24 hours a day, and receive customer feedback from the other side of the world.

All elements of the physical value chain can be moved in the virtual value chain. For example, many maintenance operations on industrial equipment are performed automatically through network services from one remote control location.

The last step is to extract information of one stage of the virtual value chain and turn it into new spin-off products or services. For example, parcels automated tracking data used originally for internal logistics can be repackaged and made available (or sold) on line to consumers. Similarly, digitally captured product designs can be converted or adapted as multimedia software for PC or video game stations. That has worked quite well for Ubisoft whose game, "Enter the Matrix," was the number-one selling video game worldwide and the fastest selling movie-based video game in history. The game is directly using the actors, sets, and crew from the blockbuster film, *The Matrix Reloaded*, and includes some footage shot exclusively for the game.

Finally, a firm is usually part of a bigger value system, where various suppliers and distributors are also involved in making and delivering a solution to the final customer. Value chain analysis positions the firm within the total value process according to its current competencies as well as its influence on the other components of the industry value chain.

For instance, in the multimedia markets, contents are more important than containers as key resources. Firms that control exclusive rights over

movies, sports, text, fundamental information, or uncommon talent have a strong competitive advantage in the multimedia value chain. Accordingly, they are in the best position to get the maximum value from other firms. The importance of content explains why some multimedia containers or carrier firms are buying content producers, like Viacom's acquisition of Paramount, or Time Warner's purchase of Turner Corporation, or making alliances, like Vodafone with Disney Corp.

### 2.3.2 The technology portfolio

Technological resources are a fundamental asset for companies that make high-tech products. Actually, research shows that technology strategy does have a direct impact on performance and profit [22]. Consequently corporate directors must manage those competences strategically with a long-term perspective.

But, when dealing with the optimum allocation of resources, traditional strategic analysis models (such as those by the Boston Consulting Group and McKinsey) take into account two criteria:

- The degree of attractiveness of each business for the firm, or the growth capacity; it is measured by the growth rate of the market or the life cycle of the business.
- The current company's competitive position on each business, because the main goal of strategy is to beat the competitors; it is measured by its relative market share, penetration rate, or brand awareness.

For a company in the high-tech sector, this is not enough. These choices of allocation of resources must be made not only according to those two strategic criteria, but also in consideration of the technological criteria. Radical innovations enable certain companies to change a market completely and to sideline long-term competitors quickly. Therefore, an evaluation of a company's range of business activities must take into account this characteristic. Unfortunately, in the traditional strategic analysis models, the technological factors are lost in the middle of many other criteria when determining a company's competitive position.

For every strategic analysis, a high-tech company's technological advantage has to be estimated and included. A technological advantage is a company's level of expertise regarding key technologies that could have major competitive impacts.

A company must do an audit [23] of all the technologies currently used in its various activities, as well as of the possible technological applications of which a company is aware, but has not yet used for manufacturing purposes.

This inventory is not a means to an end. It allows a company to evaluate the competitive impact of various technologies by identifying the strengths and weaknesses of its competitors.

In order to make an inventory of technological assets, Arthur D. Little, a consulting firm, distinguishes the following three general categories of technologies:

- Basic technologies allow a company to launch a product or a service whose competitive impact is weak in the current market. These basic technologies are readily available on the market and can be used by competitors.
- Key technologies offer a significant advantage over current competitors. These technologies belong exclusively to one particular company and are usually patented. This technological knowledge is a key success factor for the industry.
- Emerging technologies are still being developed and are in a nascent implementation stage; their future is unsure. Some will become key technologies, while others will never be used.

To get a complete overview of the technological business activities portfolio of a firm, one can match the competitive impact of various technologies with the company's degree of expertise. This comparison allows for an evaluation of a company's technological asset as illustrated in Figure 2.7,

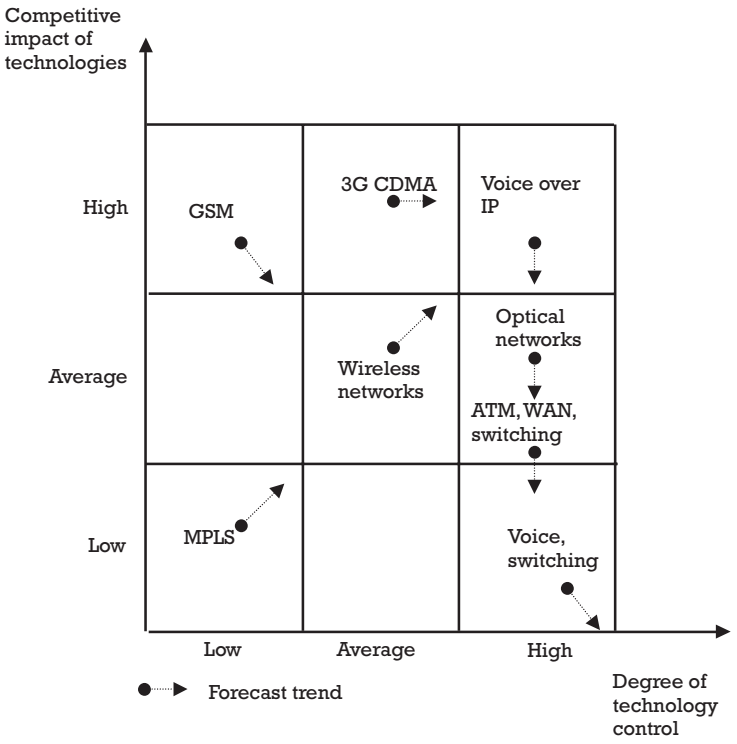


**Figure 2.7** An example of a technology portfolio. *Note:* The competitive impact of technologies can be evaluated by a cost-efficiency ratio, a value-addition ratio, or by a more qualitative index of differentiation potential.

which shows the technical portfolio of a global supplier of communications networking equipment in 2002. Here, one can easily identify that the company has a good control of an attractive technology, such as voice over IP, but still has to invest resources to grow its competence in 3G and wireless networks. The portfolio is also rich in mature technologies, such as Optical, WAN, and ATM networks, not to mention voice switching, but it is a little bit short on new technologies such as multiprotocol label switching (MPLS), which is starting to replace Frame Relay and ATM in the traditional long-distance networks.

A given technology may have a different status in various industries. For instance, titanium-based materials are common for aeronautics; the lightness, toughness, and anticorrosiveness are qualities preferred by airplane manufacturers. These titanium-based materials are key technologies for defense contractors, especially in manufacturing deep-sea submarines. These materials are just emerging in architecture (the first titanium roof is under construction at the Suma Aquarium in Japan), medicine (for use in prosthetics), and jewelry (like the Brietling Aerospace watch).

### 2.3.3 Managing technology as a core competence

Mapping technological resources allows top management to make some strategic decisions. The first choices concern protecting and leveraging the most valuable technology. The second ones are about financial investments.

Every company must protect these assets through patents and licenses. Those patents are not only legal tools, but also provide sustainable competitive advantages, as well as important financial revenues [24]. For instance, through a careful and organized action plan to leverage its intellectual assets, IBM managed to boost its annual patent licensing royalty from a meager $30 million in 1990 to more than $1 billion in 2002 [25]. IBM is the biggest patent owner with 37,000 patents registered in the world and 20,000 in the United States alone. According to the U.S. Patent and Trademark Office (USPTO), in 2001, IBM received 3,411 U.S. patents, far ahead of the Japanese NEC (1,953 patents) and Canon (1,877 patents) [26]. In the pharmaceutical industry, Pfizer is by far the overall commercial leader with total revenues of $15.1 billion in 2002 from licensed products.

Not only can patents be used as a revenue source, but they can also be repackaged to attract new investors [27]. To participate in the patent market, companies have to answer questions such as: "Should we protect the invention or keep it secret?" "When should we protect the invention and in which markets?" "Which applications of the patent should we exploit?" "Should we grant a license and to whom?"

Furthermore, some costs can be decreased by stopping maintenance fees on unneeded patents and can even be donated to universities or nonprofit organizations for a tax write-off in the United States. Thus, for companies, patent management represents as much a strategic as a legal question [28], because success depends on the conformity of the protection and on the use of patents according to market trends. In this perspective marketing is a

useful tool to help companies handle this challenging job. Figure 2.8 details the different contributions of marketing management in the various stages of the patent management.

The value chain analysis and the technology portfolio are useful tools for top management to make resources allocations and decide on the size of the R&D budget, whose size may significantly vary from one company to another and from one year to another (see Figure 2.9). Characteristics of individual CEOs also have an impact on the level of R&D spending. Companies whose CEOs are younger, have greater wealth invested in stock and a large career experience in marketing and/or engineering tend to spend more in R&D than other firms [29].

Another strategic decision of top management is to decide if it must create or buy a given competence. In some high-tech industrial markets with high growth but short product life cycles, very often the lack of technology resources, rather than profitable opportunities, stands in the way of growth. On one hand, a company may decide to build a core competence internally, to ensure the maximum value and then protect and defend it from competitors. This was the case with Intel. Facing competitors like Motorola and IBM, it decided not to license its technology for the Pentium microprocessor. This sole provider strategy, coupled with its leadership in design technology, has kept its competitors at bay while generating huge margins before finally AMD managed to catch up in the beginning of this decade.

On the other hand, some companies use external resources, rather than develop everything internally, to minimize fixed investment and/or accelerate the adoption of a new technology.

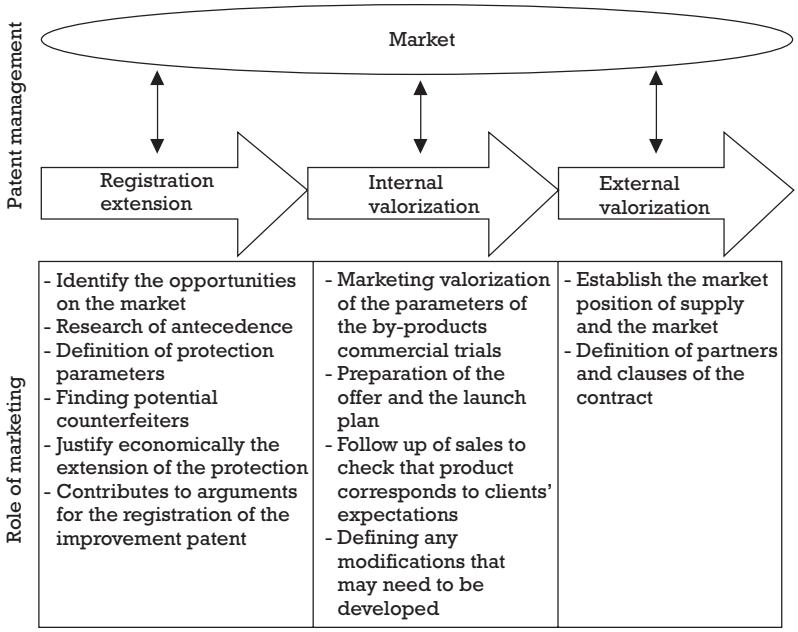


**Figure 2.8** The contribution of marketing in patent management.

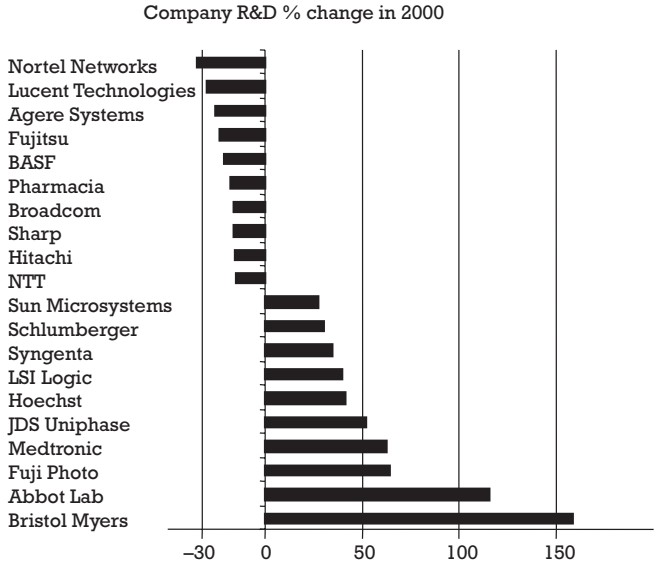


**Figure 2.9** Illustration of the strategic importance of R&D investment. (*Source:* Standards & Poor, 2002.)

Indeed, one must note that major innovations very often come from outsiders. Edison had no experience in the lighting industry, just as Gemplus had little relevant experience when it created the first "smart card," namely, a plastic card with an engraved microprocessor intended for use for telecommunication or electronic payment.

The main explanation for the unwillingness of existing firms to adopt new technology as it emerges can be attributed to the fact that innovations require new competencies, which compete with and may even destroy existing competencies. Sometimes, however, they may enhance existing competencies.

Usually, competency-enhancing innovations come from established firms and outsiders alike. General Electric moved from manufacturing incandescent lights to making vacuum tubes for radio and televisions but had difficulty switching from tubes to transistors. Kodak successfully made the transition from photographic movie film to videotape. Microsoft advanced from a proprietary technology to an Internet-based source of solutions. In each case, the innovations were competency enhancing and backed by top management. On the contrary, competency-destroying innovations always come from outsiders. For instance, in the mid-1990s, top management at Nortel Networks, the former Northern Telecommunication, decided to build competence in IP, the Internet technology that customers increasingly demanded. However, the company did not manage to develop the technology internally, because its R&D engineers were not keen on developing solutions on a technology, which they had not invented (and which was coming from exotic California). Consequently, in 1998 Nortel's top management made up its mind to buy the Californian Bay Networks. Not only did they get

the technology, but also most of Bay Networks managers got the key positions in order to change the R&D mindset of the not invented here (NIH) syndrome. The IP adoption blew up the traditional Nortel R&D structure.

Building new competencies and recruiting new talents in anticipation of future developments is a key element of long-term business success. This can be done internally and we will elaborate in detail about that in Chapter 10, when considering the relationship between the R&D department and the marketing department. This can also be done externally as described in the following section.

## 2.4 Developing technology competence through external growth

In order to grow and develop new business activities, every company must find new markets, develop new products, or diversify based upon internal resources or on external competencies. Strategy development is one of the key responsibilities of corporate managers. It can be achieved either by organic growth or external growth. The latter also provides the opportunity to introduce new technology and technological competences.

Indeed, the uniqueness of high-tech companies influences the development possibilities of new technologies. Those can be acquired in a variety of ways as listed in Figure 2.10, according to the complexity of the operation and its value addition to the competence of the firm.

The possible choices are relabeling, licensing, external research contracts, hiring from the industry, alliances, joint ventures, and acquisition. We address each option in its own section in the following.

### 2.4.1 Relabeling

Relabeling is the purchase of finished products or components that are then sold under the company's brand name. For example, Dell tapped Network

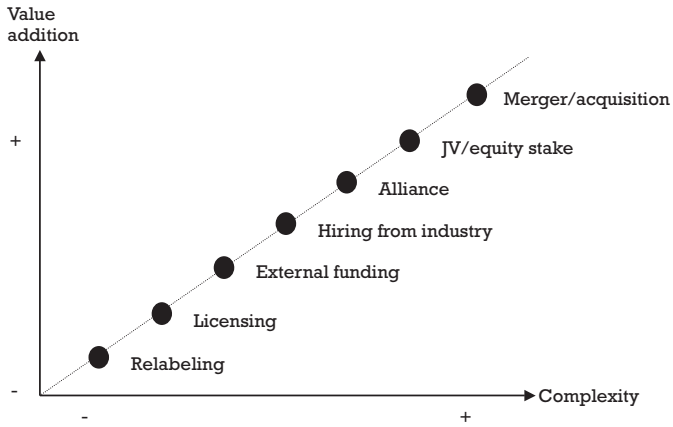


**Figure 2.10** External sources for the development of technology competence.

Appliance in 1999 for selling high-end storage servers. More recently Hewlett-Packard signed a partnership with Procom to resell its competing products.

### 2.4.2 Licensing

Licensing allows for the use of technologies developed by another company. Purchase of licenses allows for the use of technologies that were developed by other companies. Yahoo, for instance, used Web search technology developed and licensed by Google up to 2003.

In the pharmaceutical industry, buying license rights, usually from small innovative biotechnology companies, has become one of the favored ways for big firms to supply their development pipeline. For instance, since 1988, the industry leader GlaxoSmithKline (GSK) has acquired licenses to market 80 drugs from other companies after the fiasco of its own products. More than half of the licenses have been bought since 1998. Similarly, other big players such as Johnson & Johnson, Roche, and Abbot, cut more than 20 license deals between 2001 and 2003. Today, licensed products contribute more than $60 billion a year to the revenues of the top 20 pharmaceutical companies representing almost 25% of their total revenues, according to the consulting firm Wood Mackenzie.

Sometimes, one licensee manages to modify the technology in such a way that it can replace the licenser's technology and stop paying royalties to the licenser. Intel had such an argument with AMD for the K5 microprocessor, AMD's clone of Intel's Pentium microprocessor. Intel asserted that K5 was derived from its own technology, originally licensed to AMD for the production of the 80286 microprocessor, but AMD countered that K5 utilized a microcode developed in house and was consequently not related to any former contract.

Sun Microsystems is still in dispute with Microsoft about Java, a new programming language for Internet-based applications. In order to make Java a new technological standard, Sun has been extensively licensing its new program to various developing companies under the condition that it be made open to any computer architecture. However, Microsoft has bought the license to include Java in its own proprietary Windows NT environment, thus making Java a nonopen-standard program.

### 2.4.3 External research contracts

External research contracts exist when technical development is contracted out to a research laboratory, research consultants, or a university. In the United States, 49% of all companies finance research in universities where (on the average) four times as many patents are generated as in industrial research. From 1980 to 1997 the number of universities licensing technologies has grown from 20 to over 200 [30]. In France, the INRIA, a public research institution dedicated to information and communication science and technology, has signed more than 600 research and development contracts with industry, for example, with France Telecom R&D and Alcatel.

### 2.4.4 Hiring from the industry

Hiring from the industry was one solution Hughes Electronics' DirecTV used to enter the "direct-to-home" broadcast market, an emerging market very different from its traditional business of communication satellites. To be successful, Hughes Electronics had to buy programming content, manufacture and distribute home satellites dishes, manage the customer billing, and set up and run a customer service network. Similarly, in 1989 when Microsoft wanted to enter the professional market with an operating system solution, it recruited the competences of a team of six specialists from Digital Equipment to develop what would become the first version of Windows NT 2.5 years later.

### 2.4.5 Alliances

Alliances involve two or more parties agreeing to change how they do business for a common purpose, without losing their strategic autonomy and without abandoning their own specific interests.

Today, the lessons learned from allying with suppliers are being applied to alliances with peer companies, channels, and customers to gain market share at a reduced cost. For instance, Allen Bradley, the world leader in automation control solutions, has more than 80 alliances, not only with suppliers, such as Motorola for microprocessors, but also with peer companies and primary distributors.

In the high-tech industries, while some alliances are market based, a significant number are technology based. Indeed, an alliance is more and more frequently also seen as a way to achieve increasing returns by constructing a technology-oriented alliance around a technological standard. This usually happens at the early stage of an innovation, which is typified by rapid product changes [31]. Consequently firms compete and try to establish their technology as the dominant design. Technology-based alliances spring from the confusion created by uncertainty and change. They distribute and decrease risks, augment flexibility, improve innovation capacity, and decrease complexity, which can be too high and too costly for individual firms. A good example is the alliance behind Bluetooth (see Section 2.2.3).

Technology-based alliances usually happen when a technology is no longer disruptive or radical, but has entered the growth phase [32]. Such alliances replaced the vertical integration of companies—integration that is needed at first when expertise is not widely available. In the beginning of the computer industry, IBM had to invent the hardware and the software, and create a manufacturing process, as well as the structure for distribution, installation, and maintenance. The cost to find buyers and sellers was huge, as were information, negotiation, decision, and implementation costs [33]. As expertise expands, transaction costs (i.e., the costs of carrying out the operation externally and not internally) drop. Since IBM could not be the best in all the operations of the value chain and compete with every

category of innovators, the most efficient model was to engage in technology alliances: some companies provide silicon as raw material for other firms who make microprocessors and semiconductors; others manufacture printed circuit boards or peripherals, while some develop operating system software, and yet others application software.

The on-line services industry is another example of the substitution of technology-based alliances for integrated firms as a key to achieving success in a new field. When Prodigy (IBM + Sears) entered the business in the early 1990s, it had to build a vertically integrated business that covered content creation and packaging, network and server design and operation, as well as billing and network operating systems. This business model disintegrated later, as specialized providers sprang up to supply every component of an on-line service technology platform.

A comparable trend is emerging today in the cellular phone industry with the deconstruction of the integrated model. Companies such as Nokia or Motorola focus increasingly on the design and the marketing of the new generation of cell phones. They rely on Texas Instruments or Philips semiconductors to make the ASIC components, while the operating system is provided by Microsoft or Sun Microsystems; the batteries are supplied by specialist providers such as Intelligent Batteries or Universal Power Solutions. and applications are provided by firms such as Palet Games, Reqwireless, or Trolltech.

In B2B, there are also alliances of firms that specialize in offering integrated computing systems and consulting, while other firms provide training or after-sales services. Other alliances have been carved around SAP's integrated application software solutions or Siebel's Customer Relationship Management solutions for manufacturers.

Technology-based alliances also improve the climate for innovation, because they connect various resources in creative collaboration. The first spreadsheet product from VisiCalc originated from the technological net of small firms created by Apple for the Apple II platform. Later, the first desktop publishing software rose from the alliance set up around the Macintosh platform. One can wonder if they would have occurred had the innovation remained only within Apple.

Some alliances are also motivated to conduct joint production in order to combine different competences and to minimize costs. Usually those alliances are taking place at the latest stage of the innovation process, when innovations are more incremental than radical. Normally one design emerges on the market and the innovation process takes the lead on innovating product [34]. Likewise in the aircraft manufacturing business, while Boeing is still mostly vertically integrated, its competitors have adopted a model similar to the Airbus alliance; each member is in charge of making one key module of a plane (see Table 2.1). Actually what started as an alliance ended in a joint venture (see the following).

One may estimate that a firm can manage about 5 to 10 technology-based significant alliances, but not more. Though they may have positive effects, too many such alliances will slow new solution development

**Table 2.1** Technology-Based Alliances in the Aircraft Manufacturing Business: The Case of Airbus

| *Component Provided in the Alliance* | *Company* |
|---|---|
| Nose | Aerospatiale |
| Body | MBB |
| Wings | British Aerospace |
| Tail | CASA |
| Final assembly | Aerospatiale |

because of the pressure they put on a company's financial and managerial resources.

To maximize the investment, some firms carefully scrutinize their alliances to learn more about the process instead of only the outputs. For instance, managers at HP hold a debriefing after an alliance is formed with all the participants. They consider the original goals and their implementation, figuring out the reasons for success or failure. All this information is entered into an alliance database.

In any case, one must always remember that whenever an industry begins to expand, cooperation comes less easily than competition between firms. Furthermore, the rise of a predominant design can increase the importance of a given technology provided by a partner and change the relative bargaining power of participants. Hence, companies should first decide what technology is important to them from a strategic standpoint and then make sure that they are fully assimilating this technology from the alliance. They must ensure that they are not simply buying it, like IBM did with Intel and Microsoft in the desktop computing business.

### 2.4.6 Joint ventures

Joint ventures are another powerful medium for entering and developing new markets. For instance, when Corning ventured into the optical fiber technology business, it created a joint venture with companies such as Siemens and Plessey to expand its own manufacturing, marketing, and selling capacities. Today, Corning is a leading worldwide supplier of optical fiber.

Rather than merge, Dell Computer prefers to strike joint ventures to extend its reach into other markets, such as printers (with Lexmark International Inc.), storage gear (EMC Corp.), and systems integration (Electronic Data Systems).

Not all joint ventures are successful, for instance, IBM's 1992 Taligent joint venture with Apple Computer, which failed to defeat Microsoft's

upsurge in the operating-system market. In that case, acquisition may have been more efficient.

### 2.4.7 Acquisition

Acquisition of a company is the last way to develop a new business by directly buying market share and innovation competencies. Examples are numerous in various high-tech industries.

For instance, in order to boost its product offering for small and medium firms, Microsoft bought smaller rivals, such as Great Plains, in 2001 for $1.1 billion and the Danish Navision in 2002 for $230 million, and in May 2002, HP finally managed to buy Compaq for an estimated $19 billion. Two months later, IBM acquired PricewaterhouseCoopers' consulting arm for an estimated $3.5 billion, in order to expand its reach in the strategic consulting service business.

In 2003, Palm, the leader of the personal digital assistants market, bought Handspring, a former spin-off and the third-largest smart phone maker behind Nokia and Motorola. The smart phone market represented only 3.6 million devices in 2003, but it is expected to grow to 80 million units in 2007, accounting for about 20% of all cell phones. Like these communications technologies, mobile telephony has a potential of more than 1 billion customers worldwide; in comparison, the shrinking 30-million-user PDA market is just a footnote, where Palm has seen its market share deteriorating constantly to low-cost competitors from the computer industry, such as HP and Dell.

The trend for acquisition has accelerated since the Internet bubble burst in 2000. Many start-ups have been acquired by bigger or more successful rivals, as in the case of Overture, which bought AltaVista in 2003, for only 10% of its market value in 2001. Webmergers estimates that out of the 4,854 Internet firms that have disappeared from the market between 2000 and 2002, only 962 went bankrupt while the 3,892 others have been acquired for a total of about $200 billion, on an average of 1,200 acquisition each year [35].

In the data networking business, Cisco Systems has made acquisition a unique way to enter new markets, building an expertise in how to screen and purchase target firms, as well as in retaining and motivating the new management team [36].

Cisco has grown extensively from zero when it was created in 1984 to a $4 billion firm in 2002 via a significant number of acquisitions. It acquired its first company, Crescendo Communication in 1993. Since 2002, Cisco has acquired more than 70 companies [37], but the tech slowdown that hit in 2001 had a significant impact on Cisco acquisition strategy and slowed the process dramatically. Cisco bought 23 firms in 2000, but only two in 2001, five in 2002, and three in 2003.

Similarly BEA Software, a maker of applications-server software, has managed to lead that market with 34% market share, ahead of IBM,

Oracle, and Sun, by cutting more than 20 acquisition deals from 1996 to 2001.

When considering acquisition strategy, a recipe for success seems to be a steady diet of small deals. The transactions undertaken by the most successful high-tech firms tend to be small compared with their own market value. One survey revealed that those companies pay less than 1% of their market capitalization for an acquisition [38]. Furthermore, deals in which the purchase price of the target was 50% or more of the acquirer's market capitalization were exceptional.

Smaller transactions led to simpler, more disciplined organization and integration; consequently, they decrease the negotiations and infighting that can defeat the logic of the acquisition, as often happens in larger deals. For example, AT&T bought NCR in 1990 in order to gain control of computer technology. The acquisition did not pay off, because of poor management and shifting technology demands. Eventually, after having lost billions of dollars, AT&T spun off NCR in 1996.

Moreover, those companies consider acquisitions the same way they do with their R&D programs. They accept the risk of failure and try to optimize their experience curve by bringing discipline and consistency to each deal. In any case, the choice between these different types of development plans should not only take into account technological criteria but also the company's overall position in all of its business activities.

The marketing manager plays an important role in the strategic development process, because he or she can supply information about customers, the environment, and competitors. The marketing manager's role is even more essential in the high-technology industry, because performance requirements, as well as forecasting the company's reaction capability and innovation capacity, demand a continuous strategic reevaluation; the high-tech-product world looks more like a raging ocean than a calm river. When this work is completed, the marketing manager can define a marketing strategy that will, of course, be included in the more general framework of the company's strategy.

## 2.5 Marketing strategy and marketing plan for high-tech products

The marketing strategy represents the framework on which the company's sales activities are based. The marketing strategy is developed by the marketing manager and is then used to complete an annual marketing plan. Every company has its own way of drawing up a marketing plan, but the following steps are indispensable. First, it must include a situation analysis, which will in turn allow for the targeting of different markets. Then comes the design of the marketing mix required to reach those markets the most efficiently as possible. After that the plan must decide on the appropriate action programs and monitoring procedures. The specific characteristics of high technology, however, will impose certain adjustments on each of these

four categories, which the marketing manager must take into account when making her or his marketing plan [39].

### 2.5.1 Situation analysis for high-tech firms

Situation analysis aims to identify market opportunities as well as the company's constraints. This analysis allows for quantitative forecasting about the potential of various markets, as we will discuss in detail in Chapter 3. The situation analysis must also take into consideration the various element of the environment of the firm, which is driven by various political, economical, sociological and technological, ecological and legal forces. This analysis is sometimes called by the acronym of its parts, the PESTEL analysis. Added to those forces, the competition is also a leading element of the direct environment that needs to be scrutinized carefully, as detailed in Chapter 4.

In the situation analysis, the most important factor is obviously the technological force. The reasons for doing so relate to the nature of the business. However, it would be an error not to take into consideration the other forces. Most specifically, many high-tech firms tend to underestimate the sociological constraints that may slow the adoption process of a new technology, like in the case of WebTV, where the majority of TV users did not appear to be ready to invest in the Internet. Contrary to the majority of PC users, most TV users were passive users not willing to switch to a more interactive mode of communication.

The political dimension is also extremely important. In Europe, many telecommunication operators readily accepted the outrageous prices set by the government to obtain 3G licenses. This drove some of them, such as France Telecom, Deutsche Telecom, or KPN, almost to the verge of bankruptcy. Other operators came with a clearer appreciation of the risks and refused to bid for the license.

So, for high-technology firms, the situation analysis must take into account the existing and future life cycle of a technology. This analysis is essential for making good evaluations of market opportunities as well as competitors' positions. This is even more important in the case of radical innovation and radical new products, where companies can be blindsided, because they tend to underestimate the potential of a breakthrough innovation, or because they do not listen attentively to their best customers, and invest only in incremental innovation, and ultimately lose ground [40]. This is the classic history of the ocean shipping companies. They put more sail on their ships in order to satisfy their best customers who wanted more capacity at cheaper cost per ton than the steamer at first could offer. But ultimately they went on with the wrong technology and by the time they figured it out, it was too late to switch and the majority ended up broken.

A similar story could be said of the telecom providers that created too much bandwidth in order to satisfy their customers during the Internet frenzy of the end of the 1990s. When the dot-com bubble burst, the

majority ended up with lots of capacity, but not enough customers to pay for it, and went broke.

Equally important when performing situation analysis, particularly involving high-technology solutions, a company's study of its strengths and weaknesses must inevitably include an evaluation of the cooperation between the marketing and the research and development departments. This relationship is very important for the successful development of new products that the market expects within certain time limits, as we will encounter more extensively in Chapter 10.

### 2.5.2 Targeting market(s) and designing the marketing mix

The marketing strategy introduces the marketing objectives, sales figures, amount of profit (and the calculation method), segmentation, and then the target markets [41]. However, due to the specific characteristics of high-tech products, firms must specifically design certain segmentation techniques to target markets, as we will see in Chapter 5.

Then, for every selected market, the marketing manager defines the company's proposal or marketing mix—in terms of the four Ps—product, place (distribution), promotion, and price [42].

The main tasks associated with a product include developing and testing new products, modifying or eliminating existing products, managing the product range, formulating a brand name, and creating a product guarantee and associated services At the distribution level, the marketing manager must, among other responsibilities, select appropriate distribution channels, design an effective program for the distributors, set up inventory controls, and minimize total distribution costs. Promotion activities include setting promotional objectives, selecting the adequate promotional media, designing the message, developing the advertising message, and creating sales promotion leaflets and programs. With regard to the price, pricing policies must be formulated, competitors' prices and customers' sensitivity to price (elasticity) evaluated, and prices and discounts set [43].

When considering the implementation of the marketing strategy, what is usually called the marketing mix, another very strong characteristic of the marketing of a high-tech product comes into play: the weight of the product variable compared to the other elements of the mix, namely, distribution, communication, and pricing. One reason for weighting this variable is that new high-tech products are introduced to the market more often than traditional, nonhigh-tech products (see Chapter 6).

### 2.5.3 Action programs

Action programs correspond to the implementation of each element of the marketing mix by market. These action programs indicate which steps must be taken, their responsibilities, their deadlines, and their available financial resources and budgets.

Since the environment changes very quickly in the world of high technology, action programs must be developed according to a relatively flexible format so that they can easily be reviewed and modified. Budgetary procedures must especially be open to change so that they can follow the movements of a rising and falling market. A truly efficient action program must be short and flexible; otherwise it will simply become an administrative exercise, contrary to the objectives it seeks to meet. The monitoring procedures should be designed according to the same principle.

### 2.5.4 Monitoring procedures

Monitoring procedures plan an evaluation schedule for the progress of the action programs, as well as of the results of the marketing strategy in terms of the sales and profit figures. The evaluation process must serve as a reference point for the marketing manager, who then has the opportunity to correct the company's marketing strategy. The evaluation process should not, however, become a restraining device that will keep it from adapting itself to the market. Bureaucratic companies do not survive in the high-tech industry.

With all the turbulence and uncertainties in a high-tech environment, certain authors suggest adding a fifth phase, called a "contingency plan," to the marketing plan [44]. If a threat such as the entrance of a new competitor or the disappearance of a market segment occurs, a ready-to-use contingency plan is very useful. With such a plan, a company can react instantly and with much greater efficiency than if it were completely taken by surprise.

A marketing plan is very useful because it allows for a more complete understanding of the competitors' market, as well as of the company's strengths and weaknesses. It is also useful in documenting the main strategic marketing decisions that can then be discussed or adopted using clear and precise information. This information facilitates quick decision making, as well as communication among the company's different departments. Finally, the marketing plan must be approved by the executive board of directors, which emphasizes the importance of the marketing department.

As a conclusion of this chapter, Figure 2.11 summarizes the marketing manager's role in the general framework of the company's strategy. A marketing manager contributes to the collection of necessary information on markets and the environment to facilitate decision making with regard to the strategic segments (or business activities). For each of the selected strategic segments, the marketing manager establishes a marketing strategy and supplies a marketing plan, which is used by the executive board to allocate the available resources among different departments.

The marketing department implements its plan depending on the allocated financial resources. Ultimately, these plans are regularly evaluated by the executive board, which allows the marketing manager to make new recommendations.

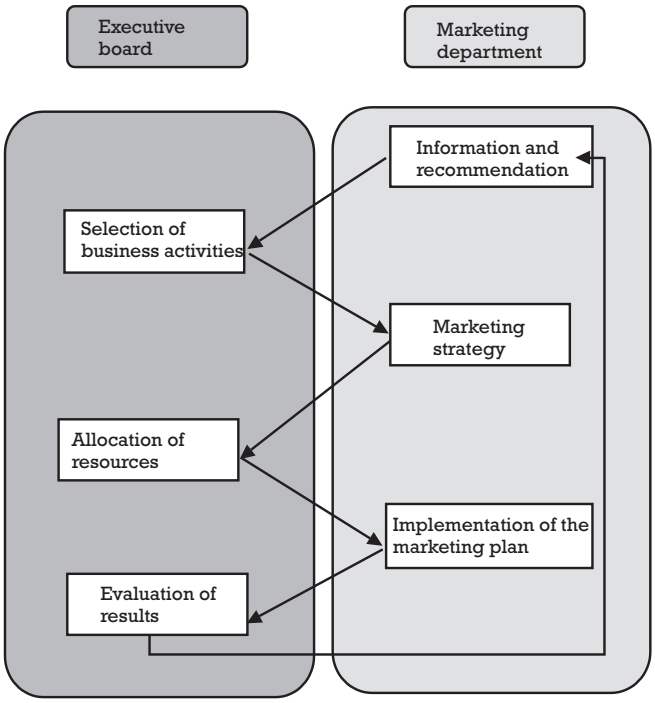


**Figure 2.11** The role of the marketing department in corporate strategy.

## 2.6 Summary

As is the case for every company, marketing in a high-tech company is part of the overall framework of the strategy that is instituted by the executive board to make the company's objectives and resources correspond to opportunities in the market.

This marketing strategy is designed to fit with the overall direction or mission of the firm. It must also build on the resources and competences available within the firm; chief among them is technology.

Due to the nature of the high-technology business, technology has a bigger strategic magnitude than in more traditional business. The concept of technology life cycle helps strategists and marketers to understand the different stages that any technology will go through. More specifically, we analyze why so many companies are usually unable to anticipate the market impact of radical technologies. Also we look at various ways to establish a technological standard during the growth phase of a technology, and what the marketing department can contribute in that matter.

The physical and virtual value chain model and the technology portfolio are two other useful analytical tools. They help a company pinpoint the various technological competences required to create value with information, as well as to build a sustainable competitive advantage.

Then the top management can make some strategic decisions with regard to technology. The primary ones are about the protection and

leverage of the most valuable technology. The secondary ones are about investments, not only in terms of finance, but also in terms of whether to make or buy technology development.

We then go into the detail of the different ways to build technology competence externally. Finally we introduce the different elements of a marketing strategy: a situation analysis, targeting different markets, designing the marketing mix, appropriate action programs, and monitoring procedures. Lastly, we summarize the marketing manager's role in the general framework of the company's strategy.

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CHAPTER

3

Contents



# Knowing Customers and Markets

The weathered high-tech firms that have successfully survived the business whirlwind of this decade are all highly tuned in to the market. Actually, when demand is going down, it is a matter of life or death to know the customers, their needs, expectation, and wants, as thoroughly as possible. Only with this knowledge can a high-tech firm market the right product at the right time to the right client. Those companies have a talent for knowing the customer's expressed or latent needs before these needs can be transformed into a company's products and technology.

To know their customers inside and out, first companies talk to their customers and ask the right question. A good example is Lou Gestner, the former CEO of IBM, who managed to turn this technology-driven mastodon into a market-sensitive elephant. Unlike previous IBM executives before him, Lou Gestner spent half his time traveling around the globe visiting IBM customers. Routinely he asked his customers, "How can I serve you better as a vendor?" [1].

Also, high-tech winners know how important it is to understand customer value [2] for a given product. For example, laser discs and the use of digital sound technology have answered the call for a higher quality of sound. The need to communicate generated wireless networks and satellite connections. The need for greater reliability and performance in automobile assembly resulted in the use of robots for welding, painting, and manufacturing purposes.

According to the manufacturers of electronic measuring instruments, three out of four of their innovations come directly from customers' insights. In the semiconductor and printed circuit board industry, it is two out of three [3].

However, the high-technology sector is also characterized by an abundance of technical processes derived from research

and development laboratories or individual researchers. In this case, a marketing manager must therefore be able to help transform these new ideas into products that are suited to the needs of the customer and the market. This preliminary step is necessary to assure the maximum amount of success when launching new products as a result of a newly developed technology in the company.

In both cases, a marketing manager must know how to estimate the level of market demand. He or she must have an understanding of the buying behavior of a company's actual and potential customers in order better to perceive the needs of the market, find ideas for new products, or test the compatibility between the applications of a new technology and the customers' needs.

A marketer must know not only the needs, but also the wants and the demands of target or potential markets. Needs are the basic human requirements, such as the need for food or shelter, but also the need for communication, entertainment, or education. The needs turn into wants when they are directed to specific categories of products that might fulfill the need. For entertainment, a male teenager will play with a video game while an adult will look for a movie on network TV, on cable, or even at the nearest video rental store. Wants are driven by different factors, which are detailed in the following section. Demands are wants that can materialize thanks to money and some purchasing power. Many western consumers want broadband with unlimited access to Internet connected to a sophisticated home cinema system. Only a few are able and willing to buy that.

## 3.1 Determining the customer's buying behavior

The analysis of the principal purchasing factors for high-tech products is not different from the analysis performed by a marketing manager in a more traditional company. The guidelines that are used in performing such an analysis already exist and are used as much in the consumer goods and services sector as in the industrial goods and services sector.

However, the particular characteristics of high-tech products, especially their newness, make their value often difficult to determine for potential customers (see the following). Consequently, marketers of high-tech products must specifically analyze the attitudes of customers regarding innovation and risk.

### 3.1.1 Purchasing factors for high-tech consumer products

High-tech consumers [4] can be defined as anyone who buys and consumes innovative products and services as defined in Chapter 1. This includes digital video discs (DVDs), digital cameras, cellular phones, palmtops or video games, as well as broadband and Internet services.

**Back to the Future [5]**

Frequently changes in mindset trail technology changes. History offers some examples of this, sometimes from some very astute connoisseurs of technology.

*"What can be more palpably absurd than the prospect held out of locomotives traveling twice as fast as stagecoaches?"—The Quarterly Review,* England, 1825

"*This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value."*—Western Union internal memo, 1876

*"The horse is here to stay but the automobile is only a novelty, a fad, a passing fancy."*—A president of the Michigan Savings Bank advising Horace Rackham (Henry Ford's lawyer) not to invest in the Ford Motor Company, 1903

"*While television may be theoretically feasible, commercially and financially I consider it impossibility, a development of which we need waste little time dreaming."*—Lee DeForest, American radio pioneer, 1926

*"There is not the slightest indication that nuclear energy will ever be obtainable. It would mean that the atom would have to be shattered at will."*
—Albert Einstein, 1932

*"Computers in the future may have only 1,000 vacuum tubes and weigh perhaps 1.5 tons."—Popular Mechanics,* 1949

*"There is no reason for any individual to have a computer in their home."*—Ken Olsen, president and founder of Digital Equipment Corporation, 1977

"*I see no advantage to the graphical user interface."*—Bill Gates, chairman of Microsoft, 1984

When someone purchases a high-tech good or service for personal use, he or she is influenced by four classes of factors: sociocultural, psychosocial, personal, and psychological (see Figure 3.1).

Let's take the example of Wi-Fi, the high-speed wireless technology, based on a set of communication standards known as 802.1, which allow users to log on the Internet without cables, using wireless local area networks (WLAN). Already in place in universities and large and small firms, Wi-Fi is reaching the end-user customer thanks to the growth of public WLAN networks, which provide Internet access within a range of 100m are

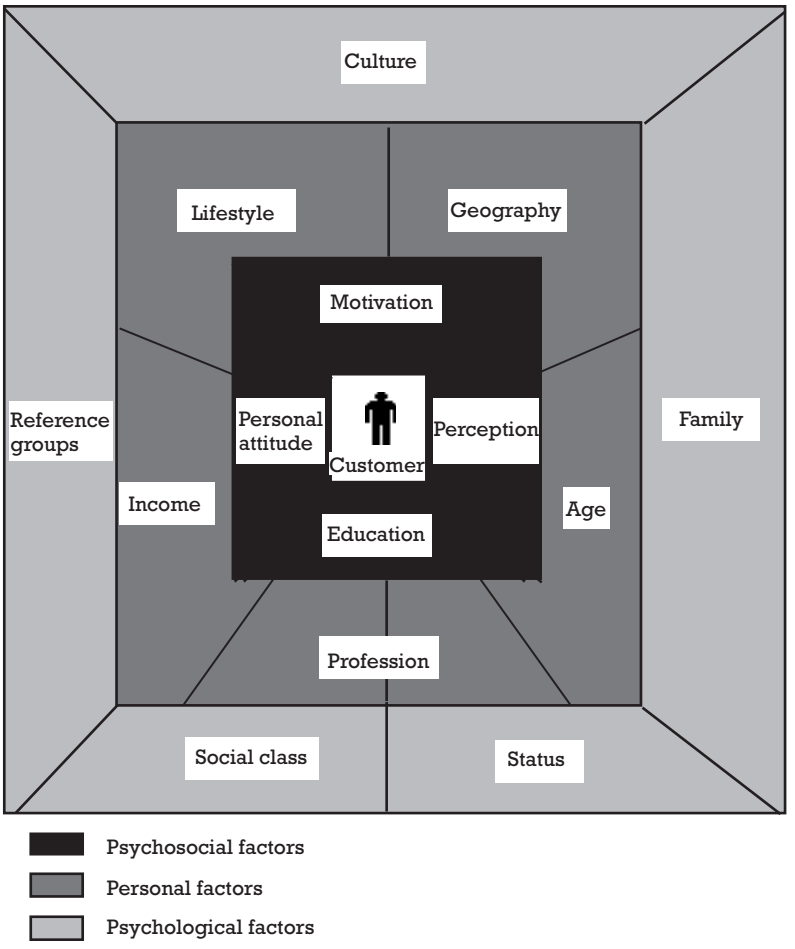


**Figure 3.1** Purchasing criteria groups for high-tech consumer products. The lightest shaded areas represent psychosocial factors, the darker shaded areas represent personal factors, and the darkest shaded areas represent psychological factors.

installed in airports, hotels, coffee shops, and even barbershops. In 2003, there were more than 5,000 Wi-Fi hot spots in Europe, and the number is expected to grow exponentially to 90,000 by 2007.

As with many other high-tech consumer products, Wi-Fi technology of today derives from military development. During World War II, an American composer, George Antheil, and an Austrian engineer turned starlet, Hedy Lamar, came up with the idea of inventing a communication system, which repeatedly changed the signal that guides a torpedo, therefore making it impossible to jam. This opened the door for WLAN networks, which operate on the same principle. The first Wi-Fi products were developed in the 1980s by NCR, a firm that makes ATM and cash machines, to connect the cash registers to the mainframe computers of large retail companies such as Kmart or Sears. In 1999, Apple paved the way to Wi-Fi consumer

applications when it started equipping its laptops with receivers, while launching the AirPort transmitter. Today, Wi-Fi is on the way to become ubiquitous.

#### 3.1.1.1 Sociocultural factors

The interest in Wi-Fi only exists because our culture values images and speed, and because we have owned laptops and used the Internet for a significant amount of time. The product does not have the same attraction for consumers who live in cultures where Internet and information technologies are relatively unfamiliar.

Consumption choices vary according to nationality, religion, race, and national origin. This is very true for high-technology products [6]. For instance, 60% of the on-line households in Korea have broadband access and 95% log on to the Internet. In the United States 27% of the on-line households have broadband access, while the share is only 14% in the European Union. In India there were about 2.5 million Internet users in 2002, while more than 33 million people in China were on-line with less than 1% penetration rate for broadband in those two countries, the biggest in the world.

The social environment also plays an important role: someone who belongs to a fairly high class spends more money on leisure activities and could be specifically targeted for a new high-tech product.

#### 3.1.1.2 Psychosocial factors

Reference groups (such as family, neighbors, friends, and colleagues) have a strong influence on purchases of high-tech products. Purchasing Wi-Fi can be influenced by family pressure, impressionable neighbors and friends, or colleagues who have already bought and are very happy with one. Furthermore, Wi-Fi can be perceived as a status symbol that appeals to all consumers who buy products for social status reasons.

#### 3.1.1.3 Personal factors

Age is an important determining factor. Wi-Fi is mainly of interest to age groups that heavily invest in their leisure activities: singles or young couples without children, as well as older couples ("empty nesters"). For those categories of consumers, one of the main appeals of Wi-Fi is to move music and videos from the various MP3s, digital and video cameras to the home entertainment systems, namely, TVs and stereos.

Wi-Fi also attracts mobile professionals who need to stay in touch. They will use Wi-Fi at the coffee shop or the barbershop to read e-mail, access databases, or edit video on-line.

The consumer's financial status (level of income and debt) is also important in the decision to purchase a high-tech product with a price that is initially high, because the research and development costs must be recovered.

Lifestyle also determines consumption choices. According to the lifestyle definitions by CCA, a major French market research company specializing in consumers' lifestyle analysis, Wi-Fi more often attracts forerunners, who are interested in new technologies and have an adventurous mind, than the traditionalists, who glorify the past.

#### 3.1.1.4 Psychological factors

Many psychologists, the most notable of which are Sigmund Freud, Abraham Maslow, and Frederick Herzberg, have stressed the importance of motivation. Their conclusions have important ramifications for the marketing of high-technology products.

Freudian theory emphasizes the psychological dimensions of a product: that outside of its functional aspect, a buyer of Wi-Fi takes into consideration more than just the product's performance and main benefit. For instance, Hewlett-Packard and Philips have launched devices that use Wi-Fi to connect computers with TVs and stereos, a major catch for consumers. But even so the buyer of such devices is also sensitive to other aspects of the product like its size, shape, weight, color, and even the aesthetic quality of its buttons. These elements can trigger emotions that will reinforce a customer's attraction to a product or, on the contrary, will keep her or him from purchasing it. Therefore, a company must carefully consider all exterior aspects (such as packaging) during a product's design and manufacturing phases. In the computer business, Apple is well known for its unique ability to offer very attractive products with shiny colors, round and sensual design, and inimitable artistic form, such as the iMac or the iPod.

Maslow developed an analysis grid that is divided into five categories of needs: physiological, safety, love, esteem, and self-actualization. The purchase of Wi-Fi can therefore respond to many motives, which correspond to diverse needs, such as reassurance and belonging to a group (by imitating people who already own Wi-Fi), being respected (by differentiating from others who cannot afford Wi-Fi), or treating oneself (by buying a high-performance item).

Herzberg differentiates between the two states of satisfaction and dissatisfaction that exist in each person. The practical consequence is that a company must absolutely avoid dissatisfying elements and must carefully list the satisfying elements for the consumer, so that these elements can be added to the product. One of the major drawback of Wi-Fi systems today is that it drains a computer's battery power very quickly, and that may result in customer dissatisfaction. On the other hand, an extraordinarily easy access to Internet services or e-mail from a place like a coffee shop, a barbershop or even a doctor's waiting room, can evoke the consumer's satisfaction and enthusiasm, and lead him or her to purchase the product.

The purchase of a product also depends on the perception that people have of the product. Someone who wants to buy a Wi-Fi system will notice all the advertising for Wi-Fi, but will ignore advertising for GPRS or 3G cell phones. Also, such a person will pay more attention to laptops with Wi-Fi in stores than to new 3G cell phones on display.

Perception is complicated by two phenomena: selective distortion and selective retention. Selective distortion makes someone "adjust" information so that it corresponds to his or her wants. For example, in Europe, someone who likes Orange products will have a tendency to idealize the advantages and reduce the disadvantages when examining an Orange Wi-Fi offer.

Selective retention inclines the customer to remember information that reinforces his or her beliefs, and the belief will predict the attitude about the product [7]. For instance, a Vodafone advocate will more easily remember the advantages of a Vodafone Wi-Fi and the disadvantages of a T-Com Wi-Fi than vice versa.

Past experiences also play a large role in the purchasing decision process. These experiences can be ascribed to behavioral learning. Someone who is unhappy with a high-tech product after purchasing it will have a future tendency to reject this type of product and instead consider more traditional products. In addition, a buyer who is satisfied with his or her Orange cell phone will most likely prefer an Orange Wi-Fi. This preference goes to a brand with which a customer is already familiar.

Finally, one's attitudes toward a product are important. Opinions and tendencies lead or curb certain behaviors. Everyone has a certain attitude toward almost every element of society: politics, art, education, and food. These attitudes allow for a coherent response to many diverse subjects. An attitude creates a positive or negative environment for a product. Someone who believes that mobile operators have greater service quality than Internet service providers or fixed-network operators, and that "Vodafone always has the best communications services," has an attitude that reinforces his or her intentions to purchase a Vodafone Wi-Fi.

Finally, a consumer who chooses to buy a high-tech product for personal use is influenced by many factors. Accordingly, a marketing manager must identify all the factors that lead to a purchase and should take these factors into account during product development, price setting, distribution selection, and sales promotion.

### 3.1.2 Purchasing factors for high-tech products in business-to-business activities

Typically, high-tech industrial markets are smaller than consumer markets. In 2002, the worldwide market for photoresist, a chemical material used in manufacturing semiconductors, was $820 million, while the market for semiconductors was over $150 billion. Similarly, the market for the plasma material used in the flat panel display (FPD) was only $900 million while the global FPD market was over $25 billion. As a consequence, the limited size of business-to-business markets makes them easier to identify, analyze, and understand.

The purchase of industrial goods and services rarely depends upon a single person but rather usually on a group. In such a group, there are the following participants: the user, who needs a good or service and prepares the

**Case: Global Results of Tech Marketing Study**
**The Tech-Savvy Consumer of Today ... and Tomorrow**

A new study of tech-savvy consumers around the world provides a candid global portrait of digital living and draws insightful implications for marketing to the "Netizens" of tomorrow. The study, "Wired & Wireless: High-Tech Capitals Now and Next," was conducted by Euro RSCG Worldwide, one of the world's leading advertising and communications networks. The study queried consumers in 19 cities around the world with heavy penetrations of wired Internet usage and/or mobile, wireless devices, as well as in emerging markets with rapidly rising technology usage rates.

One of the most sobering conclusions drawn from the study results is that advertising and point-of-sale promotion fall flat when it comes to disseminating information and stirring consumer desire for technology. Just 13% of the total sample said they get most of their information about technology products from advertising, and a mere 1% said they get it from stores. The Internet seems to be doing a better job of getting the word out: 20% of respondents overall said they get tech information from Web sites. However, the most relied-upon source of high-tech product information is word of mouth: 20% of respondents turn to colleagues at work, 11% call upon their friends, and 3% rely on family members.

The survey identifies also a paradox between Home Tech and Work Tech. On one hand, the gap is narrowing between home, workplace, and the social arena. According to respondents, technology is on the brink of creating an all-in-one digital lifestyle, blurring the lines between work, entertainment, and family life.

Alternatively, the findings suggest that the respondents are making a conscious effort to maintain some separation between work and home. Even though 91% of respondents have a computer at home, 60% do not have a space they define as a home office. Actually economic and cultural reason play into this variable: Tokyo respondents were least likely to have a home office, probably owing both to space limitations and to their culture's rigid concept of work as something to be done at the office; San Francisco respondents were most likely to have one, thanks to their early adoption of the 24/7 tech lifestyle and high levels of entrepreneurship and freelance/contract work.

Finally, just 15% of the total sample agreed completely that technology is a threat to personal privacy, while another 31% agreed somewhat, and 25% disagreed completely or somewhat. The respondents seemed to have made their peace with this side effect of progress. This seems to indicate that marketers needn't take extraordinary measures to gain consumers' trust. They must simply be straightforward. Users want to know what information is being gathered and how it will be utilized.

**(Continued)**

The study was conducted in April and May 2001, and consisted of four parts: a 100-question e-poll (1,830 respondents); a 40-question, self-administered written survey (108 respondents); videography and photo documentation of the digital lifestyle in each market; and extensive secondary research. In addition to the 108 self-administered interviews in the target markets, Euro RSCG received survey responses from approximately 50 respondents elsewhere in the world (ranging from New York City to Bangalore, India), which served to inform the regional analysis.

Question 1: What are the marketing implications of the main results of this survey?

Question 2: What do you think of the methodology? Is the sample representative? To what extent must a marketer consider the validity of the outputs?

specifications; the go-between, who puts the user in contact with an outside supplier; the adviser, who is usually the subject specialist (for example, in computers and robotics); the purchasing agent, who chooses the suppliers; and the decision maker, who signs the purchasing contract.

The price of a particular high-tech product strongly determines the number of participants in a purchasing group. A computer workstation, worth thousands of dollars, can be bought directly by a development engineer, but an investment in robotics equipment for a manufacturing line with a total value near several million dollars will be carefully scrutinized before a member of the executive board signs the purchasing contract.

Therefore, a marketing manager must analyze the principal determining factors for industrial purchases. These factors can be divided into three classes according to their relation to the environment, to the organization of the purchasing company, and to the decision maker (see Figure 3.2).

#### 3.1.2.1 Environmental factors

Environmental factors that can be found outside of business customers are political context, economic situation, demand level, competition, and technological evolution. This last dimension is, of course, fundamental in the high-technology sector.

For instance, when the marketing manager of Arianespace analyzes the needs of some of its clients, such as the telecommunication companies, the civilian governments or the 30 biggest military forces in the world (see Figure 3.3), he or she must evaluate the position of rocket launchers in relation to other technologies, such as radio links, electromagnetic waves, or fiber optics, that will strongly determine the demand for satellite launching.

He or she must also study:

- The position of current competitors, Lockheed Martin and Boeing (At which price will Lockheed Martin offer its new rockets? Have

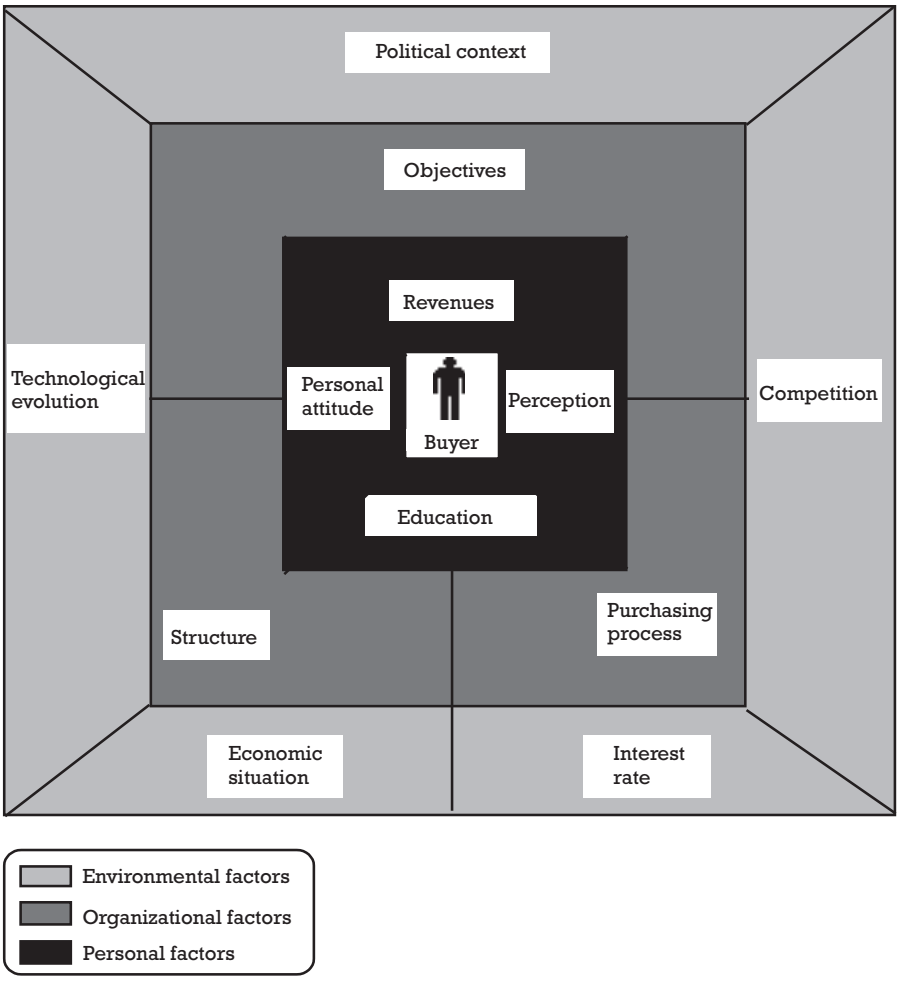


**Figure 3.2** Purchasing criteria groups for high-tech industrial products. The lightest shaded areas represent environmental factors, the darker shaded areas represent organizational factors, and the darkest shaded areas represent personal factors.

Boeing's Delta rockets launch problems been fixed?), as well as new entrants (What about the viability of a new venture such as the Sea Launch platform, an oil rig redesigned as a launch pad, which floats near the equator? How frequently and reliably can this system send rockets into space? What is the business potential of the old Russian ballistic missiles, decommissioned at the end of the Cold War, to become actual competitors?);

- The overall economic situation (for example: What impact will the telecommunication slowdown have on the projects of private telecommunication companies regarding the launching of satellites?);
- The political situation (What are the projects of China and India? So far they have achieved successful launches, but only of small

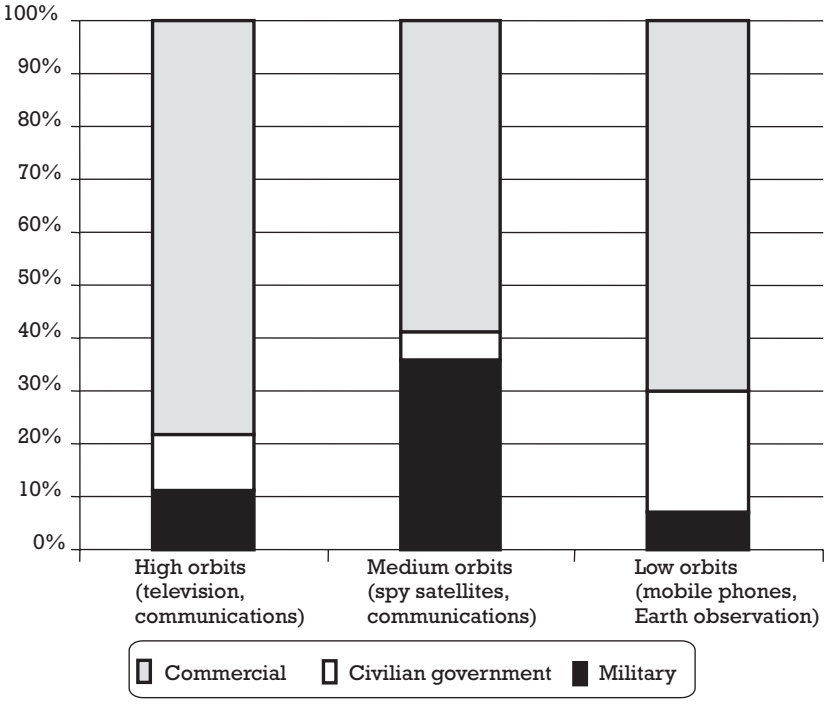


**Figure 3.3** The three main categories of customers in the satellite launching business. (*Source*: Arianespace, 2002 Annual Report.)

satellites. Will they develop bigger rockets? What is the future of Japan's satellite launch business after the H-2 rocket was canceled?).

#### 3.1.2.2 Organizational factors for the purchasing company

As for all industrial products, the client's organizational dimensions must be taken into account in order to make a high-tech product a marketing success.

Every company has its centralized or decentralized organizational structure, its procedures, its objectives, and its politics, all of which can influence the success or failure of the acquisition and the adoption of a new high-tech product. Consequently, the sales force plays a fundamental role in pushing the product through the decision-making system of the purchasing company. The marketing department must supply the sales force with useful reference points.

The marketing department can point out changes in the decision-making process for a particular sector or a type of customer. For example, in the information technology business, MIS managers are no longer always the ultimate decision makers when choosing computers and software; the general management and the users often make these decisions, even in the case of purchasing a large mainframe or big database software.

The marketing manager must also urge the sales force to establish early business relations with potential clients. Actually, certain high-tech

products require an extremely long courtship, for example, extending up to 10 years for a rocket launcher or a supercomputer and even 15 years for certain chemical molecules. These time periods are longer when the products are more specific.

The customer must be approached at the moment when a need develops. The sales force must have a firm control of the relationship in order to offer products that satisfy the company and to work with the company regarding the development of the product. If this is not the case, competitors take control.

Another very important case is for purchases that are made by a bidding process, a frequently used procedure for high-tech products in civilian and military industrial markets. Here, a prospect company must be approached very early on, as soon as it shows a need, in order to present the company with a preliminary draft of the solution and to establish a specifications list that will be used as a source document during the bidding process. When this specifications list officially appears, it is already too late to react. For example, in the case of a Request for Proposal (RFP) for supply chain management software, even a specialist such as i2 Technologies, Inc., will have trouble responding to the required specifications if they resemble SAP software. Similarly, Alcatel Space will not be able to offer a satellite if the characteristics are almost an exact copy of the model manufactured by Hughes Space and Communications Co., the American company.

#### 3.1.2.3 Personal factors

The individual characteristics of each decision maker and participant in industrial purchasing groups must also be very carefully taken into account. The personal factors for consumer good purchases also play an important role in industrial purchasing.

However, different studies show that the intangible characteristics of the solution (the supplier's credibility, service, and long-term commitment to support the product) matter more than its physical characteristics (for example, performance and speed) when the minimum performance level has been reached.

The importance of psychological factors is still too often neglected in the industrial high-tech product sector. The marketing department's explication can often be of considerable help to the sales force and lead them to a better understanding of the representatives.

However, there is often a tendency to focus on the functional characteristics of the product instead of on the needs that should be satisfied. As we will see later, experience shows that many buyers are often dazzled by the complexity of the technology and choose the solution that reassures them the most.

The marketing department must therefore carefully analyze the importance of different purchasing factors and take these factors into account during all product stages from design, to introduction to the market, and to further development.

### 3.1.3 Specific purchasing criteria for high-tech products

For a consumer, buying the latest laser-video disc player is riskier than buying a traditional hi-fi sound system. For an industrial purchaser, buying the first robot with six degrees of freedom (for manufacturing purposes) that just appeared on the market is riskier than buying a robot with three degrees of freedom, but with technology that has already been in use for a long period of time.

Therefore, because buying a high-tech product as compared to a traditional product often means taking the risk of experiencing the initial problems of a new product, two additional purchasing criteria should be considered: the customer's attitudes toward innovation and risk.

#### 3.1.3.1 Attitude toward innovation

Many studies have been carried out on the new product adoption process, following the leading research by Rogers [8], which defines the diffusion of innovation as "a process that communicates innovation through certain channels overtime among the members of a social system." Various studies deal specifically with the rate of adoption of personal computers [9] software [10], or fax services [11].

These studies show that not all customers (individuals or organizations) react to new products in identical ways, mostly because of their degree of involvement with technology [12]. Certain customers will buy new products immediately, while others will buy them much later.

Building on different adoption and diffusion models, we can distinguish between six classes of customers: the Innovators, the Forerunners, the Mainstream users, the Followers, the Traditionalists, and the Rebels. This typology is not very different from the famous one made by G. Moore [13], a Silicon Valley marketing expert in information technologies, who identifies the Technology Enthusiasts, the Visionaries, the Pragmatists, the Conservatives, and the Skeptics. Moore does not take into consideration people who are opposed to a given technology, while this category may be quite significant for some categories of products, such as the genetically modified organism in Europe.

We can characterize each category of consumers by using psychological traits:

- *Innovators* enjoy trying new products and are adventuresome. They are those leading-edge customers who are not afraid of the "bleeding edge" of any new technology. Actually some researcher argue that over time technological innovation can encourage a psychological addiction to high technology for some categories of users, either at home or in the work environment [14]. Innovators usually have an enduring involvement based on an "interest or arousal for a given product on a day to day basis" [15].
- *Forerunners* are often respected opinion leaders, who are more careful than innovators. They consider the ownership of a high-tech product

mostly as a status symbol to assert their difference with the rest of the society. In the case of businesses and organizations, Forerunners are lured and motivated by gaining a new or supplementary competitive advantage that will make a difference and will increase profit. Consequently, Forerunners, being consumers or business customers are not very price sensitive. They are ready to pay a premium in order to be special.

- *Mainstream users* will purchase a product not because it is innovative or different but because it fulfils a need, such as saving time or money, being more practical, or more reliable than the existing solution. Also dubbed as the "early majority" by Rogers and "pragmatists" by Moore, they like to analyze a product before buying it. They are very concerned with bridging the gap between their current solution and any new solutions to their need, and prefer to evolve by finding compatible products, rather than radical innovation. They are the people who did not buy pagers at once when they were launched, but are today heavy users of SMS on their existing cellular phone. They go for the safe and reliable product with a strong performance and security track record. They rely heavily on references and testimonials from actual customers. They try to minimize the risk and usually go for the leader, boosting the external network effects [16] and generating huge increasing return to one company, which becomes a "gorilla" according to Moore's words. In the information sector, they are the customers who bought IBM in the 1970s, Oracle in the 1980s, Microsoft in the beginning of the 1990s, Cisco at the end of the 1990s, and who favor Nokia today.

- *Followers,* labeled "conservatives" by Moore, go along with the majority, but much later. They are under the influence of the incapacitating FUD (Fear, Uncertainty, and Doubt) factor. Like Saint Thomas, they need to touch and see the solution functioning elsewhere—either at a relative's or friend's house for consumers, otherwise in a customer's or competitor's place of business—before deciding to purchase it. Technology often makes them nervous and they are looking for fully packaged and easy to use high-tech products. The "Wysywyg" (What You See is What You Get) approach works well with them. Because they do not have much interest in technology they are extremely price sensitive. Consequently, because they also are buying a product during the mature phase of its life cycle, they contribute to lower prices and reduced profitability.

  For instance, Followers accounted for the bulk of the growth of the prepaid card for cellular phones in Europe from 1999 to 2001. At that time, the cellular telecommunication operators were so anxious to increase their customer base that they offered bargains to reach this category of customer, which was not willing to pay for full-time services. When the telecom market burst in the wake of the Internet crash, the most market-oriented companies quickly figured out that

this category of customer was not profitable and companies like Orange, Bouygues Telecom, and others embarked on a program to switch those consumers to full services or to wipe them out of their customer base, by quickly raising the price of prepaid cards.

- *Traditionalists* are "Skeptics" who do not buy a product until it has become part of tradition. They are technology averse and will buy this category of product only when they do not have any other choices. They are very often old consumer and ancient companies who do not like any kind of change. Usually they tend to adopt a technology solution when it is at the mature or decline phase of its life cycle, in other words, when it is no longer an innovation or even high tech.
- *Rebels* will always reject a product, because of its very nature. Such an aversion to technology arises from cultural or religious reasons, like in the case of the well-known Amish in the United States. In that case, the numbers are not important. But sometimes, the rejection of technology may be based on security reasons and may create a significant number of rebels. In the biotechnology industry, the rejection of the Genetically Modified Organisms by the majority of the European consumers is a notorious example. Less known is the number of people who are restraining themselves from buying cell phones because of the health risks, especially for the brain, which may be created by using cell phones. Similarly, a significant number of prospective buyers of Wi-Fi solutions in Europe worry about the potential health problems related to the massive use of electric radiation.

For simplification, all six classes can be theoretically divided along a normal distribution curve (see Figure 3.4), though in reality their distribution may vary significantly according to the very nature of each market. For instance, in the case of cable TV pay-per-view services in the United States, 20% of households account for 80% of all purchases. Similarly, in the cases of video rentals in the United States and United Kingdom, 20% of households with VCRs generate 80% of the total demand.

The attitude toward innovation may also vary from one country to another. Consider, for example, the case of the penetration rate of broadband in western countries. According to the consulting firm McKinsey, in Italy, the United Kingdom, Australia, France, Spain, Germany, and Japan less than 10% of households are equipped with broadband (emerging markets) in 2003; in the Netherlands, United States, Belgium, and Sweden, the adoption rate is between 10% and 14% (growing markets); while in Canada the penetration rate is 25% and in South Korea over 50% of households use broadband (mature markets).

This analysis is important when marketing innovative products with a potential short life. In fact, to optimize the introduction of a new high-tech product, a company should first identify innovators and forerunners. These two groups of potential customers will give the product its acceptance and win over other customer groups. However, one should not think that this is

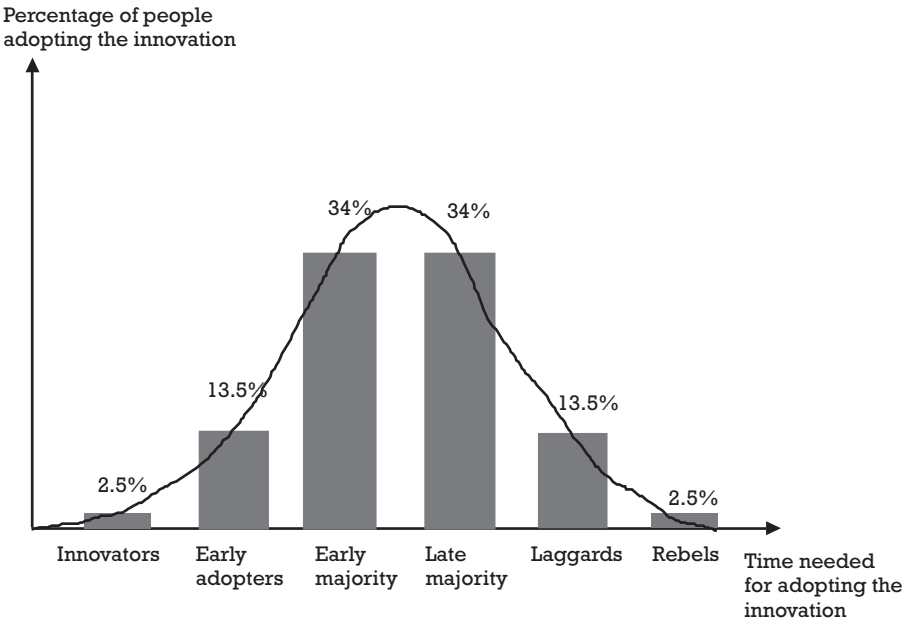


**Figure 3.4** Market sensitivity to innovation (segmentation according to attitude).

the recipe of success. Actually, if one may consider that the high-tech industry has a cemetery [17] full of companies with less than one product out of ten making it on the market, it is because usually companies cannot expand beyond those two first categories of customers. They have difficulties crossing the "chasm" between forerunners and mainstream users. That is the real marketing challenge. But before reaching this chasm, a marketer needs to capture innovators and forerunners, therefore they are a necessary condition to succeed on the market, but not a sufficient one in and of itself.

Savvy marketing companies will identify Innovators and Forerunners. For instance, when he started Siebel Systems in 1993, Thomas M. Siebel deliberately went after prospects that fully understood the need for Customer Relationship Management (CRM) systems from the get-go. "We were looking for people who understood the need and wanted to do it" [18].

The innovators are very often "lead users" companies, organizations, or individuals that are well ahead of market trends and have needs that go far beyond those of the "average user" according to E. Von Hippel [19] who first coined the concept of "lead user."

For instance, in 2002, Microsoft singled out 10,000 "hard-core gamers"—from more than 100,000 volunteers—to test its new on-line gaming service and they came back with some useful suggestions. For example, the microphone/headsets that Microsoft provides with the Xbox Live service allows players to change the sound of their voice and assume a different identity.

Networking is the most effective way to find lead users, because people who are interested in a topic tend to be familiar with others who know

more. So, one can start with the individual who seems to have a degree of expertise on the subject, and then ask for a referral to someone who has even more appropriate knowledge. Ultimately, one can reach the lead users at the forefront of the market. Then the marketers can scrutinize the behavior of those lead users and interview them to get a better understanding of their needs, wants, and desires. They can also giving lead users the opportunity to test various prototypes. Actually, it has been shown that when individuals play a part in the design of the technology their degree of involvement increases [20] and their response more positive, adding to the need for and value of the technology [21]. Subsequently, with all that information and feedback, a company can elaborately design and market a product that will appeal to innovators. Mostly, it has to be introduced to the market with a lot of technical information, always a must for the innovators, and then relayed by the network of lead users and technology experts.

This solution can also attract the forerunner, but will have to be marketed differently, because individuals or organizations that fall in this category are looking for something innovative but mostly *different*. To attract them to the product requires a specific type of communication, as well as the capacity to customize the solution, as much as possible, and to offer specific services, including technical support.

For example, before introducing the Macintosh computer in 1984, Apple carefully prepared its potential market by building fruitful relationships with six different types of people: third-party developers; dealers; financial analysts; trade, business, and general press; most critical Apple customers; and "luminaries." This last group represented about 50 creative people and decision makers such as Ted Turner, Lee Iacocca, and Andy Warhol. These famous people were all opinion leaders who were ready to make the Macintosh a new phenomenon and would pass on their passion for the Macintosh computer to an audience of "up-to-date" innovators and early adopters.

Long before introducing the Macintosh to the market, Apple had already informed the six aforementioned reference groups about the product so that these people would be inclined to make favorable comments because they already knew the product well. Apple gave almost 60 individual 7-hour presentations to financial analysts and journalists in the computer industry, 16 demonstrations for groups of 10 people or less, and training sessions for 40,000 retailers in the 3 months before introducing the Macintosh to the market.

Microsoft even went further to dramatically multiply the number of testers. When it rolled out Windows 2000 Beta 3, not only did it send the operating system to its usual core of 250,000 evaluators, but it opened up the beta-testing process through its Windows 2000 Corporate Preview Program (CPP), for a nominal fee with telephone support from either Microsoft or a solution provider during their evaluation. Demand exceeded 350,000 with all categories of companies from car rental agencies to network solutions providers and more, the highest number of customer previews of any product in the company's history (see also Section 6.3.1).

The importance of understanding the needs of innovators and forerunners is illustrated by another example in the on-line services business, where first users seem to value the communication abilities of networks, rather than their content. However, when Prodigy entered the on-line services business, its management postulated that its central value would be to give consumers access to various kinds of published content—such as news, weather reports, sports scores, and economic data—as and when required. Very soon subscribers appeared to be much more interested in communicating with one another. Unfortunately for Prodigy, its architecture was designed to facilitate access to published content, rather than connection among users.

That flaw left a window of opportunity for America Online (AOL). Prodigy's competitor developed a different architecture that allowed users to communicate either in real time through chat rooms or at any time through bulletin boards where they could post and receive or read messages. While Prodigy's growth stagnated, users rushed to AOL, especially after it introduced specialized chat rooms and bulletin boards for users who shared a particular interest or a similar lifestyle, like teenagers.

Targeting first innovators is also a sound business-to-business marketing strategy, because they may create a snowball effect that will expand in the whole market. For instance, Shinko, a Japanese semiconductor packaging manufacturer, decided to target Intel as a key customer, because of Intel's leadership in the semiconductor business. Shinko managed to meet Intel's packaging design requirements for different chip forms and became its first supplier. When other semiconductor manufacturers such as Texas Instruments and IBM switched to the same technology as Intel's, Shinko was already there to provide leading-edge solutions. As a result, Shinko increased sales at an annual growth rate of 18% from $68 million in 1980 to $726 million in 1994.

Similarly, Hashimoto Chemical first targeted Sony as a customer and managed to achieve a 90% market share by establishing a de facto standard in electrolyte-related materials for lithium ion batteries. Another Japanese chemical company, Tanaka Chemical, first targeted Matsushita and ultimately won 80% of the market of active material for hybrid battery cathode.

Furthermore, studies show that the more complex an innovation, the more time it will take for customers to accept the innovative product [22]. For any new product, the more important the extensive retraining required, the higher the risk to be rejected because of the high switching costs [23].

Consumers, especially mainstream users and followers, of high-technology products usually want to be able to transfer the product/usage skills that they developed with one product to another original product. If this is not the case, they may decide not to learn how to use the new product [24]. A classic example is the QWERTY typewriter keyboard that has persisted as a standard for years, despite the availability of superior alternatives; a contemporary example is the de facto Lotus 1–2–3 standard for spreadsheet software due to the proliferation of the electronic spreadsheet

in the workplace and the extended period of training needed to use them efficiently [25]. In the mid-1990s, Excel replaced 1–2–3 as a best seller, but one must note that it adopted a design similar to 1–2–3 in order to ease the switch for 1–2–3 users. Even popular products such as Windows 95 or Pentium microprocessors are not as widely adopted, as one would imagine, given their image of being the "standard" solution. A recent survey in June 1997 revealed that the Pentium was used by only 40% of the American households equipped with PCs, while the other 60% relied on x86-based computers (or even older). Similarly, only 48% of the American PC household users were using Windows 95; the others used older operating systems. In 2002, Microsoft was still selling 110,000 copies of the Windows 98 upgrade compared to 230,000 copies of Windows XP upgrades; in fact, Windows 98 sales increased from the fourth quarter of 2002.

In essence, a company can accelerate the market penetration of a new product by informing and educating as many potential customers as possible, so that they will know the product, will be able to measure its superiority over other existing products, and will feel capable of describing the advantages of the innovation to other people. Sun Microsystems has even set up an organization of technology evangelists, a group of about 15 top guru engineers whose main role and job are to share the passion of technologies with developers around the world and to inform them about the latest developments by Sun.

Another reason why innovation may take many years to replace an established technology is because of the investments made in the previous technologies that can still be productive. A case in point is the introduction rate of electricity on the American industrial market. In 1910, only 25% of U.S. factories used electric power mostly for new plants or new activities. In more mature industries, the replacement of water or steam by electricity as the source of power had to await the depreciation of existing plants. Twenty years later, 75% of firms were using electricity. This trend is not confined to businesses; it applies to consumers, as well. For instance, the market success of the DVD is largely correlated to the consumers' value of their current VCR system. The higher the value, the less they will be inclined to invest in a new image recording system.

#### 3.1.3.2 Attitude toward risk

Having confidence in the company that offers a solution is an extremely important factor. According to marketing managers, this trust is an even more important purchasing factor than the technology used and is equal to the price of the product (see Figure 3.5, which is based on interviews that I conducted).

In the high-technology industry, customers are often faced with a technically complex solution, the elements of which they do not understand. These customers, however, do realize that this solution is likely to change quickly over time and can suddenly become obsolete. Finally, innovation can often be disturbing for buyers.

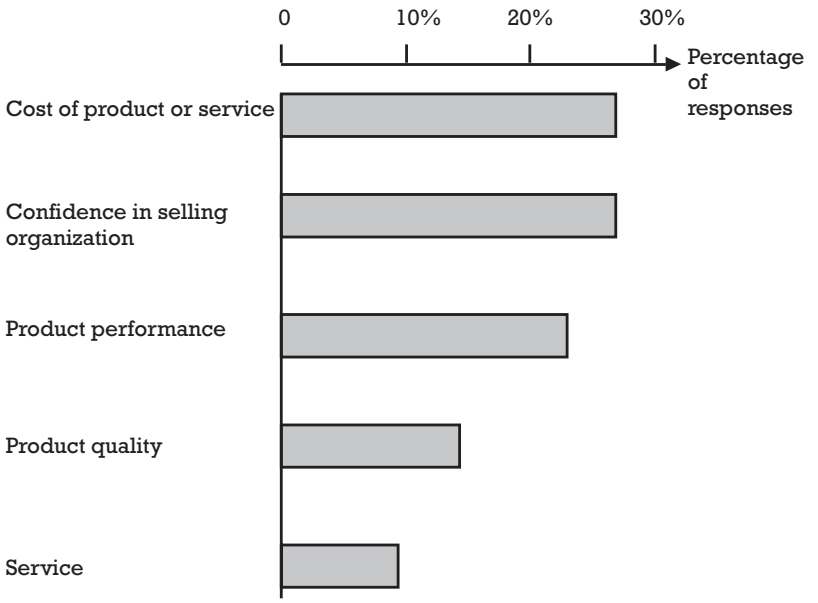


**Figure 3.5** Purchasing criteria for high-technology goods and services. Tabulation of responses to the question: Which are the deciding factors that influence your customers in a purchasing decision?

With this in mind, customers prefer security. They choose a company they can trust and that they know will be around for a sufficient length of time to guarantee the durability of the solution. This was the strength of IBM in the computer industry of the 1970s—no one was ever fired for selecting an IBM product.

Arianespace's marketing director Ralph-Werner Jaeger expressed this same idea: "In our business, there is a development toward criteria of trust and reliability of service. All our activities are ultimately materialized in about 30 minutes, after a 3-year waiting period and million-dollar investments…customers prefer that we spend more so as to supply an extremely reliable product."

The same reaction can be found concerning high-tech consumer products, because many consumers feel radical product innovations are risky purchases [26]. Faced with a complex and changing supply, consumers prefer either the least expensive brand or the most prestigious brand. For that matter, a successful licensing strategy helps to decrease customer perplexity, leading to bigger market acceptance for a given technology. So, when Philips NV settled on licensing the VHS videocassette recorder format from Matsushita, rather than continuing to pursue its own V2000 technology, it decreased the number of technologically incompatible VCR formats from three to two. Further, this move contributed significantly to the growing approval of the VHS format by the market, as well as the manufactures of complementary products.

Consequently, the marketing strategy for large companies should include improving their image and reputation. Smaller companies must rely on recommendations that reassure their potential customers, on a selling style that can establish confidence, and on a long-term support commitment for the solutions that these smaller companies offer.

In any case, according to marketing managers, technology is not a necessary and satisfactory element for convincing the market. The marketing manager must understand the client's needs in terms of performance but also in terms of psychological expectation. He or she must also try to reduce the risk aversion that inhibits the behavior of many buyers (final consumers or businesses) toward a high-tech product.

## 3.2 Estimating demand

When estimating demand, marketing high-tech products is significantly different than marketing standard products, because the marketing of high-tech products must create markets, rather than battle for existing market share like in the consumer goods business, for instance.

John Sculley compares his experiences at PepsiCo and Apple: "One of the major differences between computers and soft drinks is that the soft-drink business is a large industry where the major competitors fight over fractions of market share. In personal computers, the growth was so phenomenal that early market share gains were not nearly as important as making sure Apple was properly positioned in areas that were going to be significant in the longer term" [27].

Another PepsiCo marketer, Steve Case, the founder of America Online, defines its markets as "everybody else" and was quoted as saying, "we want [AOL] to be the Coca-Cola of the on-line world." AOL had only 200,000 members in 1992, but surged to 1 million in 1994, 4 million in 1995, 8 million in January 1997, and 34 million in 2003.

Furthermore, a precise evaluation of demand is not easy to accomplish when markets are exploding, which is often the case for high-tech products. Measuring a product's market share is always risky when the market grows 60% to 80% per year and the competitive positions change with incredible speeds, showing sales curves that more often bring to mind Swiss mountains instead of gently sloping Irish hills. For instance, Gemplus, a European company, created the global market for smart cards, nail-size chips that securely store data on plastic cards and now mobile phones. Gemplus estimated in 1999 that the market for smart card would reach 3.5 billion units in 2002; the growth pattern was slower and sales reached 2 billion units instead, with revenues down 23%, creating havoc for the company.

Nevertheless, the purpose of marketing is to understand the customer in order to respond better to his or her needs. An analysis of future demand is needed, especially for new innovative products, and the market acceptance rate should be tested for these products. The high level of investments

($100 million for the development of a sophisticated processor or the single production of HDTV) also requires multiple forecasts in order to estimate the return on investments and to measure the customer's reactions. At this price especially, marketing catastrophes should be avoided.

For this reason, companies conduct marketing research. The American Marketing Association defines marketing research as the "function that links the consumer, customer, and public to the marketer through information—information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor marketing performance. Marketing research specifies the information required to address these issues; designs the methods for collecting information; manages and implements the data collection process; analyzes the results; and communicates the findings and their application" [28].

Marketing research is mainly used to study user behavior and attitudes, product testing, advertising and corporate image evaluation, retail audit, consumer/customer panels, customer satisfaction measurement, concept evaluation, and distribution/price checks [29].

The typical steps of an effective marketing research process are: formulating the problem to be solved, determining a research hypothesis, designing a sample, collecting data through various methods (such as readings, field surveys, store checks, concept tests, and focus groups), analyzing and interpreting the data, and finally reporting the research findings [30].

Hence, certain traditional marketing research tools are used to estimate future demand, all the more because all high-tech products introduced on the market are not always revolutionary. The majority of these products consists of nothing but innovative improvements on already existing products for which the market can be identified. These identifying tools can be divided into four categories: concept tests and prototype tests, opinions of experts, sample groups and test markets, and quantitative analysis.

### 3.2.1 Concept tests and prototype tests

Performed on existing or potential groups of customers, concept and prototype tests allow for a conceptual evaluation of a new product or a prototype and its features. These tests measure the product's appropriateness in relation to needs, the perceived degree of its advantages, the ease with which these advantages can be understood, the provoked interest for the product, and the possible inclination to purchase the product.

Concept tests can be performed in two ways. In a focus group, a number of individuals are brought together in a room to talk about some topic of interest to the focus group sponsor. The discussion (which is taped for further analysis) is directed by a moderator, who follows a rough outline of issues while simultaneously entertaining comments made by each person of the group.

Focus groups are used very often in marketing research because they have proved to be very effective in generating hypotheses that can be tested further quantitatively, generating information for structuring consumer

questionnaires, providing background information on a product category, and securing impressions on new product concepts.

Concept tests can also occur in creative workshops according to, for example, the method of Turtlebay Institute, a New York–based market research company. In this case, customers are asked to fill out long questionnaires; the information is not as valuable as that of a focus group, but it is better organized and therefore easier to analyze.

The development of concept tests is based upon classic survey techniques that are used to measure a customer's reactions to global concepts and their characteristics, but it is also based upon more sophisticated methods such as multidimensional scaling analysis and conjoint analysis or tradeoff analysis. The experience survey attempts to tap the knowledge and experience of those familiar with the general subject being investigated. The aim is to obtain insight into the relationship between variables, not the exhaustive statistics of the profession. Thus, a selected sample of respondents must be chosen. The survey can be conducted through interviews, structured or loosely structured, or questionnaires. In multidimensional scaling analysis, the respondents are asked to make judgments about the relative similarities of products or brands. In conjoint analysis (or tradeoff analysis), the respondents are asked to make judgments about their preferences for various attribute combinations (that is, features) of products or brands; for example, conjoint analysis played a key role in AT&T's entry into the data-terminal market by facilitating an estimate of the total demand for data terminals and AT&T's market share [31].

In regard to prototype tests, innovators and early adopters as well as important customers, who might be interested and to whom the company wants to show its long-term commitment, should ideally be part of a group test. These presentations should always be performed in strict secrecy.

For the development of its Docutech Systems program, Xerox initially chose 25 carefully selected test customers. Xerox then heeded their suggestions for improving the prototype before introducing it to the market. Similarly, Boeing worked closely with United Airlines in developing its new line of 777 jets to decrease the likelihood of a product miss.

In the consumer market, Microsoft relies heavily on prototype tests. More than 10,000 worldwide customers tested its Windows 95 operating system before it was ultimately launched. In the telecommunication business, Viacom, Time Warner, and Comcast ran a test market of interactive-TV in Orlando, Florida, involving more than 50,000 households, to evaluate their needs and behaviors when able to choose from a menu of shopping catalogs, news, networks, and movies, for example. In a similar test involving 200 homes in the Denver, Colorado, area, ATT and TCI found that viewers ordered an average of only 2.5 films per month, roughly the same consumption as ordinary moviegoers, which is a clear indication that technology does not drive needs on its own.

It is also very useful to perform concept and prototype tests on retailers. Retailers are close to the market and, hence, more likely to consider its marketability than simply a single technical feature.

### 3.2.2 The opinions of experts

Another interesting viewpoint comes from experts—members of professional associations or universities, consultants, or even employees of suppliers or distributors. Their opinion is useful in forming a more precise idea of future market tendencies or the probability of a technological breakthrough.

Three methods can be used to obtain expert advice. The first is a discussion group, which brings together several experts who aim to arrive at a common idea. The second is a synthesis of individual opinions that are collected from each expert and combined by an organizer. The third is the Delphi method, in which every expert sends his or her recommendation and, after receiving the synthesis of opinions from the other experts, is invited to explain his opinion verbally. The process can be repeated several times in order to bring forth a group opinion.

Calling in experts is always questionable. A marketing director for a large computer company cunningly noted that if you ask a group of experts today if Linux will become the standard operating system for all computers in the future, 50% of the experts will answer "yes," and 50% of them will answer "no."

### 3.2.3 Sampling groups and test markets

Sampling means choosing a limited number of targets that presumably have the same characteristics as the total population of customers, consumers, or businesses that marketers want to study, to determine their assumptions about the future, as well as their buying behavior. Sample groups can also be used to test new products, after the development stage. The group members try the new product in its proper environment (at work, at home) and give their opinion on the same criteria as those that were measured during concept and prototype tests.

To determine the composition of the sample, marketers use different methods.

- In random sampling, all the units of the studied population have an equal chance of being selected.
- In stratified sampling, the studied population is divided into subgroups with a common characteristic and then each group is determined by probability.
- In quota sampling, the units are defined by two or three main characteristics and selected by the interviewers as representative, as, for instance, when an information technology company decides to concentrate on the 500 largest firms in Europe defined by their turnover and their spending on information systems. Accordingly, those samples are not a probability sample, and sampling errors cannot be calculated statistically.

Usually, the last step before launching the new product involves its evaluation on a test market (for a consumer good) or on a trade show (for

an industrial product), but some aggressive high-tech companies market a product directly because they want to put a product on the market very quickly and want to protect the innovative secret against competitors who can copy the innovation and misappropriate it. These companies observe the product's impact on the customers and make possible modifications after marketing the product. Many Japanese companies act in this way, whereas U.S. and European companies often prefer to surround themselves with a maximum of caution before launching a new product, with the risk that their product will often arrive too late.

Samples or test markets facilitate the receipt of data directly from the customers, which is called "primary data," as opposed to "secondary data" collected through reports, publications, databanks, and other indirect sources. Those data can be obtained by using different survey methods, which are mail, telephone, and face-to-face interviews. Each method has its pros and cons, as listed in Table 3.1.

### 3.2.4 Using a quantitative analysis

Once a product has been shown to the sales force and the distributors prior to the actual marketing, the marketing manager can also adjust the sales forecast, as prepared by the sales force, or key channel partners, by correcting their traditional bias (underestimating demand for quota calculations, lack of long-term views). These forecasts can supply the marketing manager with interesting information.

One of the characteristics of high-tech-product marketing is the lack of historical data due to the product's short life and innovative quality. Also, a

**Table 3.1** The Different Ways of Collecting Primary Data

| | *Pros* | *Cons* |
|---|---|---|
| Mail surveys | Lowest cost per interview | Return rate is often low (less than 25% in consumer surveys and 1% in business surveys) |
| | No interviewer bias (anonymous questionnaires) | Lack of flexibility in the questionnaire (which must be short and easy to answer) |
| Phone surveys | Less expensive than face-to-face interviews | No observation |
| | Flexible because interviewers can probe or stimulate correspondents to answer | Sample limited to people listed with phone number |
| | Relative anonymity | Interviewer bias |
| | | Engaged line and no answer can be significant |
| Face-to-face interviews | Very flexible: respondents can be shown visual materials and helped to answer questionnaires | Interviewer bias |
| | Refusals may be lowered by a positive attitude from interviewers | Expensive |
| | Observation provides more quality data | |

quantitative analysis often involves working with product data that are going to be replaced (classic televisions by HDTVs, cassette recorders by compact disc players, and telephones by videotex computers). Scenarios should be made according to the hypothesis regarding the replacement of these products and on the expansion possibilities for other uses.

Quantitative analysis techniques and related models, frequently used for consumer goods, must always be dealt with carefully. Actually, even for consumer goods, such as microcomputers and HDTVs, the market changes so quickly that the obtained information is rarely reliable.

It is also very important to keep in mind another market limitation in high-tech business: Customers must be able to employ the product, which will limit the ultimate market potential. As an example, consider the original small size of the videotex market, which depended on people who had a terminal at home. On the French market, France Telecom, the videotex manufacturer, tried to solve this problem by giving away millions of Videotex terminals. Although this move helped to create the market for videotex, it did so at a significant cost for France Telecom. The demand for transponders in Europe was likewise limited until more transmitting and receiving dishes were installed. Similarly, there is a strong correlation between the development of the on-line services market and the PC equipment rate by households. For instance, it does not come as a surprise that the countries that have the biggest number of Internet users, namely, Finland, Norway, and the United States, also have the biggest number of households equipped with PCs.

Another issue for the marketers is to differentiate between customers' preferences and purchase behavior [32]. It has been shown for instance that for high-technology products, large organizations prefer innovative, radical impact products, but usually adopt incremental impact products. In other words, preferences and purchase behaviors do not fit mostly for two reasons. First, the importance of compatibility with the existing (and often costly) technology and equipments is extremely important and prevents the introduction of extreme and breakthrough innovative product and/or process. Second, most organizations are usually risk averse and favor conventional solutions, which cause minimal changes in the structure of the company.

Probably, the biggest danger for the marketing manager is to perform quantitative extrapolations based upon limited qualitative information, which can lead to a generalization of hastily acquired, limited results from a small sample.

Agencies that specialize in market analysis of the computer industry have a tendency to overestimate the level of demand and the rate at which demand will develop. This was the case for the evaluation of the PC home-consumer market, as well as for the system integration business-to-business market. Conversely, AT&T and other telecommunication operators underestimated the market for cellular phones and none expected the World Wide Web to explode like it has. Those two markets have grown at such a rate that the number of subscribers have beaten the number of fixed phone

network accesses as early as in 2001 in Japan and Western Europe, according to ITU; and the United States is well on the way, with more than 146 million cell phone subscribers in 2003.

In fact, these forecasting methods are merely tools that can help reach the final decision. These methods contribute to the clarification of the company's choices, but they cannot guarantee results. In many cases, the ultimate decision (for example, launching a product) depends upon the attitudes of the company's managers toward a double risk: losing a market if the company expects too much or making a mistake by going too fast.

Such is the case, for instance, in the biotechnology business. One of the leading biotech companies, Synergen, lost more than 90% of its market value when it appeared that its major drug, Antril, had no real potency. Ultimately, Synergen was acquired by one of its main competitors, Amgen.

Besides, one must note that frequently incumbent companies fall short of realizing the potential effect of a new radical technology in their industry and consider visions of it as overhyped. Since the potential customers for this technology are usually not well identified, market research may infer that the potential for revenue is small and that the development of such a market will be too expensive. For instance, when early xerography technology was presented to IBM, senior management declined the offer, because their analysis concluded that demand for copiers was too low. In the 1980s, DEC made the same error in dismissing the potential of PCs as a growing computer solution for firms preferring to stick with their policy of offering more traditional minicomputers.

Conversely, one leading U.S. PC manufacturer underestimated demand for two of its best selling products and lost around $300 million in potential sales. Eventually, when it had its manufacturing capacity in line with the demand, the market for these products had already vanished.

At this point, common business sense appears at the same time as a business vision. According to the definition given by economist Schumpeter, isn't the entrepreneur the one who knows exactly what the market is waiting for, and doesn't the entrepreneur know it even better than the market itself?

### 3.2.5 On-line market research

The growing percentage of the adult population having on-line access in western countries, coupled with the unlimited capacity of the Internet to influence lifestyles, has turned the Web into a tool for understanding and anticipating consumer needs and to gauge consumer thinking and behavior [33].

As electronic commerce is slowly but surely taking off, on-line testing happens to be a useful alternative or add-on to traditional market research methods. And package-goods companies are taking advantage of what the Web has to offer—from speedier results to global reach—so they can race to market and gain competitive advantage.

Indeed the Internet does offer some advantage but it has a few drawbacks too. Some of the drawbacks pose substantial risk to companies that naturally want to keep innovative ideas private at least until launch time.

The main benefit is timesavings. On-line concept testing can cut testing time from 4 weeks to 7 days or even less. It is also generally less expensive, especially when sample sizes are large. For example, a typical on-line focus group can run from $4,000 to $10,000, with the high end including written reports and analyses. Its off-line equivalent costs more or less the same, but travel budget for the marketing staff can add thousands of dollars to the original cost. Another beauty of on-line testing is its versatility: It can be limited to a few Internet users or reach a global audience. It also enables marketers to reach their target audiences quickly or to survey consumers from wider cross sections of the public. This provides companies with clearer pictures of buyers' likes and aversions, allowing them to cut prelaunch preparation time, while supplying precious feedback that once took months to gather.

Quick results are a prime benefit but longer test periods are possible with on-line testing, too since questionnaires can be posted on the Web for indefinite periods while results can be reported on a daily basis.

Another benefit of on-line testing is that participants usually become more engaged than in other test methods, though they are not truly representative of the off-line consumer. Typically, the elderly and uneducated people are underrepresented among on-line consumers. This means that on-line test results may be skewed for low-tech concepts. On the contrary, the Web is the perfect place to run a concept test, a qualitative, or a quantitative study for high-tech products, since the Internet is a secure environment for innovators and forerunners. Companies like Microsoft, Konami, Activision, Disney Interactive, Universal Interactive, and Logitech are heavy users of Web market research.

Nevertheless the disadvantages of on-line testing are many. First, you face hackers, who can create chaos if they gain access to ideas for new concepts or product blueprints, or are able to tinker with test results. Another issue is the difference of results for off-line and on-line tests, because research shows that consumers grade concepts differently off-line than they do on-line. Occasionally, results for purchase interest, uniqueness or believability may be lower on-line.

Another hindrance is that developing test materials can eat most of the time savings in the administration process. Indeed Web questionnaires must be constructed to ensure reliable results, which sometimes require the survey company to invest a lot of effort in test preparation. Furthermore, a short time frame for testing can prevent connecting with light browsers who could be heavy category users. An additional problem is data manipulation, since it is often difficult to know exactly who the respondents are or whether the competition is manipulating the test.

Finally, when testing brand-new-product concepts, there are always the risks of leaks on a global scale by anyone who can access private product images on the Internet. Clearly, untimely disclosure can damage or destroy

a product's chances even before it is launched, but the majority of those cons is not unique to the Internet and can be experienced off-line as well.

On-line testing is far from perfect, but overall the pros outweigh the cons. The Internet offers significant ways to interact with consumers. Furthermore, though on-line test results can differ slightly from off-line test results, in the long run, concept validations show that marketing decisions remain unchanged despite the differences.

As for quantitative and qualitative market research applications (e.g., focus groups, on-line interviewing via chat rooms, Web surveys), one can use on-line likewise off-line-generated data and just keep in mind the potential differences related to the medium and the sample. Ultimately, as the number of Internet users increases, the differences between on-line and off-line test results will diminish [34].

## 3.3 Managing the relationship with customers

Leading high-tech firms also are extremely skilled in leveraging the value of their customer-installed base. More specifically, they treat customers differently, on the basis of their long-run value. Consequently, they manage to increase the durability of the relationship with large and profitable customers. They also reduce the defection rate of customers. Moreover, they boost their revenues with cross-selling and up-selling, meaning the selling of complementary products or services thanks to an ability to identify the existing customers' needs more accurately. Finally, they try to avoid unprofitable customers. For instance during the Internet boom, IBM did not run after every Internet startup without considering their long-term ability to pay [35]; this approach paid off and saved IBM the financial problems that faced Lucent, Nortel, Sun, or Compaq when this category of customers went broke and could not pay the bill.

Such an approach relies mostly on the use of customer-relationship-management CRM software from vendors like Siebel, Oracle, SAP, or PeopleSoft, which allows firms to manage their customer contacts and call centers, to identify sales leads, and to plan and analyze marketing campaigns [36]. According to AMR Research, by 2001, in Western countries, more than 40% of the high-technology companies and two-thirds of the telecom operators had implemented CRM systems.

Leading software companies such as Microsoft, Intuit, and Cadence, as well as successful hardware firms such as IBM, HP, Acer, and Legend, are using CRM programs also to manage, synchronize, and coordinate all customer contact points, such as sales representatives, but also call centers, the Web, field organization, and third parties like distributors.

The main point is to know the customer and to get as much information as possible about that customer. Consequently, all the CRM programs rely extensively on the set up and the manipulation of a customer database where all the information stored in a data warehouse are then sorted and analyzed through data mining software.

The CRM approach has proven very effective for some high-tech firms, but it has its downsides, as well. First, it is extremely costly—up to $100 million for the most sophisticated projects—and requires a big investment in computer hardware, database and communication software, and skilled experts. Some CRM projects have cost overruns more than two or three times the initial budget. However, the technological infrastructure is a key factor for CRM to succeed, because very often the failure of the infrastructure will lead to the failure of the CRM project [37].

The second obstacle is that CRM requires everyone in the company to be customer oriented in order to acquire and to use the available data. The firm's top management must drive this cultural orientation and encompass it in the corporate culture, but actually, many technology-oriented high-tech firms are not able to make this cultural shift. As a consequence, they end up with some kind of advanced database marketing, but no better relationships with their customers [38].

Finally, CRM has not proven very effective in B2C for products with low unit sales or where customers show little brand loyalty [39]. Actually, some researchers even argue that loyal customers are often less profitable, because they expect a reward for their loyalty [40].

## 3.4 Summary

First of all, a marketing manager must know the purchasing behavior of his or her customers in order to know the needs of the market. The manager can then develop ideas for new products or approve sales applications of a new technology.

When dealing with high-tech consumer products, purchasing factors can be divided into four large categories: sociocultural factors, psychosocial factors, personal factors, and psychological factors. For industrial goods, these factors are grouped into three classes: environmental factors, organizational factors at the purchasing company, and personal factors for each buyer. Finally, there are two specific purchasing factors for high-tech products: the customers' attitudes toward innovation and risk. The marketing manager must identify, among all these factors, those that may influence the purchasing of products so that these factors can be taken into account when defining the marketing strategy.

Estimating the overall demand of a high-tech product is not easy because high-tech marketing deals with markets that are in a constant state of flux. Nevertheless, the manager can rely on several tools such as concept tests and prototype tests, expert opinions, sample groups, test markets, and sales forecasts. The manager must, however, keep a critical eye on these methods due to the unreliability of certain data. He or she should also never make the mistake of extrapolating the outcome of qualitative studies on a large scale.

The growing percentage of the adult population having on-line access in Western countries, coupled with the unlimited capacity of the Internet to

influence lifestyles, has turned the Web into a tool for understanding and anticipating consumer needs and for gauging consumer thinking and behavior.

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CHAPTER

4

# Understanding Competitors

Contents



In the midst of the high-tech economic slowdown, only the fittest companies have managed to survive. On the competitive battlefield, they have triumphed in the war of positioning and overwhelmed their competitors. In some cases, large companies such as Kodak, IBM, or more recently Microsoft have been accused of predatory behavior. For instance, Microsoft was also accused of forcing PC manufacturers to use Internet Explorer, rather than Netscape, which was based on the power of Windows as a strong lever.

Indeed, this is defined as an anticompetitive activity based on a predatory technology forcing existing rivals to leave a market or to limit their growth opportunities, as well as preventing future competitors from making a profit when they enter the market [1]. In reality, those "de facto" monopolies have always managed to wiggle out of those charges, usually after a lengthy trial, because it is extremely difficult to achieve a monopolistic position very long in those markets.

Positions are constantly changing, and this "hypercompetition" [2] creates a state of constant disequilibrium and change. The development of the personal digital assistant (PDA) illustrates this reality quite nicely. The market for PDAs was invented by companies, such as Casio and Sharp, which offered digital diaries at the end of the 1980s. Then Apple Computer introduced the famous Newton. Apple's CEO John Sculley coined the name "Personal Digital Assistant" in a 1992 speech. Apple's lead was followed by Tandy, IBM, and Casio; later Motorola and Sony joined the fray. However, the Newton was too bulky, too expensive and loaded with handwriting recognition bugs. It flopped and was shelved in 1998. By that time, the Palm Pilot, made by Palm, Inc., a subsidiary of 3Com Corporation, was already dominating the market. Launched in 1995, Palm Pilot sold over 1 million units during its first year. As the PDA market grew, Palm's share reached nearly 80% of the market in 1999. But competitors such as HP or Compaq

entered the market running Microsoft's Pocket PC operating system. Because of tough competition from licensees, such as Sony and HandSpring, Palm-branded devices fell to 60% of the global market in 2001 and declined to around 40% in 2002.

Successful high-tech companies that managed to thrive during the technology shakeup of recent years outsmarted their competitors, who are also struggling to satisfy and acquire (new) customers. In the first place, they know how to identify competitors. Secondly, they also know how to analyze these competitors' strategies, while incorporating the technological dimension, which is so characteristic of the high-tech sector. Finally, they have organized a systematic monitoring strategy for competitive information.

## 4.1 Identifying competitors

Even though high-technology markets are very often winner-take-all markets, as seen in Chapter 2, arrogance and the underestimation of competitors can lead to a quick death in high-technology industries. One should always remember the haughtiness of mainframe computer makers toward the PC when it came out 20 years ago. They considered it a hacker's toy that did not interest business firms nor threaten their supremacy. Surprisingly enough, minicomputer makers—like DEC, HP, and Data General—had an identical opinion, though they had defeated the mainframe the same way desktop computers were going to defeat them.

When one considers the competition, one must not only consider direct competitors, but one must also look at all the competitive forces on the supply side of firms that serve much the same markets within a given industry (or sector), and that may have an impact on the long-term industry average profitability.

### 4.1.1 Identification by market and by product

A competitive analysis must first analyze all the existing competitors who meet the same needs that the company currently meets or plans to meet. For example, a new resin based on polybutarene that can be used in manufacturing fire-resistant material has not only similar resins as a competitor, but also other fire-resistant components, such as asbestos and ceramics. What the customer buys is not a resin but a "resistance to fire" that will be integrated into his or her own product.

The marketing manager must identify his or her main competitors on the basis of market/product combinations by trying to identify possible future uses of these products by customers in different markets. Such a guideline has proven to be very effective. Indeed, though the technology, the products, and even the producers are changing rapidly in the high-tech sector, at least the customers do not vary that drastically, so it is very useful to anchor the competitive analysis to the primary markets and to the

industry's responses to the needs of these markets (i.e., the products). Figure 4.1 illustrates this method with an example of identifying who the main players in the computer industry were in 2003.

Figure 4.1 is an interesting illustration because the computer industry has experienced many dramatic changes in the recent years. On one side, the range of products has expanded considerably. In the 1970s only mainframe and mini computers existed; then in the 1980s came desktop PCs and workstations; after that, in the 1990s came laptops and PDAs; now new categories such as mobile phones are functioning more and more as computers. On the other side, the leading firms for each category of products have changed enormously. Interestingly some companies who had the biggest market share in one category were able to expand their product line and gain market share in other categories by dislodging less effective competitors.

For instance, Sun Microsystems started out manufacturing workstations for university researchers. However, a workstation is really a large local computation capacity for the user who is connected to a standard operating

| | Market segments | | | | | |
|---|---|---|---|---|---|---|
| | Corporate [+] | Education | Government | Small offices/ home offices | Healthcare | Personal |
| Mainframe | IBM<br>Unisys<br>Silicon Graphics | HP<br>Silicon Graphics<br>NEC | IBM<br>HP<br>Silicon Graphics | | HP<br>Silicon Graphics | |
| Minis (servers) | HP<br>IBM<br>Sun<br>Dell<br>Fujitsu | HP<br>Sun<br>IBM<br>Dell | IBM<br>HP<br>Dell<br>Sun<br>Fujitsu | Dell<br>HP<br>IBM | HP<br>Dell<br>IBM<br>Fujitsu | |
| Workstation | Dell<br>HP<br>IBM<br>Sun | IBM<br>HP<br>Sun<br>Dell | IBM<br>HP<br>Sun<br>Dell | Dell<br>HP<br>IBM | Dell<br>IBM<br>HP | |
| Desktop PCs | Dell<br>HP<br>IBM<br>Gateway<br>Siemens Fujitsu | IBM<br>HP<br>Dell | IBM<br>HP<br>Dell<br>Siemens/ Fujitsu | Dell<br>IBM<br>HP<br>Gateway | IBM<br>Compaq<br>HP<br>Dell | Gateway<br>Compaq<br>HP<br>Dell<br>Apple |
| Laptop | HP<br>IBM<br>NEC<br>Toshiba | HP<br>IBM<br>Toshiba | IBM<br>HP<br>Toshiba | HP<br>IBM<br>Dell<br>Toshiba | HP<br>IBM<br>NEC<br>Toshiba | Dell<br>HP<br>Toshiba |
| Pocket handheld PCs/PDAs | HP<br>Dell<br>Palm<br>Toshiba | Palm<br>Dell<br>HP | Palm<br>HP<br>Dell | Palm<br>HP<br>Dell | HP<br>Dell<br>Palm<br>Toshiba | Palm<br>HP<br>Sony<br>Dell |

[+] Corporates includes: Manufacturing, insurance, and financial sector

**Figure 4.1** Product/market segments in the computer industry (manufacturers with largest market share).

system such as UNIX. This system corresponds exactly to the needs of banks for their trading rooms. Sun Microsystems was able to respond to the banks' demands and became one of the leading suppliers of this industry. Later on, when the majority of mini-computers turned out to be dedicated mostly to be telecommunication servers, Sun managed to be one of the leading companies in providing servers for large and small companies running Internet applications. In the very recent years however, Sun lost significant market share by sticking to its own proprietary operating system, while its main competitors were pushing Linux-based servers.

Silicon Graphics (SG) had a similar story. The vendor of the most powerful workstation, SG first achieved fame as the favorite tool for computer-aided design in the manufacturing industry, before successfully entering the financial market, as well as governmental agencies. Building on its sophisticated technology and computing power, SG offered a more powerful computer and entered the mainframe market, namely, worldwide Fortune 500 companies, major universities, and big government agencies. Ultimately, SG bought Cray, the scientific supercomputer vendor, and secured almost half of the market. Its biggest competitor emerged as Compaq, which bought Tandem Computer to complete its product line in the mainframe business.

Originally Compaq began in the PC business. It started as an IBM PC clone vendor, the smartest in its category. Then in 1989 it introduced its first server, the system Pro, which could run up to five different operating systems, before launching in 1992 the successful Prosignia server, a low-price, high-performance solution, and then, in 1993, the Proliant 1000, an easy-to-install, easy-to-use server. Ultimately, Compaq bought Tandem, the leading fault-tolerant minicomputer vendor, and DEC, which gave Compaq access to mainframe customers, mostly in banks, education, and government offices. Finally, Hewlett-Packard acquired Compaq in 2002, and today, Tandem, DEC, and even Compaq's organization and expertise are buried within the HP structure.

Previously, Dell followed the path of Compaq to overtake it. Started as a PC vendor, Dell sold only through direct marketing, first to consumers, then to small businesses, and finally to larger organizations. Then Dell managed to move successfully up-market by offering workstations first and then servers, storage, and networking to its corporate customers. But Dell is also expanding in other markets. First, in March 2003, Dell made the decision to challenge HP and IBM by rolling out inkjet printers. Then, in September 2003, it announced it was entering the consumer electronics market, selling MP3 players and flat-panel TVs on its popular Web site. Dell was not the first computer firm to go into this new business dominated by Asian companies, such as Sony, Samsung, and Matsushita. Gateway was the first to act in 2002 when it started marketing large-screen plasma TV monitors and took the biggest market share in the United States in less than 1 year; now Gateway is also selling digital cameras.

Finally IBM, the oldest player in the computer industry today, is still the leading mainframe vendor for financial and nonscientific applications. It also has the biggest relative market share with its AS400 minicomputer

family, which is a winner with all kinds of organizations—big and small, private or governmental. The RISC workstation family is also helping IBM gain a strong position in all those market. In the PC business, IBM covers all the market segments with its different PC brands, but is the second vendor behind Compaq and ahead of HP, the minicomputer specialist whose solutions are appreciated by various types of business customers and governmental organizations. In 2003, IBM grew revenue share in UNIX, Linux, and Intel Servers to 30.7% revenue share worldwide, according to Gartner.

These various examples clearly indicate that competitors may migrate from one market segment to another. Consequently, a firm that wants to match its competitors' capabilities must be ready to extend its technology base.

A similar analysis can be done for the electronic commerce industry, which encompasses all of the firms that are trading information, goods, services, and payments, by electronic means. This industry has two chief markets—businesses and consumers—and offers three broad types of solutions: on-line information services; messaging, including XML and other Web services [3] for business customers; and market transactions.

If for the same product, several brands can compete with each other on similar or different price levels, it is also important to identify close-substitute products that can take a product's place. For example, for a long time, the ultrasound market consisted of only two-dimensional ultrasound echographs, but they are now beginning to be replaced by three-dimensional ultrasound echographs.

### 4.1.2 Identification of the competitive forces at the industry level

After positioning the competitor's offer to meet the market's needs, the marketing manager must analyze the competitor's position in the industry (or sector) in which his or her own company operates. Since industries are constructed, and not found, usually boundaries are easier to define in mature industries. With industries where the technology is less stable, it is helpful to define industry more broadly [4].

Using an extension of the model created at Harvard University and popularized by Michael E. Porter [5], a useful framework for diagnosing industry structure can be built around seven different competitive forces: the rivalry among existing competitors (as discussed in Section 4.1.1), the threat of both substitute products and new entrants, the bargaining power of suppliers, buyers, as well as "complementors," and ultimately the influence of governments (see Figure 4.2).

#### 4.1.2.1 Threat of substitute products

Because of the highly innovative nature of high-tech products, it is important to understand the threat from substitute products driven by indirectly competitive technologies. Substitute products can put an end to an existing

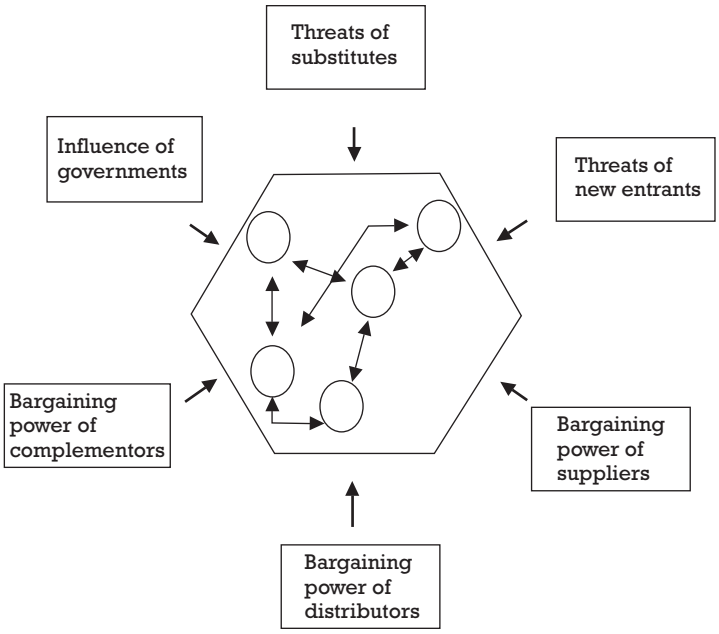


**Figure 4.2** The seven competitive forces. (*After:* [5, 6].)

technology by making it useless. To understand risks imposed by new technologies, these risks should be evaluated by application (by type of needs being met), rather than by product.

When Quicken was released in 1984, 42 software packages for personal finance were on the market. Yet none had managed to crack the market, despite the fact that every household has to pay bills, representing, in principle, a big market for personal financial software. Intuit managed to dominate this market, because it saw its greatest competitor outside the industry. It was the pencil, which is amazingly low in cost and extremely simple to use. Yet the entire industry had overlooked it. Existing software packages were too expensive (around $300), hard to use and full of accounting jargon.

So Intuit designed Quicken with its user-friendly interface similar to the familiar checkbook; it made it faster and more exact than the pencil, still almost as easy to use. It cut the accounting lingo and the sophisticated features, which allowed them to cut the cost and reduce the price by 70% to about $90. Neither the pencil nor other software packages could compete with Quicken, which redesigned the industry and expanded the market dramatically [7]. Even Microsoft, which failed in its attempt to buy Intuit, has not been able to catch up.

#### 4.1.2.2 Threat of new entrants

New entrants are companies that are attracted by the high profit level in a sector and wish to establish themselves in that sector [8], usually with the

help of both new products and technologies. Their access to the market depends on the level of entry barriers. In the high-technology sector, entry barriers can be high, if there are strong capital requirements (it cost Intel $1 billion for its latest state-of-the-art components factory), if significant economies of scale and learning effects are present (an absolute necessity in the computer memory industry), if a high number of governmental licenses are necessary (as in the biotechnology industry), if gaining distribution is particularly difficult, if a strong corporate or brand image exists already (as in the case of home electronics products), and if there is a significant product differentiation that leads to strong customer loyalty.

In the high-tech sector, as in many other sectors, the entry barriers are lower at the early stage of the technology or product life cycle. For instance, the technological convergence of mobile phone and digital consumer products is redefining the competitive landscape and yielding room to new competitors from various industries. This is the case of Samsung, a recent entrant in the consumer business, which introduced the first voice-activated phones, the first handsets with MP3 players, and the first GSM digital camera phones. Other new entrants are coming from the computer industry, such as Gateway and Dell, which are following the example of HP and Apple.

However, new entrants may also decide to pursue a business at a later stage of the technology life cycle, when it is getting more mature and standardized. At that stage, marketing, as well as cost management competence become key success factors. A good illustration is the case of the telecommunication hardware industry where the leader Cisco Systems has experienced new competition from Dell Computer, which began selling switches in late 2001, from Huawei Technologies, China's largest telephone equipment maker, and other Asian manufacturers [9]. Building on existing technologies (Cisco is even filing a patent infringement lawsuit against Huawei Technologies), those new entrants are slashing prices thanks to their ability to lower their manufacturing costs, thanks to flexible technology in the case of Dell and thanks to low labour costs in the case of Huawei Technologies.

#### 4.1.2.3 The bargaining strength of suppliers

The power of suppliers is an additional major determining point of industry competition, and its impact can be significant, especially if there are a limited number of suppliers. It is exercised largely through an increased price, which may lower the margin of the suppliers' customers if the customers cannot pass the increase to their own customers. The power of suppliers is even more important if the cost of switching and the prices of substitutes are high. Such is the case for almost all the PC manufacturers that must rely on Intel for microprocessors and on Microsoft for operating system software.

Similarly in Europe, the telecommunication operators have managed to kill or restrain independent service providers (ISPs) through the control of

their existing infrastructure and back office resources, as well as aggressive marketing. Dominant ISPs in Europe belong to telecom operators: In 2002 Deutsche Telekom had more than 60% market share in Germany, Telefonica had more than 50% in Spain, while France Telecom had more than 40% in France.

This situation is in sharp contrast to the U.S. market, where independent ISPs, such as AOL, Earthlink, and MSN lead the market. But they started earlier than their European counterparts. The Internet was created in the United States and they were already well established before Internet surfing became a mass market and telecom operators started to consider it. Furthermore, in the United States local telephony was charged at flat rates and not metered, meaning that the cost of dial up Internet services was more on the shoulders of telecom operators than ISPs or even consumers.

In Europe, phone calls were charged according to time, which gave an even stronger lever to telecom operators to control the access to the Internet [10]. Nonetheless, recently in the United States the rise of broadband for high-speed access, which is provided in the United States mainly by the major telecom companies and cable operators, has so affected AOL that Time Warner dropped it from their name in 2003.

#### 4.1.2.4 The bargaining strength of buyers

In their efforts to get reduced prices, added services, or better product quality, among other concessions, buyers play individual suppliers against one another. The extent to which they succeed depends upon how concentrated buyers are in a market (the more limited the number of buyers that account for a large portion of industry, the more clout they have); the switching costs; the product's importance to the performance of the buyer's product (the greater the importance, the lower their bargaining power); the buyer's profitability (the more a product is an important part of the cost, the more aggressive the bargaining); and the threat of backward integration, which may soften the need for the supplier.

For instance, in 2001 semiconductor equipment sales felt the heat of the drop in semiconductors. Equipment leader Applied Materials, Inc., reported sales down by more then 30%, while throughout the industry, foundries were running at about 50% capacity.

#### 4.1.2.5 The bargaining strength of complementors

A complementor can be defined as a firm that provides complementary products or services, as well as added value to an existing product or services [11]. For example, to install ERP or CRM software from SAP or Oracle in a large company requires huge organizational complexity. Complementors such as Accenture, Cap Gemini Ernst & Young, and hundreds of smaller and more specialized consulting firms, are helping the organization to implement and to adapt to the software. Consequently, the complementors that

are backing the software largely drive the value of what they are helping to install.

Similarly, the value of an operating system depends on the number of software applications available on it. Software developers are complementors of Microsoft, Linux, or Symbian. They can have some significant power as Apple discovered the hard way when many application developers left its operation system for MS Windows. The standardization of a technology eases the rise of complementors, which are needed to expand the market, and whose bargaining power may become more important as the more companies depend on them.

Another example is the telecom and satellite field where competitors like satellite providers and cable operators use complementors to create distinct competitive advantages. Satellite providers offer a low-cost solution, especially to cover rural and thinly populated areas, that is able to bypass local content limitations. Cable operators offer an interactive solution through services like PPV or video-on-demand (VOD), a high-speed Internet access with better broadband capacity and picture quality than satellite, without the need for satellite dishes.

#### 4.1.2.6 The influence of government

Interacting with governments is a very important feature of the competitive game in high-technology sectors. First, a government can act as an entry barrier. For example, Apple was barred by the French government from entering the French education market to the benefit of Thomson, the French government-owned electronic company. Similarly, in 2003 many high-tech French firms were banned from all the U.S. government RFPs, following the disagreement between France and the United States during Gulf War II.

The government also creates markets, through governmental research programs such as Eureka in Europe or High Performance Computing and Communications Initiative (HPCCI) in the United States. Those programs are funded and managed by various governmental agencies (see Section 1.2.7), which can introduce much competitive bias by championing national suppliers.

Governmental constraints are especially important when it comes to standards in international contracts. For example, the European Union's taxation on the broadcasting of television programs by the D2 Mac satellite killed the market of D-Mac decoders. This decision caused problems for companies such as Thomson and Philips because they had to stop production (more than 60,000 per month) of D-Mac decoders, but this same decision benefited a Finnish company, Nokia, which was already very advanced in the development of D2 Mac decoders.

On the other side, in 1985 the French, Italian, and German governments signed an agreement for the development of Groupe Spéciale Mobile (GSM) as a common standard for the development of an effective pan-European solution to mobile communications. This decision paved the way to the

meteoric growth of the mobile telecommunication industry in the 1990s. GSM became the world's leading and fastest growing mobile standard, and was a big hit globally spanning over 190 countries. By the end of 2002 there were 787 million GSM subscribers across the world.

Finally, government can also create markets by putting on the market—through auctioning [12] or a beauty contest with a predetermined price [6]—properties that will subsequently be used by the winners to compete against each other in downstream markets. Such has been the case of Universal Mobile Telecommunications Service (UMTS) licenses in Europe, particularly in United Kingdom and Germany where the prices of licences reached very high levels (see Table 4.1) and had a tremendous negative impact on the financial structures of the telecommunication operators that won the auction.

If the government influences the competitive environment, one should note that its force varies according to the size and the characteristics of the firms. It can also be affected by the political strategy of the largest firms, or even of small ones provided they have managed to team up together.

In conclusion, the size of the sector and the number of players should always be carefully analyzed, because the higher the number of participants, the more difficult it will be to establish prices [13]. It is also necessary to differentiate product performance and quality of service to achieve competitive advantages in a market segment. Finally, because of their highly technical specialization, high-tech companies that operate worldwide deal with a limited number of customers, which requires them to have an international strategy. Therefore, the difficulty is to identify competitors, especially the local ones, and to analyze their game.

**Table 4.1** Average cost of 3G/UMTS in Europe (in Millions of Euros)

| | |
|---|---|
| Germany | 8,468 |
| United Kingdom | 7,193 |
| France | 619 |
| Netherlands | 537 |
| Belgium | 150 |
| Italy | 134 |
| Spain | 134 |
| Denmark | 128 |
| Austria | 117 |
| Portugal | 100 |
| Switzerland | 34 |
| Norway | 25 |
| Finland | 0 |
| Sweden | 0 |

*Source*: [14].

## 4.2 Analyzing a competitor's strategy

Before performing a detailed study of individual direct competitors, it is a useful practice to identify and group different types of competitors.

### 4.2.1 Strategic groupings of companies

Generally speaking, in a particular market, the more companies are alike, the more they will have a tendency to compete against each other. This observation leads to the definition of strategic groups—a collection of companies that have performed similar strategic choices. Usually a strategic group acts as a reference point for group members in formulating competitive strategy. The number and size of strategic groups, as well as the "strategic distance" that separates them should be correctly identified. Groups that are larger, more significant, and more recent will experience fiercer competition.

The concept works well for the analysis of various high-tech industries [15], where technology may have a significant impact on the formation of strategic groups [16]. For instance, in the semiconductor industry Intel and AMD belong to the same strategic group. Actually AMD started its business as a licensee of Intel chip design technology. In 1996, when the contract was terminated, each company went into its own way but on a very parallel path. AMD made the decision to emulate the leader by providing chips of similar design and performance at a discounted price. In 1997, it took 17 months for AMD to release a chip similar to Intel. In 1999, the lag time had been reduced to less than 1 month. In 2003, AMD even managed to launch a new type of 64-bit chip before that of Intel. This is a very different move that other semiconductor companies made, like Texas Instruments or Ericsson, which focused on application-specific integrated circuits (ASICs), which are microchips designed for a special application.

Another example is the CRM software market where, as illustrated in Figure 4.3, we observe a clear division between large, mission-critical database software products and small, easy-to-use packages. The former are designed for large firms and are marketed by companies such as Siebel, Oracle, PeopleSoft, Nortel, or Remedy. In 2002, an average deal for those CRM software companies ran from $300,000 to $400,000 (not including the cost of additional services provided by complementors, which can reach or exceed $100,000). In the later category, companies such as Interact Commerce, FrontRange Solutions, Epicor Software, Oncontact Software, and Multiactive Software have carved niches with more basic solutions at $30,000 or less. Small firms may also rent the applications from an application service provider (ASP) for a monthly fee of about $2,800. Interestingly Microsoft, which has many agreements with companies from the first group, entered the second market when, in May 2001, it purchased Great Plains, a European company specialized in CRM software solutions for small businesses.

The boundaries of strategic groups are open and susceptible to change, especially in a sector where markets are formed and disbanded very quickly.

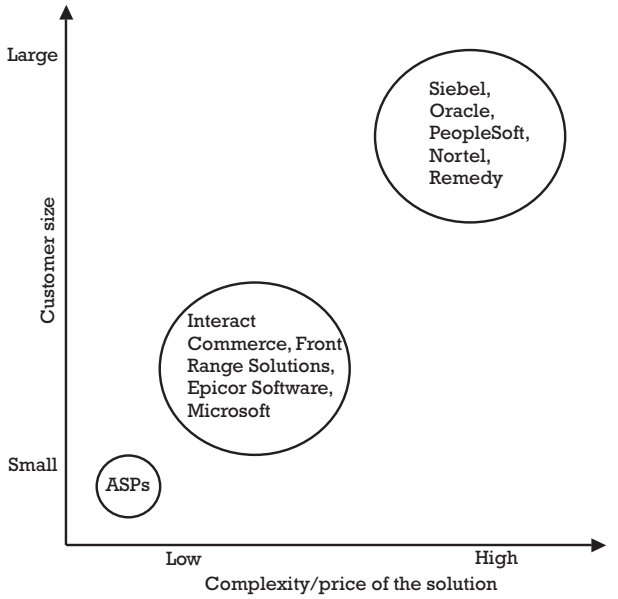


**Figure 4.3** Main strategic groups in the CRM software industry.

Changes in strategic group structure and increasing rivalry between groups usually translate into the declining profitability of the entire industry [17]. The PC industry is a case in point where most of the traditional computer makers, such as IBM and HP, have lost ground to direct marketing specialists, such as Dell and Gateway.

### 4.2.2 Competitive analysis

When the marketing manager analyzes strategic groups, he or she must collect and evaluate a certain amount of data about the company's competitors, which will enable him or her to identify their strengths and weaknesses simultaneously (so as to exploit their weaknesses better). For each competitor, he or she should analyze sales, financial, industry-specific, and political information.

*Sales data* essentially concerns sales figures, market share, the type of sales, and the level of competition in the selected sales channels, brand awareness and product availability, and the level of after-sales service.

*Financial data* includes profit margins, analysis of costs (which appear on the income statement), profitability, asset turnover (which measures the efficient use of resources), long-term debt ratio, and the short-term cash flow. For companies listed on the stock exchange, the price/earnings ratio (PER) reflects their position on the stock market and their credit in the opinion of investors.

The information used to provide financial data should not be underestimated. Bain and Company, a large American consulting firm, earned admiration and respect from one of its clients when it predicted that the client's

main competitor would soon be forced to increase its prices, not because of the market, but because of a considerable rise in the dividend paid to stockholders. Increasing the amount of dividends paid forced this competitor to adjust its margins and, as a result, increase prices. Rising prices for the competitor's main products could, therefore, be anticipated and actually took place about 2 months later.

The most important *industry-specific data* concerns investment programs and manufacturing capacities. The opening or closing of a factory is an important sign of success or failure for a product. This type of information also often leads to short- or long-term price changes, because of resulting volume fluctuations. Many high-technology firms are inclined to overinvest in manufacturing facilities, because they believe, incorrectly, that they will secure superior product quality and lower costs, as well as dissuade potential entrants.

Overinvestments in manufacturing capacities coupled with cutthroat competition drove down prices and profitability, putting many players out of the high-tech market. For instance, in the dynamic random access memory (DRAM) industry, the tendency of all the chip firms to minimize risk by following the same strategy of manufacturing commodity memory chips has contributed to over-investment, excess competition, and dumping abroad. Those firms built up memory chip factories to meet massive demand for chips during the technology boom of 1999 and 2000, but as demand for personal computers slipped, they were left with huge surpluses and were forced to slash prices below the cost of production. Many firms exited the market and today the world's top four makers (Korean Samsung Electronics Co., Hynix Semiconductor, Inc., American Micron Technology, Inc., and German Infineon Technologies AG) accounted for 70% of the DRAM market in 2002.

Consequently, such massive investments increase a firm's tendency to persist in businesses long after they have ceased to be profitable. Technology changes in the manufacturing process will also allow a competitor to improve productivity, which can then be reflected in the sales price.

*Political data* concerns, for example, the relationship between a parent company and a subsidiary and the subsidiary's degree of autonomy in making strategic choices. When the subsidiary of a competitor is not very independent and merely executes the parent company's policies, understanding its strategy will be easier than for a more autonomous company.

For instance, this may explain why Sony has been successful and Matsushita has not in their market diversification strategies. Sony bought Columbia Studios expensively and entered the game console market late. However, both businesses are doing well. Matsushita dumped a lot into Paramount and ended up giving it away. While the strategies were similar, Sony is known to give much more autonomy to its business units than does Matsushita.

In the computer industry, up to the end of the 1980s, IBM subsidiaries used to enjoy, each in their own country, a fairly large degree of decision-making autonomy when selecting the markets and products they preferred.

That changed dramatically in 1994 when the new CEO Lou Gestner introduced a new more centralized organization, which is still in place today. Similarly, Microsoft has a very centralized company, with employment concentrated in Washington State, in and around Seattle. In the telecommunication industry, Lucent is a very centralized company. Cisco Systems is also very centralized, but is substantially marketing driven; for instance, according to one of its vice presidents: "IT actually reports into customer support and gets his funding out of the business organizations based on their priorities in terms of what they think they want to be done."

The personality of the competitors' top executives is also valuable information, which may help to anticipate a competitor's move. For example, Oracle's Larry Ellison is known for his autocratic management style; it can be positive when he managed to shift Oracle's strategy to the Web and then to applications suites, but it can be negative when he is driving away key executives, to existing or future competitors.

Similarly, some of the plight of Vivendi Universal when it failed to diversify successfully in Internet and e-business, as so many dot-com firms, can be related to the personality of its CEO, Jean Marie Messier. He was a man with vision and ample ambition, but he was mostly a deal maker with no experience of the high-tech sector and had limited interest in strategy execution.

Jean Marie Messier's profile is not very different from Bernard Ebbers, the ex-CEO of WorldCom, which went the same way as Vivendi Universal. Along WorldCom history, Ebbers bought more than 75 firms such as MCI, MFS, UUNet, and others, but was not really interested in making those acquisitions work together. His goal was to be the number-one stock on Wall Street, not to be a market-oriented company. At a time, WorldCom's large account managers were competing directly with UUNet for corporate telecom bids with different proposals and quotes.

There are also the cases of certain companies that cannot advance when their founder (usually the person who came up with an innovation of genius) refuses to understand that his or her technology is outdated and that others must be developed.

The competitor's culture should also be taken into account. For example, many U.S. companies are obsessed by their quarterly earnings. These figures determine their stock's value (a decrease can considerably increase the cost of financing) or can lead to a collapse of the value. This happened to some U.S. biotechnology companies, the best known of which is Genentech. After being the stars of Wall Street, these biotechnology companies saw their stock value collapse due to their inability to come up with profitable products quickly. Some of these companies still find it difficult to finance and maintain their daily business activities.

In comparison, Japanese companies, whose presence is becoming more and more important, value capturing markets even if it reduces earnings and it is time consuming [18]. These companies are not playing poker, but the Japanese game of Go, and they faithfully practice "surrounding." Once these Japanese companies master a new technology, they file applications

for a vast number of patents, even on spin-off products. Then these companies inundate the market with continuously improved products that aim to provide products "tailor-made" for the customer's needs. These companies will lead a fierce struggle to increase their market share by offering lower prices.

Finally, a competitor's management style and organization must also be studied. For example, a large electronics company analyzed in detail the average time period spent by executives in the industry on certain jobs, so that it could determine if it was moving its own managers at the same rate as the majority of companies in the industry.

Ultimately, all these analyses, as well as the evaluation of technology, form a competitor's profile by identifying strengths (to be avoided) and weaknesses (of which to take advantage). This will help companies identify their various competitive advantages, keeping in mind that the relevance of the analysis depends in large part on the quality and the reliability of the information sources.

## 4.3 Finding information about competitors

Table 4.2 lists the most important available information sources that are used to evaluate a competitor. More than 20 sources are listed. Without going into detail, let us examine them by distinguishing between a company's external and internal sources.

### 4.3.1 External sources

Clients, of course, are the sources of privileged information. This is particularly true for industrial goods and services, where customers are usually few in number and always ready to talk if the right questions are asked. Every good marketing manager should regularly visit customers to determine their needs; this visit is the perfect opportunity to learn more about recent offers or propositions from competitors.

Competitors also provide a great deal of information. If analyzed sufficiently, their annual reports are a good source of financial information. The information sent to stockholders and speeches given by their executives also provide good ideas regarding the company's strategy and key success factors.

Their advertising literature, especially catalogs and descriptive product information, supplies useful information for the technical specialists familiar with decoding these types of documents. Company newsletters and press releases also mention new product launches and sales data that have yet to become public knowledge.

Becoming a supplier for a competitor is another way to obtain practical information. Supplying supplementary products to its product line, necessary components for the manufacturing of certain products, or spare parts for after-sales service is a good way to become familiar with a company.

**Case Study: The Coopetition Between Microsoft Versus AOL**

Microsoft and AOL have been bitter rivals for years. In the mid-1990s, AOL, the on-line service provider was worried about being marginalized on the desktop by Microsoft with its new service MSN Explorer, which had been launched in August 1995. In November 1998, AOL bought Netscape Communications, the leading Internet browser at that time and teamed with Sun Microsystems in order to create an alternate standard for servers and software for consumer-electronics devices to challenge Microsoft. In fact the alliance failed. Netscape's share of the browser market plummeted, while iPlanet, the software alliance between AOL and Sun gradually dissolved.

In October 1999, AOL came up with another plan to undermine Microsoft by investing $800 million in PC maker Gateway. AOL became the default ISP on Gateway PCs and the two companies announced the launching of a string of consumer-electronics devices. The first one was the Touch Pad, a Linux based home Internet terminal launched in November 2000, but 3 months later Gateway fired its CEO and killed its line of consumer electronics.

In the meantime, Microsoft had not managed to overcome AOL. In 2002, its MSN service had only 9 million subscribers, far behind the 32 million global AOL subscribers, and was losing money.

In May 2003, the two firms decided to make peace. Microsoft agreed to pay $750 million to AOL Time Warner to settle an antitrust lawsuit filed by AOL on behalf of its subsidiary Netscape. They also set a 7-year licensing agreement that allows AOL to use Microsoft's Internet Explorer browsing technology in its Internet service provider service without having to pay royalties. They also decided to make their AOL and MSN instant messaging services more interoperable, which will help allow the technology to increase. They also agreed to cooperate in digital music, developing new ways for Internet users to download copyrighted content legally. This new alliance seems to match the needs of both companies. Microsoft is extremely good at selling products to intermediaries such as PC makers, but less savvy when selling directly to consumers, a key strength of AOL. On the other hand, AOL won't have to worry about the back-end software, Microsoft's core competence.

How long the alliance will last is an open question. In 1996, AOL and Microsoft decided to team up together on the desktop. It worked well since AOL subscriptions increased while Internet Explorer began to catch up with Netscape's market share, but the cooperation died within less than 2 years.

Question 1: What are the internal and external forces at work in the competition/cooperation between AOL and Microsoft?

Question 2: Do the two companies belong to the same strategic group?

**Table 4.2** Information Sources Used for Competitive Purposes

| | *Type of Information* | | | | |
|---|---|---|---|---|---|
| *Information Source* | *Sales* | *Finance* | *Industry* | *Politics* | *Technology* |
| Customers | x | | x | | x |
| Competitors | x | x | x | x | x |
| Reverse engineering | | | x | | x |
| Benchmarking | | | x | | x |
| Patents | | | x | | x |
| Licenses | x | x | x | x | x |
| Trade shows | x | | | x | x |
| International conventions and conferences | x | | | | x |
| Partnerships | | x | x | | x |
| Standardization committees | | | x | x | x |
| Study trips | | | x | x | x |
| Consulting firms | x | x | x | | |
| Governmental competitive intelligence organizations | x | x | x | x | x |
| Data banks | x | x | x | x | x |
| Specialized press books, other media types | x | x | x | x | x |
| Internet sites | x | x | x | x | x |
| Suppliers/subcontractors | x | x | x | x | x |
| Distributors | x | x | | x | x |
| Sales force | x | x | | | |
| Maintenance service | | | | | x |
| Employees who used to work for the competition | x | x | x | x | x |
| Employment applicants | x | x | | | x |
| Former employees | x | x | x | x | x |
| Alumni networks | x | x | x | x | x |

Fujitsu, a Japanese company, was a long-term supplier to British ICL before finally buying out the company in 1990.

Understanding a competitor's products is obviously an essential step. It can be realized through reverse engineering, which means tearing down the machines of a competitor and then trying to rebuild them. Reverse engineering has been used for a very long time as a source of innovation notably by the Germans during World War I, and by the Japanese during World War II [19]. More recently, a low-cost Chinese company, Huawei, has reverse-engineered some Cisco routers and has put similar products at roughly 40% of the price on the American market, much to Cisco's dismay.

Benchmarking (i.e., comparing the performance of a business component with others) is another source of competitive information [20]. In the early 1980s Xerox used benchmarking to obtain cost-reduction ideas. It targeted organizations in other industries that were particularly efficient in functional areas similar to those at Xerox. Hence, Toyota and Komatsu became models for quality control, American Express for invoicing, American Hospital Supply for inventory management, AT&T and Hewlett-Packard for research and development, Ford Motor and Cummings Engine for factories layout, Procter & Gamble for marketing, Deere and Company for information technologies management, Texas Instruments for strategy implementation, and L.L. Bean for warehouse operations. In the logistic and distribution area, the benchmark study of L.L. Bean, the outdoor sportswear organization and mail-order house, along with five other warehouse benchmark studies, helped Xerox improve its annual productivity gains from 3% to 5% to around 10% [21].

Patents are a useful source of information about competitors' technological know-how, as in the case that concerned the IBM personal computer. In the mid-1980s, various companies, including Compaq Computer and AMD Computer, succeeded in designing a piece of firmware, the Read Only Memory Basic Input/Output System (ROM-BIOS), which coupled the PC hardware to its operating system software. It was similar to that of IBM but did not violate the IBM proprietary microcode.

Consequently, such companies were able to make and sell IBM-compatible PCs, the so-called clones, without paying any royalty fees to IBM. For this reason, in some industries, it may be better not to patent a component or a process but to rely on secrecy. Coca-Cola or Michelin have used this rule for years to keep their technological know-how out of reach of their competitors.

Trade shows also present opportunities to examine competitors' products on display, especially new products. The Japanese have specialized in obtaining this type of information, using video cameras that are capable of capturing 90% of a product's interesting elements in less than 5 minutes.

Conferences and conventions also present the opportunity to meet competitors and to take advantage of information, often first-hand and very recent, presented at meetings. These types of events often facilitate the building of strong relations. Competitors become colleagues, and these contacts can become useful at a later date.

Partnerships with other companies for important projects are also a way to create privileged relations. In the partnership, information circulates more quickly and more easily. Sometimes this is the only reason to participate in an important project. For example, it is widely suspected that IBM wanted to stay involved in the European Union–funded JESSI project so that it could share the work of major European manufacturers.

Standardization committees, very common in the high-tech industry, often shed light on many topics. When competitors present propositions for standards, the competitors often use their own standards. On the contrary, a

competitor's refusal to accept a product's standardization often reveals a company's technological, industrial, or political position.

Study trips, if well prepared, are a good source of sales and industrial information. These trips allow one to locate products that have not yet appeared on the local market or discover unknown manufacturing methods. These trips have a very high cost. To make them worthwhile, they must be planned and focused around a set of information-seeking objectives. The tasks should be divided in order to facilitate collecting information in a thorough manner but without duplication. In addition, the newly acquired information should be outlined in reports that can be distributed to interested parties.

Specialized consulting companies that follow a certain industry on a regular basis also supply sales, financial, or technological information. In the computer industry, companies such as Dataquest, the Gartner Group, the Meta Group, or Ovum send market information to their subscribers on a regular basis and provide forecasts and consulting specialists to obtain additional information.

All these companies, and some even more specialized companies or industry experts, can do targeted research in a certain field, a selected market segment, or a particular competitor. These studies are completed with the help of interviews with specialists, clients, distributors, or even competitors. The results are then analyzed and synthesized.

For consumer high-technology goods, panels are becoming a viable information source. These high-tech panels are based upon panels of more traditional goods such as detergents, soft drinks, and industrial goods. Consumer or distributor panels can very quickly follow changes in demand and a competitor's position. Panels provide a realistic picture of a competitive situation at a given moment, but the specific characteristics of high technology limit their usefulness. Particularly, a panel's predictive value is weak due to the fast evolution of products and the difficulty in understanding innovation.

Specialized administrative agencies assist technological development and can furnish useful information. For example, in the United States, the Federal Communications Commission (FCC), an independent government agency charged with regulating interstate and international communications by radio, television, wire, satellite and cable, provides a lot of useful information on the various telecommunication markets and their environment [22].

Public or private data banks furnish exhaustive information on nearly all subjects. Their main shortcoming is that they can furnish a limited piece of information immediately (often the size of one or two computer screens per subject) but require a long waiting period (1 month or even more) in order to obtain any additional documents. In the United States, the Securities and Exchange Commission's 10Q report is worth mentioning, because it includes information on suppliers, vendors, contracts, and CEO compensation.

The specialized press inundates its readers with information. The news that the press brings is readily available and relatively inexpensive but also

often late and rarely confidential. The number of journals and magazines continues to grow exponentially.

For true operational efficiency, it is necessary to read useful periodicals, not only those for one's own profession but also periodicals in the competitor's field. Previewing information in magazines can be achieved by distributing magazines among members of the marketing department.

Periodicals can be used to acquire technical, marketing, financial, and industrial data on competitors in a useful and operational way. For example, small employment ads can often reveal a great deal to those who read between the lines. The same principles apply to the study of books and other media such as television (commentaries), films (for public relation purposes), or radio (interviews with managers).

Internet tracking also may be useful in order to track competitive information, such as when companies issue press releases, announce a new product, apply for trademarks and patents, register Web site addresses, post employment opportunity, or get press coverage. Furthermore, some free Internet site tools indicate whenever there are Web site page changes; that facilitates the screening of any changes in competitors' pages.

A supplier, or a subcontractor, who works with several competitors, often has valuable information regarding his or her customers' strategies. In the computer industry, 50% of all disk drives come from the same supplier, who must have an overall view of the market.

However, a talkative supplier chats with his or her own clients as well; one cannot keep hidden forever. The high-tech world is small and everybody knows everybody. Nevertheless, it is not the manufacturing secret that counts but rather how quickly a product is put on the market.

Distributors can provide information on the business policy and technological experience of competitors. These distributors are also centrally "located" so as to evaluate the general policy of different actors in the market. Not all distributors are able to do this, but time is never wasted in discussions with well-informed distributors.

### 4.3.2 Internal sources

The sales force, of course, is a source of privileged information about competitors—through contacts with a customer's or a prospect's intermediary. Actually, such is the case for all employees who have contact with the outside buyers (who can use the same suppliers as competitors), maintenance services people, or delivery people (who often frequent customers).

High-technology companies (especially in exploding markets) are often characterized by a high rate of turnover, but this can be an advantage. Employees who used to work for the competition—from executives to interns—are obviously good informers, even more so if they recently left their previous employer.

The same is valid for employment applicants who have had interviews with competitors; an interview offers a good opportunity from which to

proceed to a competitive evaluation. Obviously, competitors can carry out the same maneuvers.

Finally, it is always useful to keep in contact with former employees, especially if the firm is a startup company that could become a competitor in the same industry. Alumni meetings and networks supply contacts that can be extremely profitable. Alumni networks can also lead to opportunities and additional information.

## 4.4 Organizing competitive analysis

Certain companies have instituted permanent "monitoring" systems, while others have less formal structures. This leads to two questions: Who is responsible for competitive analysis? and How should competitive analysis be performed?

### 4.4.1 Who performs the competitive analysis?

Modeled after Japanese companies, monitoring departments in charge of examining a company's long-term environment have been established in Europe and the United States. This department is responsible for competitive studies. From the marketing department it receives sales and financial information. From the research and development department(s) it obtains technological evaluations; manufacturing provides industrial elements. The finance department also makes contributions.

However, the majority of companies do not have a separate structure devoted to this type of exercise. When asked about monitoring competitors, marketing managers are among the first to admit that monitoring is often insufficient or inadequately performed due to a lack of financial resources and available methods.

In our opinion, in the absence of clearly defined responsibilities, the marketing manager must carry out the competitive analysis, for two reasons. The first reason is of a theoretical nature: The purpose of marketing is to serve the customer's needs, although competitors can unfortunately prevent the achievement of this goal. The most attractive marketing strategy with the best combination of possible resources can be reduced to nothing if the marketing manager does not timely identify, for example, the competitors' new solutions, their exact market introduction, their new advantages for the customer, and their price. The competitive analysis must be included in the marketing strategy because it is one of the elements necessary for its success.

The second reason is a practical one: scale economics. Essential information about the competition is obtained from the same sources as those necessary to understand the market and its needs (see Chapter 3). Consequently, all the data can be obtained at the same time (for instance, in a questionnaire or a sales call) at a lower unit cost. This is quite significant because every piece of information about competition comes at a cost.

Accordingly, the marketing manager must weigh cost by the value that it represents, and in the high-technology industry this necessary procedure is even more important than in other areas because information can become outdated much faster.

### 4.4.2 Performing the competitive analysis

Experience shows that when performing the competitive analysis, the marketing manager must have a basic assumption to be efficient: Better keep it simple instead of thinking big. Because the marketing manager's task is to pass on competitive information that he or she has at his or her disposal to areas where it can be the most useful within the company, his or her first challenge is to define the information needs. To do so, the marketing manager can perform an internal market study of the different departments of the company with the help of a questionnaire to determine their needs.

The second challenge is the organization and collection of information. An executive of the Boston Consulting Group indicates: "Too often, in high-tech companies, the monitoring of competitors is not taken seriously. For example, reverse engineering is practically never carried out." The responsibility of the marketing department is to identify the different necessary sources of information and to set up methods for the systematic dissemination of information to appropriate departments. Without asking for long reports from each salesperson, it is obvious that "walking the hallways" will not lead to a precise understanding of the competition in the market. These methods can be adapted to every company, but the marketing department must assure its implementation.

Finally, coordination between research and development, manufacturing, and after-sales service departments is a necessity (as we will see in Chapter 10). As stressed by numerous marketing managers, the information is usually available, but the analysis is not performed correctly. More particularly, putting sales and technological data in perspective is important when performing a competitive analysis.

Only departments with technological expertise can carry out an evaluation and a serious monitoring of the competitors' possibilities. The marketing manager must then be able to compare these evaluations and monitoring activities to his or her own sales, financial, and industrial data. Is a company with a new revolutionary manufacturing process really a dangerous competitor? Are its distributors or its customers not satisfied with the current product's poor performance and ready to switch to another company? Is the company on the edge of bankruptcy? If so, which other competitor has sufficient cash flow and strategic interest to buy out this company?

In fact, the monitoring of competitors is everyone's responsibility. Analyses performed by a company's headquarters (usually by employees who are often far removed from the company's day-to-day activities) must be enriched by viewpoints from all members of the company who can add useful information.

Marketing has to combine these energies in such a way that the monitoring of competitors becomes "an obsession, even if in this field much can be improved," according to the marketing director of a major European software company.

## 4.5 Summary

The high-technology-product world is extremely competitive. Positions are gained and lost much more quickly than in other markets. Therefore, the marketing manager must know his or her competitors in order to set up a strategy.

First, the competitors must be identified. Competitors are companies who respond to customers' expectations with similar products or with different substitutes for the actual products. Furthermore, a product's technology cannot only be challenged by a direct technology but also by an indirect technology that can completely take over. Other competitive forces at work are coming from suppliers, distributors, complementors, and governments.

Next, strategies of competitors (including strengths and weaknesses) must be analyzed. In order to do so, a synthesis of sales, financial, industrial, political, and technological data must be performed. This information can be obtained from many different sources from outside (competitors, trade shows, conferences) or inside the company.

When a monitoring department (a "watchdog") exists for the monitoring of a company's long-term environment, it is usually in charge of evaluating competitors. If no specially assigned department exists, the marketing department is usually in charge of this activity. Actually, responsible for the market, the marketing department will be the first to feel the impact of a competitor's actions and must anticipate these actions. In addition, competitive information sources are similar to those needed to understand the market.

For a good evaluation, the informational needs of the entire company should be well defined and efficiently coordinated with the technical departments. Information must be complied in an organized and systematic manner but with the realization that monitoring the competition is everybody's, not just the specialist's, responsibility.

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CHAPTER

5

# Selecting Markets

Contents



Successful marketing firms are very much aware that they have to know their customers intimately and they must determine the most important customers. Those are the necessary conditions to make sure that the company's products correspond well to customer wants and expectations.

Actually, few companies target all consumers or all companies. Even when this is possible, customers' needs are so varied that these customers must be offered different products. The time when one product sufficed to satisfy demand is over. Consumers have become more demanding and more informed, and competition drives companies to differentiate themselves and individualize their markets.

There is no longer one Coca-Cola; there is Coke Classic, New Coke, Diet Coke, Vanilla Coke, and Cherry Coke. Ford stopped only producing its Model T when General Motors surpassed it; today Ford produces more than 20 different models of cars. In the services industry, airline companies fight to prove that they offer different products than their competitors by offering a "bonus" to frequent flyers, more leg room in their business class, classier meals, friendlier airline attendants, or simply more practical schedules.

This situation can also be found in the world of high technology: The same software will be sold as a basic version—without an instruction booklet or a set of installation guidelines—to universities with limited funds and many software specialists, while a more comprehensive version that will include installation, instruction, and maintenance will be sold to companies at a higher price. Similarly at the end of the 1990s, Nortel Networks had one version of a product named Succession for incumbent carriers, such as Bell or France Telecom, at that time both very reluctant about the voice over IP, and a different one named IP Connect for emerging carriers and large enterprises. Today, in the cellular phone

business Nokia is offering more than 20 different models of handsets to different categories of customers in order to provide exactly what customers want.

Because not everyone can be satisfied with the same product, groups of customers with similar needs must be identified. This process is called "market segmentation." A "market segment" groups customers who have the same demands, buying behavior, or some other significant characteristic.

One should note that segmentation always concerns customers and markets, never products. This fact is important in avoiding any misinterpretation, especially for high-technology companies that sometimes have a tendency to see the world more through the beauty of their products than through their customers' needs.

Once they have segmented their markets, high-technology companies need to target one or many of those markets in order to respond better to their customers and to optimize the use of their resources. Their strongly innovative side requires that these companies group the most innovation-receptive customers [1] who then will be able to convince other customers. Furthermore, the short product life cycle and the urge to develop products quickly require a very precise determination of the needs of a limited number of customers, taking into account the necessary resources to respond to their demands while keeping an eye on the development of new technologies. This is one of the reasons why markets for high-tech products are often very specialized niche markets. Once a segment has been targeted, the ultimate step is to define the positioning of the solution that the firm wants to offer so that it will have a unique image and position vis-à-vis the competitors in the mind of the selected customer group.

By following this three-step strategic marketing process we call segmentation, targeting, and positioning (STP), the marketer will be able to design an effective operational marketing mix for a solution.

This solution takes the form of the definition of the product, the choice of the distribution channels, the type of promotion and communication, as well as the pricing policy [2].

Managing the STP process has been a proven way of weathering the tough recession on high-tech markets during recent years. However, just a handful of companies, such as Cisco Systems, IBM, Microsoft, and Nokia, have been able to do it effectively. The reason for this can be traced to their ability to design and implement an effective positioning for their products. If high-tech firms understand segmentation and targeting, but cannot position products, they derive no benefit. Positioning is the ultimate operation in strategic marketing. Although this strategy is well known and utilized by traditional marketing-savvy companies, such as Procter & Gamble, L'Oréal, and Toyota, only a handful of high-tech firms are able to do it for their products, but those who master this technique are among the most successful companies in recent years.

## 5.1 Two market segmentation methods for high-tech products and services

When companies consider what to succeed at marketing high-tech solutions, they have options: market-driven marketing for products that customers are awaiting and innovation-driven marketing for technically revolutionary products. The first approach is based upon understanding market demand, whereas the second approach is based upon the vision of the technical creator and requires some kind of market "proactiveness" [3] (see Figure 5.1).

On one side, a large number of high-tech products are launched by customer demand in response to an expressed or latent need. Many of these products only show variations of an original product with simply some improvements that were requested by the customers. They are sustaining innovation. For instance, microcomputers are becoming more and more compact, portable, and powerful; but, apart from the introduction of PDAs, they have not really changed since 1981. The same applies to consumer goods based on laser-technology: since the introduction of laser video discs, no other revolutionary products have been introduced.

For these market-driven products, segmentation methods that are developed and frequently used in marketing can generally be used. These segmentation methods rely on a good market understanding in order to keep a close watch on the market's expectations.

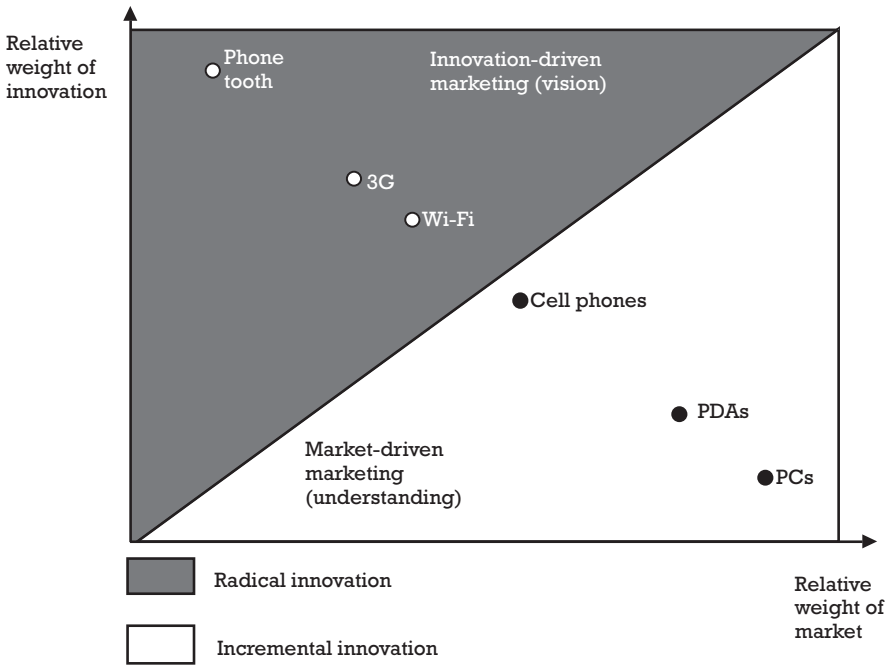


**Figure 5.1** Selecting target markets from vision to understanding. Shaded areas represent technological breakthrough in product; nonshaded areas represent technological improvement in product. Circles outline examples of products within this grid.

However, on the other side, how can a market for a new radical innovation (coming from a research laboratory or a creative genius) be evaluated? What will grab the customers' attention? Will they be interested in some of the inventions of 2002 [4], such as a "phone tooth" that can be embedded in a molar and receive cell-phone calls, a "virtual" keyboard made of a laser beam projected on any flat surfaces designed to accompany portable devices like PDAs, tablet PCs, and cell phones or a camera on a chip?

To determine the potential customers to whom these new technologies are directed, the needs that these technologies satisfy as well as the products that will materialize them must be anticipated and understood. Sony's founder, Akio Morita, always contended that "the public does not know what is possible, but we do" [5].

Anticipating the changes that a new technology will bring to the market requires foresight [6] and vision [7], and the traditional methods that are used to identify particular market segments must be adjusted. If this is done right, the product becomes a smash hit, such as the Handspring Trio, which combines a GSM phone with a Palm-based PDA. Never advertised or sold through major stores in the United States, the Trio has gained ground because of its innovative features and value to the business user. Nevertheless, if there is no vision and no anticipation of the segments' needs, the job of the marketing department often ends up in selling fully developed products to customers who do not know what they want [8], leading to failure of the product to capture the market [9].

The dichotomy between market-driven marketing and innovation-driven marketing leads to two different segmentation methods, depending on the situation. Market demand divides the market into different segments, the needs of which are analyzed before defining a product. This is called segmentation by breakdown. The market's vision, from an already existing product, can identify a certain number of customers who will serve as a basis, by extrapolating, for the definition of segments. This is called segmentation by grouping.

In reality, these two approaches sometimes end up concurring; an extremely innovative high-tech product sometimes becomes a successful product very quickly; the more popular it is, the more market-driven it becomes [10]. The marketing manager must therefore adjust his or her segmentation methods. He or she must change from segmentation by grouping to segmentation by breakdown.

The last specific feature of segmentation for high-tech products involves time, a fundamental dimension that shapes the market's outer edges and forces them to change very rapidly.

### 5.1.1 Innovation-driven market segmentation: the customer-grouping approach

Big ideas, the great revolutionary inventions of new technical procedures, are at the start of a new product. More than 80% of all researchers of all time are still alive and working today, so it is not surprising to see the number of

discoveries accelerate. Nevertheless, the intrinsic value of an invention does not necessary lead to a business success, not only because of the high level of uncertainty concerning technological feasibility. There are also great risks concerning the commercialization, because how customers will evaluate the innovation is often a big question mark [11]. Furthermore, radical innovations habitually imply drastic changes in consumption patterns [12], so the invention must be marketed adequately to the right customers.

Indeed, within 40 years DuPont, the giant chemical firm, has managed to extend the use of Kevlar, a synthetic material five times stronger than the same weight of steel, from being used in bulletproof vests to underwater cables, brake linings, space vehicles, boats, parachutes, skis, building materials, and even, most recently, residential storm shelters.

The initial developer of Kevlar, Stephanie Kwolek, was certainly not considering a market for protecting people against tornadoes when patenting Kevlar in 1966. She was researching with high-performance chemical compounds for the DuPont company; it wasn't her job to develop products for storm protection, but DuPont was large and savvy enough to have the competence and resources to open up new crossover markets using in-house technologies.

In order to efficiently assure the launching of products derived from a new radical technology, marketing managers can follow a five-step process that we have labeled "customer grouping." The first step is to estimate the product's value for the potential customers; the second step is to identify market segments by grouping easily identifiable customers; the third step is to evaluate those segments; the fourth step is to select the most profitable segments; the final step is to choose the positioning of the product within each selected segment before defining the marketing means that are implemented (see Figure 5.2). Let us now review in detail the three first steps that are specific to the market breakdown approach. As we will see later, the selection of segments and the positioning of the offer are similar for both segmentation methods.

#### 5.1.1.1 Internal evaluation of a product's marketing value

Marketing managers of high-tech products all agree that one of the essential qualities in their field is the ability to translate a new technology into a tangible response to a customer's need. This is the only way that a new technology can be sold on the market.

Every new technology must therefore be "transformed" into a product that corresponds to a need in order to determine the value in use and the utility value. One should note that a radical innovation frequently brings new level of functionality to the customer, which they may not figure out immediately [13].

For example, the electrochemical control of superconductivity—which is a technology—can have potential value for a customer because it responds to the need to measure magnetic fields or the need to detect magnetic aberrations using products such as the infrared adjustable detector.

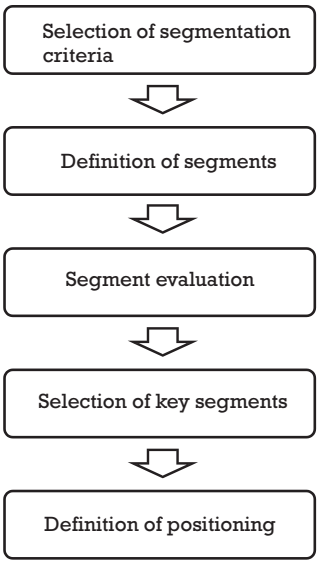


**Figure 5.2** The market breakdown approach.

In the same way, the use of barium ferrite for the magnetic recording of data instead of metal oxide—another technology—responds to the increasing need for information storage by users of microcomputers by incorporating this technology in the manufacturing of a new generation of diskettes. Another example is that of Casidiam [14], which is a new material that is harder than sapphire, but nevertheless very pliable; it is an excellent thermal insulator, but also a good conductor of heat. Further, Casidiam is impervious to hydrogen and chemically inert. All of these properties lead to Casidiam's various uses in electronics, mechanics, and the biomedical field. If a new technology and its applications can be linked together to satisfy a need, marketers can start considering all potential customers.

Brainstorming and creativity techniques are often useful during this phase because a new technology can respond to different needs for various customers [15]. After a lot of thinking, ceramic fibers used by Bronzavia, a major European company, in the manufacturing of thermo-protected shields for the future European space shuttle Hermes have been adapted for the automotive industry to insulate turbo engines and catalytic pipes. Similarly, an underwater robot with an intelligent camera can be used for offshore oil drilling, as well as for the maintenance of cooling systems in nuclear power plants.

#### 5.1.1.2 Study of potential segments

Once a certain number of customers have been identified, they are grouped into categories of homogeneous needs to form different market segments.

The aforementioned robotics firm can distinguish between three large categories of customers: oil companies, nuclear engineering companies, and

national power companies. The segments are defined by all the customers in the same category. For example, the "nuclear" segment groups EDF (the French electricity utility), CEA (a major laboratory specializing in R&D in the nuclear field), and Areva (the biggest nuclear engineering firm).

When considering radical innovative consumer products such as the first DVD recorder by Panasonic in 2000, or the first Camera Phone by Sony Ericsson in 2003, one must note that the high introductory price (due to the need to optimize R&D costs and to the lack of an economy of scale at the beginning of the manufacturing process) immediately limits the market to consumers with a high purchasing power.

Then the marketer may complete the segmentation by selecting potential consumers according to sociocultural, psychosocial, personal, and psychological criteria, as described in Chapter 3, and notably according to their attitude toward innovation. For example, potential customers for DVD recorders can be defined as TV addicts or people who watch TV at least 4 hours per day, like innovation in video, already own a video recorder and/or camcorder, have the disposable resources to purchase an expensive product, and like to show it off.

It is not always easy to identify precisely these potential customers even though in the industrial market the number of actors is much more limited. The identification process often requires a long and complicated analysis of several files. However, when making a first estimation of potential segments, one possible short cut is to stick with the consumers who are currently using products that will most likely be replaced. Actually, digital cameras have nearly replaced sales of reloadable film cameras (not including single-use cameras), the computer ousted the calculator, and the compact disc player substituted for the traditional turntable.

Another useful approach, used by 3M [16] for instance, is to target "lead users,"; they are companies, organizations, or customers that have needs that go far beyond the average user's needs, and who may even have started to develop a prototype [17]. This practice was initiated and still is more common in industrial markets: they are fewer customers; customization is more frequent; and the purchase often has a significant impact on the customer's business.

However, the lead-user approach can also be used in consumer markets [18]. For instance, the wireless division of Verizon, the biggest U.S. operator with more than 29 million subscribers, applied this approach to select the best interactive game to include in its service offer. The firm believed that wireless games could boost wireless services the same way games did for the home PC market in the mid-1980s. Verizon found that the interactive-game users corresponded well with the early adopters of its wireless data offerings, and the company relied on the feedback of those users to make and fine-tune its selection of games, with action games coming first.

When the grouping and the crosschecking of customers have been carried out, the marketing department will select key potential customers who are interested in the new innovation and are ready to test it. The process in

which the product is subjected to extensive acceptance testing by a set of preferred customers is usually called *Beta testing* [19], as opposed to *Alpha testing*, which proves concepts in the protected environment of the company.

#### 5.1.1.3 Selection of Beta-test customers

It is hard for would be customers to identify the needs that a disruptive innovation may fulfill, especially if this innovation is presented in the form of a concept [20]. The best way to recognize their needs is to partner with the customers [21] and have them test a prototype [22].

Consequently, many high-technology industries heavily use Beta testing, to test computers, software, telecommunications, or materials. Beta tests are run under nondisclosure agreements. Prototypes are installed at customer locations for a given period, usually for free or at a bargain price, in order to measure the reactions of users to the new product, as well as possible product shortcomings.

The beauty of Beta tests is that they sometimes identify radically unexpected needs that the company had never previously considered. For instance, in the case of the underwater robot, the need for the maintenance of cooling systems in nuclear power plants was discovered during a test at a major electricity utility; the prototype was originally proposed for the inspection and the maintenance of white-water power dams.

In some firms, R&D personnel exclusively run Beta tests, usually when the prototype comes from the R&D department, under the assumption that the prototype needs only technical refinements to become a product. However, the ultimate goal of a Beta test is to evaluate the fit of the prototype with the needs of the customers [23]. Too often R&D people will focus only on technical difficulties and possibly refuse to develop a new version of the prototype, even at the customers' request, because it is too simple (rarely, because it is too complicated, because researchers love tackling technical problems) or "not interesting."

Accordingly, it is essential that the marketing department be included in running the test so that the marketers can understand which solution the customers wish for. Furthermore, by working closely with test customers, the marketers may gain not only a better knowledge of their needs but also hints about the price the market will be ready to accept, as well as ideas about the most efficient way to advertise and distribute the future product.

### 5.1.2 Market-driven market segmentation: the market-breakdown approach

Identifying market segments according to methods currently used for traditional products are valid for all high-technology products if the customer is the driving force. The products are improvements of products already on the market, so the market's boundaries have already been roughly identified. For instance, marketing managers of a company that is considering

launching a new generation of personal computers or a new industrial welding robot usually have data about actual or potential users of personal computers or welding robots at their disposal.

On the basis of this information, these managers will also segment markets to determine which markets should be targeted first. This market breakdown approach is based on a very thorough understanding of the market and is also a five-step process. First, the marketer must select the segmentation criteria to break down the total market; second, he or she has to define each segment; the third step is to evaluate the business value of each segment; the fourth step is to select a certain number of segments; and in the final step the marketer has to choose the positioning and the marketing mix of each product in each segment (see Figure 5.3).

#### 5.1.2.1 Selecting segmentation criteria

The segmentation criteria that need to be considered are different when breaking down consumer markets and industrial markets.

For consumer markets, two large categories of segmentation criteria exist: criteria related to consumer characteristics and criteria related to their response to need (see Table 5.1). Because we discussed consumer characteristics at length in Chapter 3, here we focus on the behavior of consumers, because segmentation by response seeks to divide homogeneous consumer groups by product knowledge and attitudes.

For instance, let's take the example of the 3G (third generation) of mobile phones market, which allow simultaneous transfer of speech, data, text, pictures, audio and video. 3G is not a radical innovation, but rather an incremental technology, which offers added applications to the GSM/CDMA

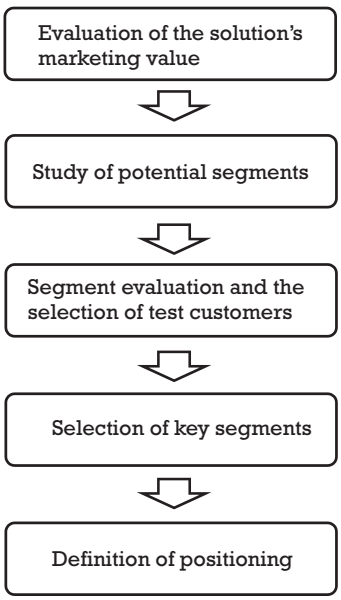


**Figure 5.3** The customer grouping approach.

**Table 5.1** Major Segmentation Variables for Consumer Markets

| *Characteristics* | | | |
|---|---|---|---|
| Personal | Psychographic | Sociocultural | Geographic |
| Age | Social class | Religion | Region |
| Sex | Lifestyle | Race | City size |
| Family life cycle | Personality | Nationality | Density |
| Annual income | | | |
| Education | | | |
| *Responses* | | | |
| Benefits | User status | Usage rate | Attitude toward product |
| Economy | Nonuser | Light user | Loyal to brand |
| Convenience | Ex-user | Medium user | Enthusiastic |
| Prestige | Potential user | Heavy user | Positive |
| | First-time user | | Indifferent |
| | Regular user | | |
| | | | Hostile |

*Source:* [24].

mobile phone users. In order to segment this market, it is important to know and to classify customers according to the advantages they seek in this product: performance (e.g., download speed, sound and image quality), prestige of new and expensive products, or use (e.g., computing, voice communication, picture swap, internet surfing).

Based on these data, we can classify consumers according to the degree of use of 3G: Are they nonusers, potential users, current users, or ex-users? The 3G owners can also be differentiated by their user rate (low, medium, high) and their degree of brand loyalty to the major players (Nokia, Motorola, Sony, Samsung), or their attraction to cheaper 3G phones branded by telecom operators, like Orange Smartphone. It is crucial to know the attitudes of nonusers to this new product, as well: Are they aware of its existence? Are they interested? Do they plan on purchasing the product soon?

For industrial customers, segmentation criteria can also be regrouped in the categories of characteristics and responses [25], but some of the criteria to be considered are different from those used to segment consumer markets (see Table 5.2).

First, the size of a firm is very often an efficient basis for discrimination because the needs of small firms differ dramatically from those of large companies. For instance, as their attention is shifting to small and medium business, companies such as Microsoft or Cisco Systems use the size of the customer's business as a key segmentation variable. Likewise, the geography of a firm is a key discriminator: In many aspects, one cannot compare

**Table 5.2** Major Segmentation Variables for Business Markets

| *Characteristics* | | | |
|---|---|---|---|
| Dimensional | Geographic | Economical | Organizational |
| Number of employees | National or multinational | Turnover | Centralized or decentralized |
| Number of factories | Location of the headquarters | Main activity | Buying procedures |
| | Localization of subsidiaries | Type and size of customers | Profiles of decision makers |
| | | Type of production process | |
| *Behaviors* | | | |
| Benefits | Application | Attitude | Preferred Buying Behavior |
| Economy | Type of application | Technical or non technical | Direct |
| Performance | User status (nonuser, first-time user, regular user) | Attitude toward innovation (positive, negative, indifferent) | Through salespeople |
| Prestige | Type of use (light, medium, heavy) | Brand loyalty | Through distributors |
| Reliability | | | Through OEM |
| Convenience | | | |

the needs of a medium-sized company working only on its national market, whatever its size, with the needs of a medium-sized company doing business with 150 countries worldwide through 10 subsidiaries, 50 foreign distributors, and four manufacturing facilities located on four different continents.

Business or economic characteristics are also very useful in determining various groups of business customers. The nature of the industry, the size of customers, the kind of production and technology used, and the type of solutions offered create various needs in business firms. The business needs of a firm are closely related to its organization, which can be heavily centralized or decentralized; the profile of the decision makers; and the purchasing policy.

Regarding the behavior criteria, they are quite similar to those used to segment consumer markets because they focus on the personalities of the identified buyers. However, in business-to-business marketing, contrary to a product bought by consumers, a solution is bought for a specific application identified within the various processes of a firm, be it manufacturing, research, marketing, or administration. Furthermore, firms appear to have preferred ways of acquiring the solutions they need to perform their business; consequently, understanding their favorite channels is sometimes an insightful way to analyze a business market.

Many high-tech firms offer solutions to both consumers and business. Various examples are IBM and HP in the computer business, Samsung and

Texas Instruments in electronics, and AT&T and Vodafone in the telecommunication business. All these firms have discovered that the needs and the buying behaviors of consumers and businesses are radically different and required different segmentation criteria, even if the solutions they require often are similar from a technological standpoint.

In a few cases, the needs of the two categories may overlap, leading to some measure of market cannibalization [26], usually when a business wants to have new, flashy attractive consumer goods for their own business, like Dell or Nokia have discovered. It also happens to some high-tech services, such as Orange, when some business wants to get the same special services or promotions offered to the consumer markets.

One of the benefits of offering solutions both to consumers and to business, is that it allows the producer to use the same infrastructure to address the different needs and markets. It permits a company to spread the fixed costs of production and logistics across a larger number of units.

#### 5.1.2.2 Defining segments

After selecting some key segmentation criteria, the next step is to define the content of segments by identifying the characteristics and behavior of customers. In consumer markets, segment contents are defined via market studies that consist of questionnaires filled out by population samples. These questionnaires often also measure the recognition and awareness of existing brands or the customer's opinion of product features for products already on the market. By processing data (by factorial analysis or conjoint analysis), the marketer can classify and arrange all answers by regrouping them in different segments that are as homogeneous as possible.

In industrial markets, the limited number of customers can more easily lead to interviews with company representatives. Generally speaking, if a company's activities are more technical, then its customers are more identifiable. The potential users of space shuttle–launching services, or of triaxial gyro lasers, currently total only a few dozen in the entire world. For larger markets, using databases can lead to fruitful selection procedures for segment identification purposes. One long-distance phone company identified a price-sensitive segment by mining its database for customers who placed their phone calls 15 minutes before rates increased in the morning and just after they decreased in the evening. Face-to-face and telephone interviews can fine-tune the approach and redefine the narrowest segments characterized by a market profile.

## 5.2 Evaluating and targeting segments

Not all segments are of interest. The first element of selection is the level of acceptance of the innovation/product by the customers belonging to the segment [27]. But the marketer has to take into consideration other strategic elements.

Determining the most significant segments also requires the evaluation of their potential—in terms of attainable volume and profit. For instance, when Intuit was searching for other products or services that could perform the same function as its own software for personal finance, it could have concentrated on private accounting firms that manage finances for individuals. However, more Americans manage their personal finances than accountants, and this consumer segment was targeted as the one with the greatest volume in usage and in dollar value.

Besides the prospects of volume and profit by segment, marketers have to evaluate the segments' accessibility according to the company's resources, their strategic significance for the company's mission, the position of competitors, and the level entry barriers—in particular, administrative and governmental stumbling blocks. Actually, many markets are protected in the high-technology industry.

For example, the majority of U.S. military markets remains off-limits for non-U.S. companies. Hence, successfully penetrating these markets takes time and significant resources, but it is not an impossible task: The Department of Defense (DoD) selected ADA, a software developed in France, as the standard application development language and chose Thomson's telecommunication equipment for its troops out in the field.

Marketers must perform all the needed evaluations of segments together with the R&D and manufacturing departments, most specifically to check the technological possibilities. Actually, although a segment, such as consumers who wish to have multimedia functions on their computers, can prove to be attractive, it may be impossible to satisfy due to the current state of the company's technical abilities (see Figure 5.4).

Within the selected segments, marketers define the most significant customers who will be targeted first. They have two choices: either making a concentrated marketing or making a differentiated marketing.

Concentrated marketing selects only a few segments. Smaller companies often prefer having a smaller number of niches rather than having a small market share of a large market. For example, Cray, Inc., the U.S. manufacturer of the Cray X1, the most powerful computers in the world, only targets organizations with enormous calculation needs and large information system budgets (such as very large automotive, aerospace, petroleum, and chemical/pharmaceutical companies; weather forecasting and global climate research centers; major academic research centers; and government agencies). Cray aims to dominate the $1.1 billion global high-end supercomputers market, a subsegment of the $5 billion high performance computing (HPC) market, and a tiny part of the $981 billion global IT market.

Sagem, a major French electronics firm, has taken this niche strategy to heart in markets as diverse as guidance systems for airplanes and missiles, decoders for digital TV, mobile phones, fax machines, modems, and railroad signaling systems. Sagem always has sizable market shares and has managed to become the second-leading French telecommunication group and the third most successful European group in electronics for defense and security, thanks to this niche strategy.

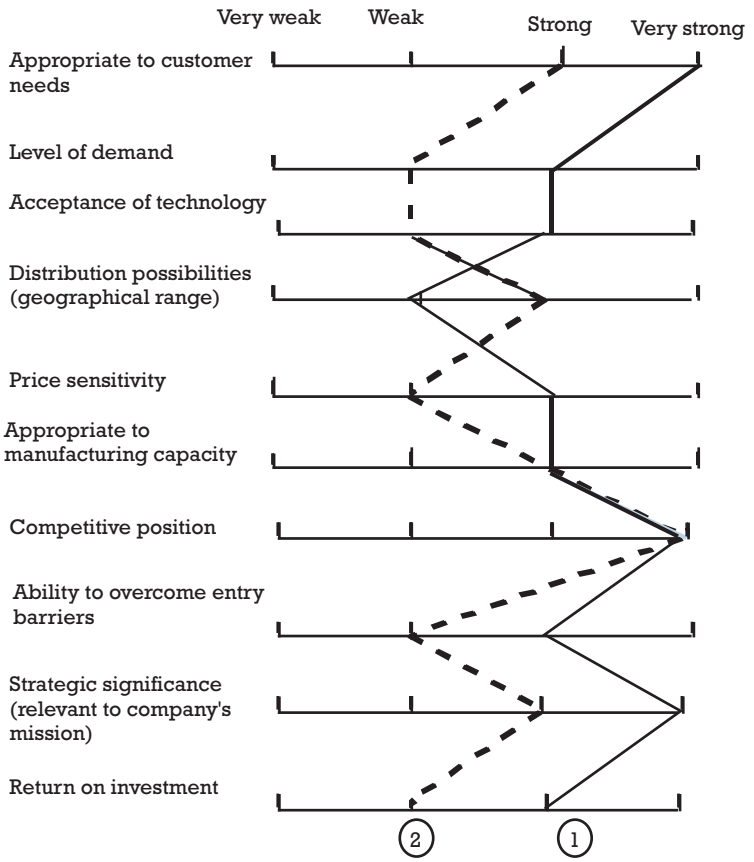


**Figure 5.4** Snake chart evaluating multiple segments: an example. Segment 2 will be selected but distribution should be improved. (This could be the case for a company that is only present in the European market and not yet in the U.S. market.) Segment 1 is characteristic of an industry or a niche that is not yet ready to accept a new technology and its applications.

Differentiated marketing selects several segments with marketing methods adapted to each segment. Large high-tech companies such as HP, SAP, or Orange, for instance, address a large, diverse group of users in different sectors (banking, insurance, industrial) with varied financial resources, ranging from small companies to large multinationals. Each segment has its own type of product, price, place, and promotion that require, of course, the involvement of more resources. Marketing that is concentrated on a segment is less expensive but riskier than marketing that is divided over several segments.

The choice also depends upon technical possibilities and the company's capacity to quickly put a quality product with a truly competitive advantage

on the market. The choice depends as well upon the company's overall strategy. Certain companies wish to postpone entering a market segment until the pioneers have shown their existence. When IBM estimated that the segment of personal computer users was sufficiently attractive, it only needed a few months to perfect the IBM PC, which then took the market by storm and nearly reduced all other producers to nothing.

Because many opinions must be taken into account, the segment choice must integrate not only the marketing department but R&D, manufacturing, service, and financial services as well in order to confirm all technological, sales, and financial evaluations. The final decision is usually made by management.

## 5.3 Positioning of the solution

The last step is to choose a "positioning" of the new product in order to ensure that it is well perceived, identified, and recognized by the customers of the key selected segments. Positioning is the creation of a product's perceived image in customers' minds. The customer's perception of the product rather than the product's use is now considered. Positioning is the ultimate step in differentiating between existing and would-be competitors.

For instance, in 2000, when Compaq decided to launch its first handheld computer to compete with Palm, it had various positioning options (see Figure 5.5). It could either decide to announce it as a Palm 3 me-too product (the Palm3 being the indisputable leader of this business, which Palm has managed to create). Compaq could also market its product as an electronic agenda or a sophisticated organizer in order to manage time more efficiently. It could as well place it in the category of the Personal Digital Assistant device, which Apple created with the Newton (the product ultimately failed on the market, but not the concept). Finally, it could be positioned as a pocket PC, emphasizing the complementarities with the Compaq desktop

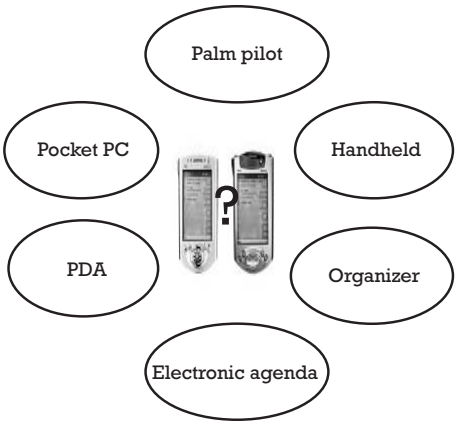


**Figure 5.5** IPAQ positioning options.

**Case Study: Nokia Segmentation and Targeting Strategy**

Nokia has built its success on its ability to target different niches for wireless telephones. Segmentation is so crucial to Nokia that in 2002 it broke its $24 billion mobile phone division into nine business units, each one focusing on different parts of the market. Six months later, Nokia had its first results from the reengineering among the 24 new products planned to be introduced in 2004:

- The Nokia 2100 proposes a functional photo insert cover, animated screensavers, and SMS chats, well as user-changeable color covers. It is the cheapest model at less than $100.
- The Nokia 3100 offers a glow-in-the-dark cover, new games, animated screensavers, MMS, and Java technology.
- The Nokia 3300 features an MP3/AAC player, stereo FM radio and digital recorder, stereo headset, hands-free listening experience, and easy drag-and-drop music transfer from compatible PC.
- The Nokia 810 is a car phone with separate display, Navi wheel, Bluetooth, RS232 connector, and high-speed data transfer.
- The Nokia 5100 comes protected against splashes, dust, and bumps, high-resolution color display, MMS, flashlight, calorie counter, and thermometer.
- The Nokia 6220 introduces a digital camera, EDGE high-speed data connectivity, presence-enhanced contacts, e-mail, and Java applications.
- The Nokia 7250i includes an XHTML browser, integrated digital camera, advanced MMS features, portrait caller ID, designer looks, and innovative keypad layout.
- The Nokia 8910i offers an elegant design, genuine titanium covers in black, color display, Java technology, and MMS.
- The Nokia N-Gage introduces a new category of a game phone. It has a mobile game deck with Bluetooth and GPRS capability, digital music player, stereo FM radio, MMS, e-mail, and XHTML browser.

In mid-2002, Nokia launched a new subsidiary, Vertu Ltd., to offer handcrafted cellular phones, made of silver or platinum with silver or gold headset, a service concierge which locates tickets to the theatre or reserves a table at a top restaurant, a palladium-trimmed case and a leather woven handle. The price for a Vertu phone ranges from $5,000 to $20,000 and more.

Question 1: Who are the different groups of customers Nokia is trying to reach with the nine different models presented here? You can go to

**(Continued)**
http://www.nokia.com and use the feature "Compare Phones," which identifies the various segmentation criteria used by Nokia.

Question 2: Which segment is targeted by the Vertu offer? Why has Nokia created an independent subsidiary to market this offer?

PC, as a strong benefit to customers while building on Compaq's image of being the portable PC expert and leader. Compaq settled on this last solution. It provided a very clear differentiation from the leader while redefining this category of products within the computer world, and the iPAQ became an instant success.

However, positioning is difficult in the high-tech world—first, because customers have difficulties distinguishing between the best and the rest within the large number of frequent new product announcements. In addition, customers often have difficulties understanding how a new radical product can be an improvement, especially as long as they have not experienced the product nor figured out how the product or service will meet their need. This makes the communication of the benefits even more indispensable [28].

For the marketer, the results of interviews with customers of a particular segment, as well as the reactions of prototype users, are fundamental in identifying the distinct advantage offered by the new technology. The competitive advantage of a solution is proportional to its value to the customer [29]. In the case of innovative high-technology products, usually this solution either provides a very high value due to its newness (differentiation) or a value equal to more traditional solutions but at lower cost (cost advantage).

To illustrate differentiation, let's consider the real case of a computer company that targets the segment of the engineers using computer-aided manufacturing (CAM) in companies with more than 500 employees. Figure 5.6 identifies the main options of the marketing manager, and this "perceptual mapping" summarizes the results of the interviews of segment participants about their expectations when considering the purchase of a CAD-CAM system. In that case, the two main features are the output quality (graphic on-screen quality) and the waiting period at the screen (data-processing speed). These results look consistent with the profile of the segments: heavy users, professionals of large firms who want to get the most from their CAD system while not standing idly in front of the screen and who are not very concerned about the price of the CAD station. After reviewing customers' expectations, an original positioning seems promising: proposing a fast system with a high on-screen quality. The final choice depends upon the particular advantage that the company can offer, such as a new, faster processor or specific knowledge regarding the manufacturing of graphic high-resolution screens. Then the marketing department communicates the specifications of the product to R&D, which develops the first

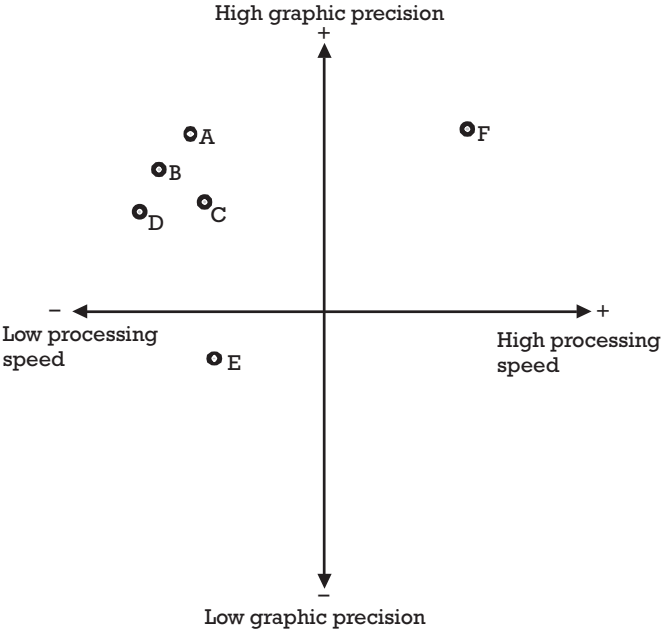


**Figure 5.6** Rating of major CAD systems by design engineers in French companies. (For confidentiality reasons, brand names have been omitted.)

prototypes, before they are tested by a sample of the target group, which validates (or invalidates) the positioning.

Considering now the value driven by low cost, the case of Parametric Technology (PTC) is a good example of a successful competitive strategy based on a cost advantage, also in the CAD-CAM business. In the 1980s, the leaders of this market, namely Computervision and Dassault Systemes, were selling sophisticated three-dimensional software to major companies like Airbus, Boeing, and General Motors at a very high price. In 1988, PTC entered the market selling downsized software with fewer features to smaller companies in mechanics and electronics and even independent professionals like architects, but at less than one-tenth of the price of the solutions available on the market. By 1997, with revenues of over $600 million, PTC stood as the new leader in the CAD-CAM market; in November 1997, PTC acquired Computervision, the firm that invented the CAD-CAM business, but concentrated too much on the single large account markets with customers like Rolls Royce, Airbus, or PSA, the French car manufacturer. Like some of its early competitors of the 1980s, namely, Apollo and Wang, Computervision did not believe in the future of adapting its software solutions to personal computers or small workstations. In 2002, PTC was still leading the CAD-CAM market with more than $750 million revenues, although Catia is still a leader at companies like Boeing and other large companies.

Actually, this competitive advantage should be emphasized in order to distinguish the product from today's existing solutions and to position it

according to the segment's customers. A good positioning statement should be able to change or even reverse the mindset of customers [30].

A product's position can be based on a number of variables such as:

- *Product Attributes*, such as unique technology, low price, and ease-of-use (such as the generic "Easy as Dell");
- *Benefits*, such as "save time and copy the way you want" for HP copier printers;
- *Usage occasions*, such as IBM, which is positioning itself as the first (and only) company to offer "computer on demand";
- *User category*, such as Siebel the CRM software provider did in 2001 when positioning its new release, Siebel 7, as a platform for e-government projects;
- *Origin*, such as Tata Consultancy Services (TCS), one of the world's largest software and services companies, which pushed its Indian origin to promote low cost offshore solutions;
- *Personalities*, such as Bill Gates or Larry Ellison, whose fame and experience can confer clout to their companies' products;
- *Product class*, such as Palm whose name is often used as a generic term for all PDAs, or SAP which created the category of ERP (Enterprise Resource Planning) software;
- *Against competitors*, such as AMD when promoting the performance of its Opteron chip directly against Intel Xeon;
- *Associated with other brands*, whose notoriety is big enough to influence the perception of the brand appearing next to them, such as Raytheon promoting its Pocket PC 2002 or NTT announcing its Sigmarion II as "powered by Microsoft."

To be effective, a positioning statement must be:

- *Simple to understand and to express.* As a rule, it should not exceed more than two phrases. Microsoft's tagline for its Xbox was "Life is short. Play more." AMD's tagline for its Athlon XP processor was "Extreme performance for Windows XP."
- *Relevant to a given customer need.* In any case, a positioning statement must not be phrased only in terms of product features. It must convey at least one key benefit that must be in line with the need of the market segment.
- *Credible.* Since positioning deals with customer perception, one has to be careful about the possible perceived gap between the positioning statement and the reality of the product. For instance, "the most powerful computer in the world" is credible for a Cray/Silicon Graphics computer, but it would be almost laughable in reference to a PC, even a powerful one.

- *Fresh*. This means that it must be different from the positioning of competitors. The difficulty rests in being unique while meeting customer needs. For instance, in the PC markets positioning based on offering a different, easier-to-use keyboard has repeatedly failed because customers are not really interested. On the other hand, Nokia touched the right chord with customers when it very successfully managed to position its portable phones as fashion objects, with a special look and various flashy colors, when all its competitors were emphasizing power, price, small size, or performance.

Marketing-savvy firms emphasize their positioning when communicating with their customers. For instance, when Nokia positioned its brand in the highly competitive mobile phone marketplace, its message clearly conveyed to consumers both the technology and human side of its offer in a powerful way. In every advertisement and communication, the tag line is "Only Nokia Human Technology enables you to get more out of life" (though not automatically in this wording). It means that Nokia understands that technology is just a tool for customers to enjoy a better life and that gives consumers a feeling of trust and acceptance. So Nokia uses a combination of benefits, emotional attributes, and competition-based positioning strategies. It owns the "human" dimension of mobile communications, forcing its competitors to find a different and weaker position in the consumers mind.

Once the positioning has been defined, it has to be conveyed by all the components of the marketing mix (i.e., the design and the associated services of the product, the distribution channels, the communication campaign and the price). For instance, in the case of the CAD-CAM system illustrated in Figure 5.6, a CAD-CAM system positioned as "the ultimate system for professional designers" should not only offer a high graphic on-screen quality and a very fast processor but also:

- Its distribution should rely on a network of specialized dealers.
- The communication should be consistent with its positioning and emphasize the comfort for professional users.
- Its price of should be higher than that of an average product so as to underline its higher value.

Many marketing failures come from a lack of coherence between the various elements of the marketing mix. To avoid this error, marketers have to consider positioning as the keystone of the marketing mix of a product, which we will detail in the following chapters.

## 5.4 Segmentation and time

One of the most significant characteristics of high-technology products is the rapid rate of change. This means that segmentation criteria also change very

quickly. For instance, in the mid-1980s when Sun Microsystems successfully introduced workstations using standard Unix software, Unix compatibility became an important segmentation criterion that was used to analyze the market for workstations. Traditional manufacturers had previously segmented the market according to performance and application criteria. As a consequence, some manufacturers had to adapt—or outsource—their supply of workstations in order to offer Unix products. The same story was replayed at the beginning of this decade with the rise of Linux as a new operating system. Suddenly offering Linux-based (or open source) solutions became a significant criterion for purchasing computers and the major vendors, such as IBM, HP, and Dell had to adapt.

Every marketing manager should therefore regularly reevaluate his or her segmentation criteria while continuously examining the markets. On the other hand, developing segments is costly and time consuming. This development requires, for instance, analysis tools, lengthy and frequent interviews, and several meetings with a company's departments. This process must be adapted to the particular situation.

Certain high-technology products are launched on a very long-term basis. In the biotech industry, only one drug out of 5,000 screened manages to get to the market, and it can take between 7 to 12 years before putting a new medicine on the market. Similarly, it took more than 20 years for the Japanese firms to develop successfully a VCR for the consumer market. The first development of VCR started at end of the 1950s, mostly to fulfill the needs of the large American TV networks, and landed in the consumer mass market at the end of the 1970s—with the first VCR by Sony (1975), followed by JVC (1976) [31]. Consequently, a thorough segmentation is both necessary and possible for the evaluation of the market in this time frame.

In the aerospace industry, a company like Arianespace must know its market 10 years in advance, to develop rocket launchers that meet customer needs. It defines its segments on the basis of technical needs, economic resources, and the political ambition of different customers. All these criteria are measured and projected into the future to estimate the type of the market that is needed when performing technical studies.

Other sectors move along very short time frames, sometimes within less than 1 year. The computer industry is a good example. In this sector, the boundaries continue to change according to new product announcements for even better performing products—between mainframes and super minicomputers, between super mini-computers and minicomputers, between minicomputers and workstations, between workstations and microcomputers, between professional microcomputers and personal desktop PCs, between personal desktop PCs and laptops, between laptop and handheld PCs, and now between handheld PCs and smart cellular phones.

In such industries, even without access to perfect information, a delay in the market introduction of a product can be very costly. In less than 3 years, Wang computers, which specialized in office automation, was swept away because Wang did not know how to change fast enough to satisfy its markets, so its niche was invaded by microcomputers with word-processing

capabilities. Similarly in the fast moving mobile phone handset market, Ericsson was not able to keep pace with archrival Nokia and stopped manufacturing in 2000. While Ericsson failed to release new models in a timely fashion, and was also stuck with poor designs, Nokia had superior phones, and rapid turnover of new models: Nokia shipped from 20 million units in 1997 to over 140 million units in 2001 introducing 14 new models on an almost quarterly basis.

However, working hastily is never the answer [32], as a product should not be launched if it does not respond to customer needs [33]. So monitoring customers on a permanent basis (using consumer panels, distributors, and vendors) and reevaluating the segmentation criteria on a regular basis are both necessary in continuously updating the market's expectations. Indeed, the ever-changing market demand can never be considered as definitive. Lastly, the marketing manager must always complement this market demand with his or her own foresight of the market. He or she must also be willing to take certain risks when proposing the launch of a new product and a corresponding marketing strategy.

## 5.5 Summary

High-technology companies must segment their markets in order to optimize their resources and to correctly respond to customer needs. A segment regroups customers who have the same demands and the same buying habits or other significant characteristic.

Two segmentation methods exist in the marketing of high-technology products. The first method concerns technologically innovative products. The business value of the new product should be determined for some key customers using test prototype. If this step is successful, that is, if the new product fulfills a need, then all the potential customers are clustered in various segments. Then the product has to be positioned in the minds of the target customers on each segment.

The second, more traditional, approach concerns incremental innovations or updated versions of what was once a radically innovative solution. This method defines the segmentation criteria in order to divide the market according to homogeneous categories. Then market surveys and research define the segments that need to be evaluated and selected. Targeting the segment that needs to be reached depends upon the potential and the accessibility of each segment, as well as the company's technical possibilities and overall strategy. Then the marketing manager has to choose a "positioning" of the new product in order to ensure that it is well perceived, identified, and recognized by the customers of the key selected segments. Positioning is the creation of a product's perceived image in customers' minds. The positioning is also the keystone of the marketing mix and must be reflected in all the components of the marketing mix.

Finally, since the high-technology field is in constant movement, marketers must reevaluate their segmentation criteria on a regular basis and

continuously examine the markets. In addition, marketers must also know how to adjust the demand analysis according to the appropriate time frame of their industry.

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CHAPTER

6

# Product Strategy

Contents



All the successful high-tech companies that have managed to bloom through the economic downturn of the beginning of this decade have made sure that their products truly meet the needs and wants of the market [1]. This starts at the marketing strategy level with the developing of the product, which requires not only a good knowledge of customers and of the competitive environment, but also a careful segmentation and targeting of customers, as well as the choice of an effective positioning. But this also reflects in product management at the operational level.

Winning companies know first that the products they are offering to their customers have more than one dimension. Actually, three product levels should be identified.

The first level is the essence of a product—how well it satisfies the customer's needs—and is the reason for the product's legitimacy. A marketer must communicate this legitimacy that justifies its existence. A computer is a "faster calculating machine" or an "intelligent machine"; a robot is a machine that "makes assembly more reliable" or "manufactures higher quality"; a rocket "opens the door to the universe."

The second level is the physical product, should it be a good or a service. The product's physical attributes such as its characteristics, style, brand, and quality wrap up its basic essence. It is important to note that the physical attributes apply also to high-technology service: Software has certain characteristics (spreadsheet, database), a style (access menu, icon-driven commands, and window applications), a brand name (1–2–3, Windows), and a quality (evaluated by users through surveys).

The third level is the product's shell. It includes all the additional products and services offered with the product to exceed customer expectations. Since high-tech products have a high-technological content, change rapidly, and often have relatively high prices, some services are essential, such as delivery,

installation, operation, instruction, maintenance, after-sales support, warranty, and credit terms. On the other hand, some services require complementary products [2] in order to function well and deliver the maximum value to the consumer [3]. For instance, the quality of all Web based services are driven both by the type of computers and telecommunication connection used by the end consumer as well as by the overall performance of the Internet.

However, a company rarely sells only one product, and any product is usually part of a product range that fits into the company's overall offer. Managing a product is also about managing its place in the product range and making product-line decisions. Finally, all products change over time. The decisions to be made for an innovative product in its market introduction phase are different than those for a product that is already "established" in a market segment. Consequently, the marketing organization, usually the product manager, must manage a product according to its product life cycle.

## 6.1 Managing the three product dimensions

### 6.1.1 Managing a product's essence

For the marketer, the product's essence is obviously the first important aspect to be identified. On one hand, this essence corresponds to customer needs and has been measured or evaluated, so it can be used as a basis for defining market segments. On the other hand, the product's communication and sales presentations are based upon this essence because the customer buys these product advantages (i.e., the positioning will reflect the essence of a product). For example, the essence of an ERP software such as mySAP Business Suite from SAP is to facilitate the management and control of a firm through a bundle of software programs, tied to a single database for automating everything from supply chain to finance, only entering information one time for the entire system. Similarly, the essence of groupware products such as Microsoft Exchange or IBM Lotus Notes is to empower groups of people to work together and share knowledge efficiently while in various locations.

The essence of a product may change with a new ability to fulfill a new customer need because of a change or an improvement in the product's physical attributes or product shell. For example, thanks to miniaturization and increased performance and services, computers were first used for polling purposes, then to make scientific calculations, then to perform accounting, communication and management functions for organizations, then to play games, do homework, keep a family budget or access Internet services at the consumer level. Likewise, the use of smart cards (plastic cards including a microchip for their identification) created by the French firm Gemplus has evolved enormously from its origin, which was to make payments as credit cards. Today, smart cards are used as storage facilities for mobile phones, as portable electronic files for doctors and insurance companies, as tickets for ski lift access or urban parking lot (see Figure 6.1).

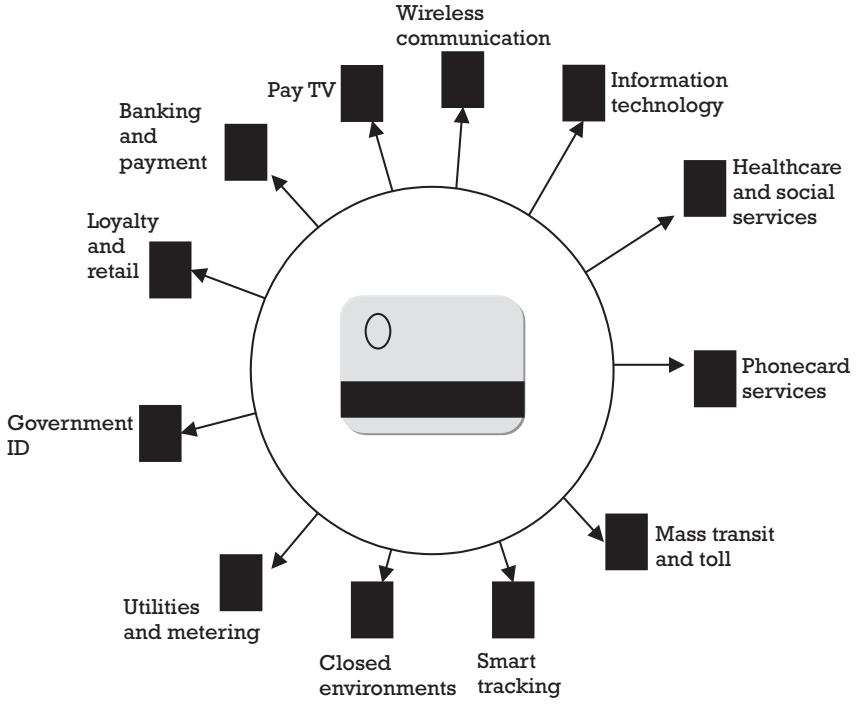


**Figure 6.1** One product, many applications: the smart cards.

Similarly, the initial concept for the video camera recorder was that of a capital good for use by television stations to record and store their video shows. However, Japanese firms like Sony and Matsushita quickly found out that the VCR could be of interest for consumers if it came with different characteristics such as a bigger storage capacity and a smaller size.

Rethinking a product's basic quality is in a way redefining its essence like Intel did with its 80286 microprocessor. From the beginning, Intel defined and sold this product as a computer and not as a simple semiconductor as it previously did similarly to its competitors. By offering a "computer on a chip," Intel created a new category of products and a dominating market position for itself. In the same way, Nokia defines the essence of the N-Gage as a gaming device not a phone, running games available from Sega, Eidos, and Ubisoft, the most famous publishers.

### 6.1.2 Managing a product's physical attributes

#### 6.1.2.1 Product characteristics

Beyond its essence, a product or a service is materialized in a given set of physical features or operations. For instance, the Telecommunication Server Platform 4 by Ericsson Telecom Server is made of hardware and software. The hardware components are processor modules (standard, off-the-shelf, single board Pentium), tape drive, hard drives, signaling processors, Ethernet switches, power supplies, and fans. The software consists of an operating

system (Linux), a DICOS software for real-time, clusterware, node management, and network signaling system [4].

Furthermore, today most of the high-technology products are usually derived from the same technology/product platform [5]. A product platform is the implementation of a technical design that serves as the basis for a series of derivative products [6]. The cost of those products is incremental compared to the development of the initial architecture, and is cost-effective thanks to standardization and components modularity. For instance, with its Common Building Blocks management initiative, IBM managed to achieve a 50% reduction of its 540,000 active part numbers and to spend 42% less on new product development between 1994 and 1997 (see also Figure 6.2). As a result, many platform products do share the same characteristics, minus some add-ons for differentiating the end-user product [7].

We have seen in Chapter 5 that the physical characteristics of a high-technology product are first determined during the development of prototypes, but that these characteristics change rapidly in order better to satisfy customers [8] and, because they can be mixed into various options, to speed up the product's life.

The average development time for a new camera-phone is 4 months and, a PC is 11 months, a knowledge-based engineering (software development) system ranges from 2–4 years. However, while some vendors need to freeze their product design 5 months before market launch, the most successful companies, like HP or Samsung, manage to refine products until 5 weeks before launching. Consequently, they can include the most recent changes in technology and customer requirements in the development process and deliver a superior solution to the market on time.

However, features that are not valued by the customer should not be added to the product, because customers might find these features useless or too expensive. In high technology, adding useless gadgets to products just to please inventors or designers is a frequent temptation, but customers are rebelling more and more often against these useless details.

Actually they often do prefer products with a limited number of characteristics. Companies that are able to reduce the number of components are usually the most successful. For instance, in 2003 Texas Instruments and Intel introduced separately a single chip that replaces most of the chips in a mobile phone by combining the functions of microprocessor, wireless communications and flash memory.

From a manufacturer's viewpoint, this chip significantly decreases the cost of material, because there are fewer chips to buy and assemble, as well as shipping and storage costs. For customers such as manufacturers of portable digital devices (e.g., mobile phones, cameras, PDAs), this chip allows them to develop products that are smaller and easier to build and maintain. Another benefit is reduced power requirements, which saves battery power, a very problematic feature of portable electronics, because battery technology has hardly improved in the past 10 years while mobile phone technology goes on doubling performance every 18 months.

In that case, concentration of chips also directly affects the physical styling of the end product.

#### 6.1.2.2 Product style

The style or design of a product is also very important and crucial for consumer high-tech products and services. Siemens is marketing its Xelibri mobile phones as fashion accessories, with radically different shapes and wearable designs. Similarly, to find success on the Internet, firms must present attractive interactive applications to digital customers. Today Web sites have to be designed simply, fast loading, and accessible to those using a variety of browsers, platforms, and monitor settings [9]. Successful products tend to have some specific design features thanks to the progress of ergonomics, a discipline introduced during World War II, when the need for a human interface component was recognized in the design of aircraft cockpits and other military hardware. Today high-tech products always go for more simplicity and ease of use, miniaturization, specialization and customization, and security.

*1. Simplicity and ease of use* Simplicity and ease of use of high-tech solutions enhance their adoption by the "early or late majority" of customers. While innovators focus on newness and technical features, practicality [10] or ease of use is important for noninnovators [11].

For example, the personal financial Quicken software [12] became a success because Intuit designed a user-friendly interface that looks like the usual checkbook, Quicken was as simple to use as a pencil, while its competitors were hard to operate with intimidating interfaces loaded with accounting terminology.

Similarly, the ease of use of the Walkman, the Mini Disc Player, or the Playstation was critical to their popularity. As Keiji Kimura, president of Sony's Mobile Network Company acknowledges: "The more sophisticated the technology becomes, the more of a burden you impose on the user and that is a major barrier to the growth of the market."

Equally, Nokia thinks a lot about how users will experience the products and the brand. Its designers have made the shape of phones curvy and easy to hold while they designed soft key touch pads to convey a feeling of friendliness; they were the first to propose faceplates of different colors, which can be changed according to the mood, personality, and lifestyle of the owner.

All the best manufacturers of consumer high-technology products focus their engineering creativity on designing features, such as readable screens and friendly keyboards that are very important for customers. A modification of 1 cm to the width of a laptop display screen can make a big difference in readability, for which some customers will be ready to pay.

Similarly, buttons have to be placed on phone handsets so either a left-or right-handed person can use them with equal ease. Some firms have introduced computer devices with rubber feet so that they do not slide easily

from a desk or table. Other companies are testing add-on devices in loud environments because the users need to turn the volume up louder when they are on an airplane than if they are in a quiet area.

There is always room for making a product more simple and easy to use. Just for a simple device such as a control button, there are more than 18 different ways [13] to make it wrong, from unexpected placement or unexpected functions to conflicting feedback or ambiguous labels.

For industrial products too, ease of use is a part of ergonomics (arranging equipment or machines for higher efficiency) and often determines a business product's style.

Simplicity is of prime importance to the user. For instance, HP makes protocol analyzer software that allows managers of information systems to diagnose network glitches. Following market research with those managers, HP expanded the types of data on which, the analyzers could identify and report. Unfortunately, this did not make the software more effective, for the simple reason that users were inundated with useless data. Then HP shifted their attention to end users, such as network maintenance technicians, and discovered that what they actually needed was not more data to analyze, as requested by IS managers, but information that would help them quickly recover from computer crashes. This insight changed new development's technological priorities. The result was Network Advisor, which detects the network problem, proposes a solution, and indicates ways to implement the solution rapidly. Given these modifications, the software was extremely successful.

Similarly, IBM has built WebSphere, a collection of different software (dubbed middleware) that runs on all categories of computers from Unix or Linux servers to mainframes, and make them work together to run different application software. This allows IBM customers to concentrate on their business while sparing them the costs of replacing their existing information technology base.

Likewise, Dell has managed successfully to enter and grow in the server market by focusing on standardized technology, because customers want lower-cost servers that are less complex and easier to manage. Dell entered the market in 1997 and by 2002 it had surpassed all its competitors in the United States, and had become the leader in Intel Servers. In 2003, Dell was trying to repeat its strategy with networking products. So far, most LAN networks have to be installed by an engineer; Dell says that it can make building networks a less difficult process, because the company has so much experience in building devices exactly to customer needs.

*2. Miniaturization and compactness* Another trend in the design of consumer high-tech products is miniaturization, which makes them easier for customers to store and manipulate. Let's consider the evolution of computer disks. The first hard drive, the IBM 350 Disk File, was introduced in 1956. It could store 5 MB of data on 50 disks occupying the space of two refrigerators. Today, the Toshiba 5 GB, PC Card Hard Disk Drive is smaller than a credit card and lighter than most traditional pagers, but packed with 5-GB

storage capacity (i.e., 1,000 times more storage than the original 5-MB RAMAC). In 1990, a 5-GB hard drive would have been the size of a 5-foot freezer; in 1956, it would have been the size of Canada.

Miniaturization and compactness comes into play more for consumer products than for business products, especially in electronics with the constant downsizing of microchips. According to Philips, in the not-too-distant future the DVD player and set-top box will be replaced by an integrated entertainment hub around a DVD recorder hooked up to entertainment devices, from a hi-fi system to digital cameras and MP3 players. PCs could handle the same functions, but Philips claims that multimedia chipsets for DVD recorders, TVs, and mobile phones cost just $15 to $30, making them a fraction of the price of computer-based microprocessors. In addition, semiconductors in PCs, notebooks, camcorders, digital cameras, cell phones handsets are constantly getting smaller, both for the convenience and pleasure of the customers, who can carry them more easily. Indeed, for European and Asian customers, the product's value is almost in inverse proportion to its size—the smaller a product, the more valuable it is—while in North America, it is usually the opposite, because there size does matter.

*3. Security and reliability* Reliability is a big issue for high-tech product and services. For instance, in the case of the Ericsson Telecom Server mentioned here above (see Section 6.1.2.1), redundancy and uses of the standard Linux operating system are also key features of the hardware.

Likewise, in the aerospace business, Arianespace, the European rocket-launcher company, built its success partly on the reliability and regularity of its satellite launcher Ariane 4. Indeed, reliability is a big issue for companies launching space satellites worth hundreds of millions of dollars. Between 1988 and 2003, Ariane 4, dubbed the "workhorse," flew 116 missions and carried 160 satellites and 27 other payloads valued at more than $30 billion into their specific orbit. Only five satellites were lost on a total of just three abortive missions, which corresponds to a reliability of more than 97%. With such an impressive track record, Arianespace managed to achieve a leading 55% market share in the satellite-launching business in 2002.

Consequently, reliability was at the core of the design of the new rocket Ariane 5. More specifically it features a complete redundancy in the electrical systems, hardware, and software (i.e., two onboard computers, two inertial guidance systems, two sets of control electronics for each stage). Also, the storable propellant upper stage is powered by a very simple engine without turbo-pumps, making it a central element of enhanced reliability. However, by 2003 Ariane 5 had yet to reach the reliability of Ariane 4. This was due to changes that were made to Ariane 4 that were initially assumed to be small but in fact were large enough to require more development (see Section 6.1.2.4).

Security is also a key issue for high-tech consumer products. For example, on the Web, the worst things for customers are fraud, products not being honored or delivered, and Internet breakdown. There is no doubt that the recent boost in Internet businesses can be credited to the increased

professionalism of e-business, as well as the increasing reliability of the Internet. Nevertheless, this area is still seen as one needing the most attention; otherwise, the gains of the Internet could be overcome by a growing concern about the overall dependability.

*4. Specialization and customization [14]* Customization starts from the need for specialization. It is a psychological issue, not a technological issue. Thus, people don't prepare meals with a Swiss Army knife, though probably it would be more economical than purchasing many separate types of kitchen equipment. A device that is adapted to a particular job will always be more convenient than a general-purpose product. Specialization leads to personalization (or customization) where the individual customer can customize a product to his or her own specifications and then order it. This translates into greater levels of customer satisfaction and loyalty. Mass customization (also known as "made-to-order" or "build-to-order" or "tailor-made") increased dramatically with the advent the Internet and e-commerce, which makes individual transaction easier.

Some Web sites do it well, like Yahoo and Amazon. For example, Amazon uses information the customer provides, as well as cookies and past transactions, to make tailored product recommendations to the customer while she or he is visiting the site and by e-mail. Another service, MyAmazon.com, welcomes the client to the site, shows personal product recommendations, and stores "favorites" for easy access to favored information such as purchase circles.

Mass customization is more complicated to achieve with consumer goods, because it requires a radically different organization in supply chain and manufacturing. In the high-tech industry, Dell pioneered custom-configured computers, whereby customers pick their computer's processor, memory, storage, and other equipment when purchasing on Dell's Web site. Still sometimes mass customization is less relevant; even for Dell, products such as printers have no configuration options at all.

Historically, high-tech industrial products and services have always tended to be individualized in order to correspond closely to customer needs, because the number of customers to serve is less important and the demands are usually much more complex. In the case of services, for example, Accenture, EDS, or Cap Gemini Ernst & Young collaborate with their clients to help them realize their projects almost on an individual basis, due to the size of their customers and projects. Even though some solutions are standardized, such as in the case of outsourcing projects, they take extra care to have the customers' interface highly customized in order to fit with each customer's needs.

Business products are also customized. For instance, the Ariane 5 rocket is modular and "intelligent," so its performance can be adapted according to the number or weight of a satellite that a customer wishes to launch. EADS has developed a large number of options for its antitank systems, such as interference resistance, tandem shelling, and accessories designed for night use, to meet customer needs.

Experience shows that a good design gives a product personality, helps differentiate it from competing products, and justifies a higher price. It is even better if the product manages to get a strong brand name and identity.

#### 6.1.2.3 Product brand name

A brand is a name, a set of words, a sign, a symbol, a design, or a combination that identifies a seller's goods or services. In the high-tech world, a brand is a basic necessity [15]. One of the criteria that determine a customer's choice is confidence in a company and its products. As the purchase of a high-tech product often represents a leap into the unknown, an individual or industrial buyer needs to be reassured by a well-known and familiar brand.

A brand facilitates product identification while attaching a quality image and a personality that establish customer loyalty and justify a price difference. A product's registered trademark can protect against clones, which is at least as important as protecting technology with patents.

For these various reasons, building a strong brand adds real value for customers, which translates into brand equity for the vendor. Table 6.1 lists the 10 more famous high-tech corporate brands in 2001, according to 700 marketing executives polled in 17 countries by the marketing firm Liquid Agency [16]. Other rankings usually include SAP and Nokia, as well as Vodafone and Orange.

In 2003, a new brand made a splash in the high-tech consumer market: Samsung. With an aggressive branding strategy to achieve a high profile in the cell phone business, the Samsung brand has managed to become as famous as Nokia, Motorola, Sony, and Philips. It was valuated at $8.31 billion in 2002 versus $6.37 billion in 2001 and was recognized as the fastest-growing global brand of 2002 [17].

**Table 6.1** The 10 Tech Companies with the Best-Maintained Brand Value in 2002

| |
|---|
| 1. Microsoft |
| 2. IBM |
| 3. Dell |
| 4. Intel |
| 5. Cisco Systems |
| 6. Apple |
| 7. Oracle |
| 8. HP |
| 9. AOL |
| 10. Sony |

*Source*: [16].

A brand is a complex representation that communicates at least three different levels of meanings [18]:

- First, a brand expresses attributes. Intel suggests powerful and reliable microchips for PCs. Oracle brings to mind top quality databases. Apple evokes flashy and stylish personal computers and electronic devices.
- Those attributes have to be translated into functional and emotional benefits. The attribute "reliable" means security for the customer, which is what Intel wanted to convey with its "Intel inside" campaign. The attribute "stylish" translates into an emotional benefit for the consumer, such as being trendy or different from mainstream PCs owners.
- A brand also communicates the producers' values. For instance, IBM stands for performance and success. Nokia focuses on the consumer and his needs, and is summed up in the slogan, "human technology." Cisco Systems is associated with technological leadership in telecommunication hardware for the Internet.

A brand identity is made of four different elements—its name, logo, colors, and tag line.

A brand name is not chosen hastily or haphazardly but has to be tested on future customers of the selected segment. A strong brand name must evoke a product's features (iPAQ, Windows, PlayStation); be easily memorized, recognized, and pronounced (iMac) product; stand out (MacIntosh when all PCs had numbers), and suggest the product's advantages (Palm, StorCard). Unfortunately, this is not often the case: Few brand names of high-tech products bring to mind the product's essence, and most high-tech products hide behind a number or an abbreviation that is usually incomprehensible to a novice.

Regarding the brand name of a product, an important decision concerns organizing brand names by product range with a number identifying the product (e.g., the iSeries 830, 840, 870 from IBM or the CLIÉ UX50, SJ22, NX 50 from Sony), or adopting the corporate brand combined with a number identifying the product or product range (e.g., Ariane 5, Boeing 767) or a corporate name combined with individual product names (such as the AMD Athlon XP Processor family, Intel 865 Chipset family, or Cisco's 3600 switch/routers series).

One of the benefits of branding by product is that the company's corporate image is not associated with its products. This can be beneficial in the case of a failure: Macintosh did not suffer from the Lisa disaster. On the other hand, a corporate name associated with a number individualizes these products while protecting them under the umbrella the company's name. For instance, in the United States Cisco Systems is facing a "me-too" strategy from FutureWei, a subsidiary of Chinese telecom equipment giant Huawei Technologies Co. FutureWei offers Cisco copycat products in several categories. For example, its low-end Quidway 2620 line matches Cisco's 2600 series, while the Quidway 3640 focuses on the same market as the popular Cisco 3640.

As a matter of fact, large companies often use several of these strategies. Intel offers at the same time the Pentium 4 chip family and the Intel E7xx family. Boeing simultaneously has the Boeing 7x7 civil aircraft family and the AH-64x Apache combat helicopter family.

In the high-tech business, experience indicates that, for market-driven products, a company is well advised to associate its name with a product. Alternatively, for technologically innovative products, it should choose one brand name for each product that then emphasize the particular innovation of that product.

Logo also defines the visual identity of the brand identity. The evolution of the IBM logo [19] is a good example. IBM has always cared about its visual identity. Its name has always been associated with quality and high performance and corporate changes have reflected on its logo evolution, as shown in Figure 6.2:

- In 1924, the Computing-Tabulating-Recording Company adopted the name International Business Machines Corporation. The new logo features the words "Business Machines" suggesting a globe, circled by the word "International," to underline the new dimension of the business.
- After World War II, IBM went through a turbulent transition from the punched-card tabulating business to computers. It began in 1947 with a change in the logo, the first in 22 years. The familiar "globe" was replaced with the simple letters "IBM" in white instead of black, another important modification.
- In 1956 Tom Watson, Jr., IBM's new chief executive, wanted to reflect a new era from the previous CEO, Thomas J. Watson, Sr. The slight change of the logo was made to communicate that change would come within stability. So the letters "IBM" were still there but colored in black and with a more solid, widened, and balanced look.


International Business Machines.
The Globe (1924–1946)


IBM in transition
(1947–1956)


IBM continuity
(1956–1972)


IBM international recognition
(1972–to present)

**Figure 6.2** Brand Logo in high technology: the example of IBM. (*From:* [19] © Copyright IBM Corporation 1994, 2004. All rights reserved. Reprinted with permission.)

- The current version of the logo was introduced in 1972 with the arrival of a new CEO, Frank T. Cary, and at a time when computer technology was revolutionizing the industry with the rise of DEC and HP minicomputers. The eight horizontal negative bars replacing the solid letters were to suggest "speed and dynamism" according to IBM. Since then, this dynamic and powerful logo has remained as constant as IBM's leading position in the information system industry.

Colors are also part of the brand image. They help to identify and differentiate. For instance, while the IBM logo is made of blue letters (IBM is also known as "Big Blue" in the computer industry), Apple's logo represents a multicolor bitten apple with no name. Similarly, orange is the color of Orange, the telecommunication operator, and is in deep contrast with the red scarlet of its main competitor, Vodafone.

The fourth element of a brand image is the tag line. Some brands do not have any tag line. Others do, such as HP "Invent," IBM "Computing on demand," and Intel "inside." A tag line is not only for corporate branding, but also for product brand (e.g., "the centre of your digital world" for the Pentium 4 processor or "Turn your sense in communication" for the first Samsung 180° camera phone). An effective tag line should reflect a convincing truth and reflect the positioning of the product or of the company.

Brands are not built by advertising only but by the customer brand experience [20], not only through the product, but also through the company's employees and distributors and all the company communication (see also Chapter 8).

A strong branding strategy is based on three key principles: dominance, exclusivity, and singularity.

A dominant brand is the one that comes first in customers' minds before those of competitors. Usually, in a consumer's sequence of thought, first the product category is identified and next the brand comes to mind. Dominant brands have greater returns than their competitors [21]: On average, the "top of mind" brand has a return on investment of 34%, while the second competitor has 21%, and the third has 16%.

The value of a brand is correlated to the degree of awareness in customers' minds. It is said that Logitech, at that time a PC mouse-maker, decided to enter the keyboard business when a poll of users voted Logitech as the number-three brand in keyboards though the company wasn't even selling keyboards at the time, but its name stood out permanently on the mouse close to the PC keyboard. Since then, the company has sold more than 30 million cordless desktops—a package including a keyboard and mouse devices.

Typically, a powerful brand will go through various stages:

- From zero awareness;
- To assisted recognition, when it is mentioned in a list of brands submitted to respondents;

- To unaided recall, meaning that the respondent associates the brand name directly with a given product or communication message;
- To "top of mind," when the brand is mentioned first without any assistance.

However, strong brand recognition also means a significant amount of money invested up front to promote the brand. The human mind does not build up favorable impressions slowly over time (see Figure 6.3). Usually, once a customer's mind is made up, it rarely changes, and a perception that exists in the mind is often interpreted as truth. Consequently, a strong branding strategy for a new product or technology requires a "big bang" to establish an initial position in customers' minds; only then can subsequent input strengthen and sustain this first impression.

An exclusive brand is a must because experience and research show that two brands cannot both occupy one position at the same time. Even worse, any major communication investment by the second brand usually reinforces the leader's position with customers by making the association more salient.

Finally, a single brand cannot occupy two distinct positions at the same time in customers' minds. When one position increases, the other must decrease. This is the main reason why it is very difficult to sell the same brand to both businesses and consumers. For instance, IBM has a strong image in business that does not translate well in consumers' minds. Conversely, Microsoft had to invest heavily to promote Windows NT as a "serious" operating system for the business environment, because Windows was perceived much more as a consumer product for individual users. Intel is seen as a prime vendor of microchips, but has not yet achieved credibility as a vendor of multimedia solutions.

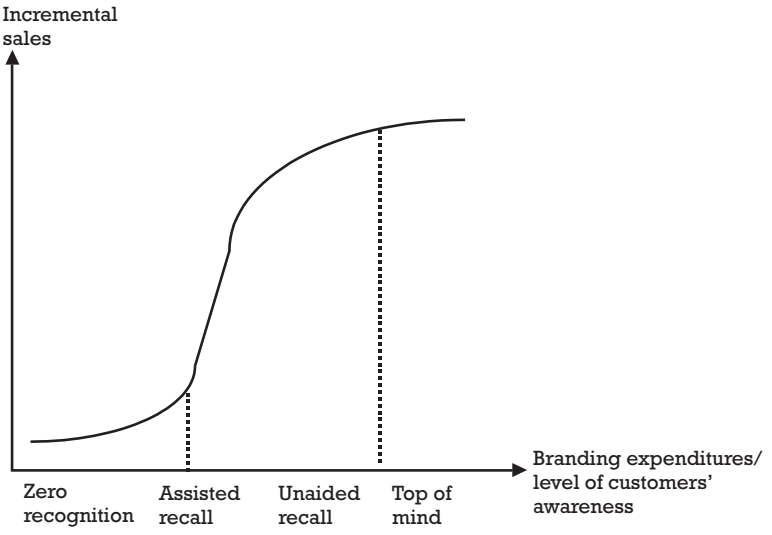


**Figure 6.3** The S model of customer response to brand awareness.

Respecting the three conditions of dominance, exclusivity, and singularity is achieved through a good segmentation process and the right choice of positioning. For a given segment, if a brand cannot be first in a product category or own a particular association, it must be positioned on a new dimension that either opens a new category or divides the existing one. Such is the strategy of Apple, which is (re)positioning the Mac as the hub of a digital lifestyle thanks to the launch of the iPod, a Macintosh music player, in 2001 and the iTunes Music store, a service to download songs from the Net "with one click for only 99¢ each."

Other brand management decisions include:

- Line extension, that is, introducing additional items in the same product category, such as Microsoft did with the updated version of its software Windows (see also Section 6.1.3);
- Brand extension, that is, to launch new products in other categories like Samsung did when moving from microchips to cellular phones under the same brand name;
- Multibranding, that is, to introduce additional brands in the same product category like Xelibri by Siemens or Vertu by Nokia to reach new customers for their cellular phones;
- Cobranding, that is, to combine two or more well-known brands in an offer like the joint venture between Philips and Nike to promote their brands together in order to cross share their respective components (technology for Philips, youth and challenge for Nike); the first output of this joint venture was the launch in November 2002 of a very innovative "sportswear "music player, the Nike psa128max (also known as Philips act210), fashioned like an oversize wristwatch to wear on a wrist with a Velcro strap or on a clothing thanks to magnetic clip;
- Rebranding, that is, to reposition the brand because of changing customer preferences or new competitors. For example, in 2002, IBM tried to turn to its own advantage the images of computer mainframes as obsolete dinosaurs by branding aggressive code names such as T-Rex for the z990 and Raptor for the lower-priced z800. Similarly, in 2003 SAP renamed its flagship software "mySAP Business Suite," known since 1999 as mySAP.com; the drop of the "dot-com" suffix was a way to signal the end of the e-business mania of the 1990s and that the company was back to its core business.

Another issue is that brand owners have little control over how their brands are used and viewed. The increased use of Internet makes it even more difficult [22] with the dissemination of messages and products through chat rooms, bulletin boards, and newsgroups. Actually the Internet magnifies the major threats to brands, which are:

- *Counterfeiting and fraud*. For instance, illegal copies of branded software are sold at bargain price on the Internet.

**Case: Branding and Rebranding**

In July 2002, in the United Kingdom, a survey conducted by Continental Research [23] among 1,906 mobile owners showed that spontaneous nonassisted recall of the T-Mobile brand, formerly One2One, was only 31% while the awareness of its old brand was higher at 39%. T-Mobile launched an aggressive communication campaign, featuring tennis players Andre Agassi and Steffi Graf.

Another competitor, O2, was facing the same situation. It only had 26% awareness in July 2002, while its antecedent BT Cellnet had a high brand recall of 54%. Similarly, O2 reacted and launched a forceful communication campaign including sponsorship of famous TV program *Big Brother*. In January 2003, a new brand awareness survey was conducted. The new results for nonassisted recall are shown in the following table:

| *Brand* | *July 2002* | *January 2003* |
|---|---|---|
| Orange | 75 | 74 |
| Vodafone | 64 | 63 |
| BT Cellnet | 54 | 40 |
| O2 | 26 | 40 |
| T-Mobile | 31 | 37 |
| Virgin | 26 | 30 |
| One2One | 39 | 29 |

*Source*: [22].

Question 1: What are the results of the new communication campaign?

Question 2: What are the long-term rebranding challenges for O2 and T-Mobile marketers, notably regarding their competitors?

- *Brand and logo bashing or abuse*. They are very frequent on the Internet; IBM, Microsoft, Lucent, BT, and France Telecom are or have been bashed on some Web sites.
- *Negative associations*. In 2002, Sony was accused of racism by singer Michael Jackson and this accusation created a lot of discussion on the Internet.
- *Boycott calls and false rumors.* In 1999 Microsoft was accused of letting the National Security Agency have access to the world's computers, because one user had found a key labeled NSA in Windows. The name was simply unfortunate, but it started a tempest of rumors about an Orwellian Microsoft on the Internet for months.

#### 6.1.2.4 Product quality

Quality is a basic characteristic of a high-tech product because the purchase of a high-tech product is justified by performance expectations that will be

disappointed if the product does not function well or at all. Furthermore, a low-quality product betrays the confidence that a customer has placed in a company.

It does not come as a surprise that a better quality product leads to higher profits, as researchers from the Strategic Planning Institute [24] have clearly established this correlation in a study among a large number of firms. This survey covers all product types, but its results can be extrapolated to high-tech products.

Let us make clear that a product's quality is what the buyer expects and not what can be manufactured in a factory. Consequently, marketers must measure the target customer's expectation level as well as the perceived quality during prototype testing.

Once this has been determined, the members of the marketing department should work in conjunction with all the other departments to assure this level of quality continuously. Quality obviously concerns the manufacturing department but also the research and development department, which can integrate the quality issue at the product's design, and the maintenance services, which are in charge of repairs of defective products.

This search for quality is not always easy in the high-tech-product world. The rate at which opportunities appear and disappear in a market or a segment and the need to act quickly when launching products some times leads managers to sacrifice a product's quality. For some technologies in which the process has not yet been finalized, it is tempting to launch a product without completely mastering all of the aspects.

This is a risky and often dangerous speculation because a product with performance that is below customer expectation almost always has negative consequences on its own image, even on the company itself. It may even lead to bankruptcy, as experienced by Boo.com or Webvan, and other less well known e-business firms, whose performance was not up to their image. Similarly, the first launches of the European Rocket Ariane 5 have proven difficult with three failures in 14 launches from 1996 to 2002, and have paved the way for aggressive competitors such as ILS, the alliance formed between Russian companies Khrunichev State Research, Production Space Center, RSC Energia, and American Lockheed Martin Corporation.

Finally, continuous quality improvement is very important before launching a product but also during a product's entire life. The product manager must organize and follow surveys that treat this subject, as well as associated services (for example, installation and repair). He or she must also participate in setting up "quality circles" or their equivalents in the company, to encourage any and all improvements that can increase customer satisfaction.

### 6.1.3 Managing a product's shell

Product marketing must include a marketing of the entire product that is being offered to the customer. Theodore Levitt, one of the leading

marketing specialists, observes that "the more technologically sophisticated the generic product (for example, cars and computers), the more dependent are its sales on the quality and availability of its accompanying customer service" [25]. How many marvelous technologies have remained unused or underutilized because of insufficient maintenance service or information that disappointed or annoyed their users? Similarly how many services are unexploited or underused because of the lack of adequate infrastructure and complementary hardware?

Service is often the key for market success. Consider the success of Bloomberg, which has become one of the largest and most profitable business-information providers in the world in less than a decade [26]. When Bloomberg entered the on-line financial-information business, the incumbent leaders Reuters and Telerate dominated the industry. They were targeting the IT managers who valued standardized systems, because they were easy to use and maintain. Bloomberg decided to go directly to the users, the traders who were making or losing millions of dollars each day [27]. Bloomberg designed a system with easy-to-use terminals, keyboards labeled with financial terms and two flat-panel monitors so traders could see all the information they need at once.

Furthermore, it added extra services: It included a financial analytical tool directly accessible on the screen for the traders to analyze information as well as to view historical data. Traders no longer had to use pencils and calculator to compute returns on alternative investments. Additionally, Bloomberg added other personal services for the traders for the times of the day when trading is low such as on-line purchasing, travel arrangements, or access to real estate listings, years before those services became available on the Internet. As a result, the traders coerced IT managers to purchase Bloomberg terminals.

Likewise Intuit Software has extended Quicken with many services for its customers, helping them preparing tax, processing payroll, planning finance and even sourcing capital for them. Other essential services include delivery, installation operation, instruction, maintenance, after-sales support, warranty, and credit terms.

For example, Dell Computer was the first to offer a telephone diagnosis and order system as well as 24-hour repair service and the installation of different software on request. To speed up its operation in Europe, Dell is working with shipping companies that deliver and install its systems and with media firms that call customers to assess satisfaction. Such quality in associated services helps to improve customer loyalty.

Regarding delivery—fast delivery, Sony has introduced a new manufacturing organization dubbed cell-based manufacturing, which makes it possible to manufacture a product one day after an order is taken and delivers the product the next day. Today, Sony needs only 30 minutes to put together a digital camera and 240 minutes to assemble a camcorder.

Documentation is also an important service, as well as an issue when some notebooks have to be translated in more than 15 different languages for the European market. As well, financial engineering is a key service for

high-priced high-tech products, in an absolute or relative value. IBM and Airbus are well known for the flexible and innovative financial solutions they can propose to their customer in order to purchase their equipment.

Maintenance is a great way to grow customer loyalty by fixing a problem quickly and efficiently. Furthermore, maintenance services are often very lucrative not only because the customers are captive, but also because the price of the repair is driven by the product value for the customer and not by the cost of the spare part or the technicians (see Chapter 7 for more details). All the successful high-tech companies marketing business or consumer products, provide a toll-free telephone number or an Internet address to contact their maintenance services directly 24 hours a day. Actually, the best way to control the quality of the after-sales service operation is to simplify its conditions at the product development stage. For instance, with modular design in electronics, models are built using a circuit that can no longer be repaired, so only the board on which it is installed is changed, which can be performed in a few seconds by a low-skilled operator. The integration of self-diagnosing systems that can anticipate trouble and notify maintenance and repair service has also led to more profitable and easier-to-repair electronics.

The services associated with a product are essentially the responsibility of the finance department (for credit terms) and the installation and maintenance departments. Accordingly, the product manager must work in close collaboration with these departments to respond efficiently to customer expectations. He or she must be actively involved in the assurance of impeccable service quality for the company's products.

Beside services, the expansion of a new technology or of a new product often relies on the availability of complementary products. Those products must be managed synchronously with the main solution, either directly, if they are provided by the same vendor, or in close cooperation with the marketing departments of external suppliers.

For instance, Apple Computer secured the success of the Macintosh computer in the desktop publishing arena by simultaneously bringing to market some crucial desktop publishing software applications, supplied by Adobe and Aldus, as well as its own laser jet printer. Similarly, the success of 3G services by telecom operators such as Vodafone, Orange or DoCoMo depends not only on the availability of this technology on their own network. It is also correlated with the availability of 3Gs handsets from Nokia or Motorola, as well as with the offer of new services such as mobile-commerce (m-commerce). Consequently, in 2003, Orange, Telefónica Móviles, T-Mobile, and Vodafone created the Mobile Payment Services Association in order to build an open, interoperable, international, and commonly branded solution for payments via mobile phones. The goal is for this service to become the industry standard for m-commerce payments for customers, content providers, merchants, and banks. The association bets that interoperable mobile payments should provide the key to the rapid growth of m-commerce, the same way interoperability did for SMS messaging in Europe.

Complementary solutions may end up being as or even more profitable than the main solutions, Indeed, in 2002 in the United States, PC purchases went flat, while Web cam sales rose 36% and sales of digital still cameras jumped 64%, according to Forrester Research.

For instance, Logitech has made a fortune in selling complementary products such as game console accessories, wireless keyboards and mice, and PC speakers. In the last 12 years, its mouse business has been growing by double digits year after year. In 2002 revenues were at $944 million, up 28% from 2001. Even more interestingly, 85% of Logitech's revenue comes from peripherals that are sold as replacements of working mice and keyboards. Indeed, although a mouse can last 3 to 4 years, most of the users replace their first mouse within 6 to 18 months after buying their PC.

Sometimes, a fourth dimension of a product can be considered; that is the potential of the product. The "Potential product" [28] includes all the possible extensions and changes the product or service might undertake in the future. For instance, cell phones have already included pagers, radios, and cameras. Japanese toy maker Takara, videogame producer Konami, and electronics maker NEC have developed a new technology that allows a mobile phone to be the remote control for a toy car: a small transmission unit is plugged into the phone, while software is downloaded and users steer their car by pushing the keypad. It seems that there are few limits for growing the use of this portable high-tech device.

## 6.2 Managing a product range

When companies have a successful product, they often tend to develop different product versions [29] that can adapt to customer needs from top-of-the-line products (high-quality attributes and shell) to bottom-of-the-line products (low-quality attributes and shell). This strategy allows a company to build on the success of an innovative product, while reaching for new segments of customers and preventing the entrance of new competitors into some market segments. Furthermore, extending a product's range also creates a customer migration path from an older product to a new, radically innovative one [30].

Platform is a common engineering concept that can also turn into a marketing concept to leverage new technology into new markets and to cut time to market [31]. A platform with its standardized interface paves the way for it to become an industry standard, because it enables and encourages a network of suppliers and complementors to emerge.

Platforms have been used very effectively in the high-tech industry for hardware products—by firms such as HP (for its printer business [32]), IBM [33], Sun, EMC, Intel, and Cisco Systems [34]—for software products developed by companies such as Microsoft and Oracle did successfully [35], as well as for information products [36] and services by firms like Accenture or EDS [37].

A product line consists of all the existing variations of a given product based on a technology platform. Therefore, the product manager of a high-tech product must often decide whether to extend or to reduce a product line. He or she has to find the right balance: A product range that is too small risks foregoing market share, but a product range that is too large risks burdening profitability with high debt because of the costs associated with, for example, the production, storage, packaging, promotion, distribution, and billing of too many products. Another risk of an extensive product range is reducing the company's focus on the more successful products or those needing special attention.

Figure 6.4 illustrates Microsoft platform strategy with the simplified evolution of the different ranges of software [38]. It clearly shows how Microsoft has managed to expand its offer through a platform strategy with mostly incremental innovations. Such an approach has facilitated the transition from one software product to the other by developers/complementors, as well as by customers. Consequently, it has strengthened the positioning of Microsoft software as being the de facto standard. Was that the best marketing strategy? In our opinion it certainly was. Was it the best solution from a technology viewpoint? The debate is open to know if more creative software could have made it on the market, if Microsoft had not used such a marketing approach.

However, Figure 6.4 also shows the risk that Microsoft may run into by overstretching its Windows software. Microsoft currently offers more than 10 different products, all carefully targeted to different segments, but such profusion may end up in some products' overlapping, which could create confusion for the customers.

A product line can be extended in two directions: upward and downward. To extend a product line, the product manager must first ascertain that the line meets customer needs and that the extension is technically feasible.

In the majority of cases, high-tech companies start out with upscale products and then step down to products of lower quality. In the beginning, the need to optimize very high fixed R&D costs in a short time period forces the company to target industrial or individual customers with a high purchasing power. Then, when the upscale product market slows down, due to market saturation or the arrival of competitors, it is tempting to target more price-sensitive markets by introducing low- and average-quality product versions. Using this approach, the company can take advantage of its high-quality image.

The risks of going down this road should be carefully evaluated, because this type of decision implies modifications of production (Can production keep up if volume increases?) and distribution (Will distributors accept less classy customers?), and because it can encourage existing competitors in the low-quality range to counterattack with higher quality products. Cisco and SAP, for instance, have successfully managed to offer downgraded versions of their flagship products to medium-sized companies, especially in countries like India, or Malaysia. Small and Medium Enterprises (SME) will

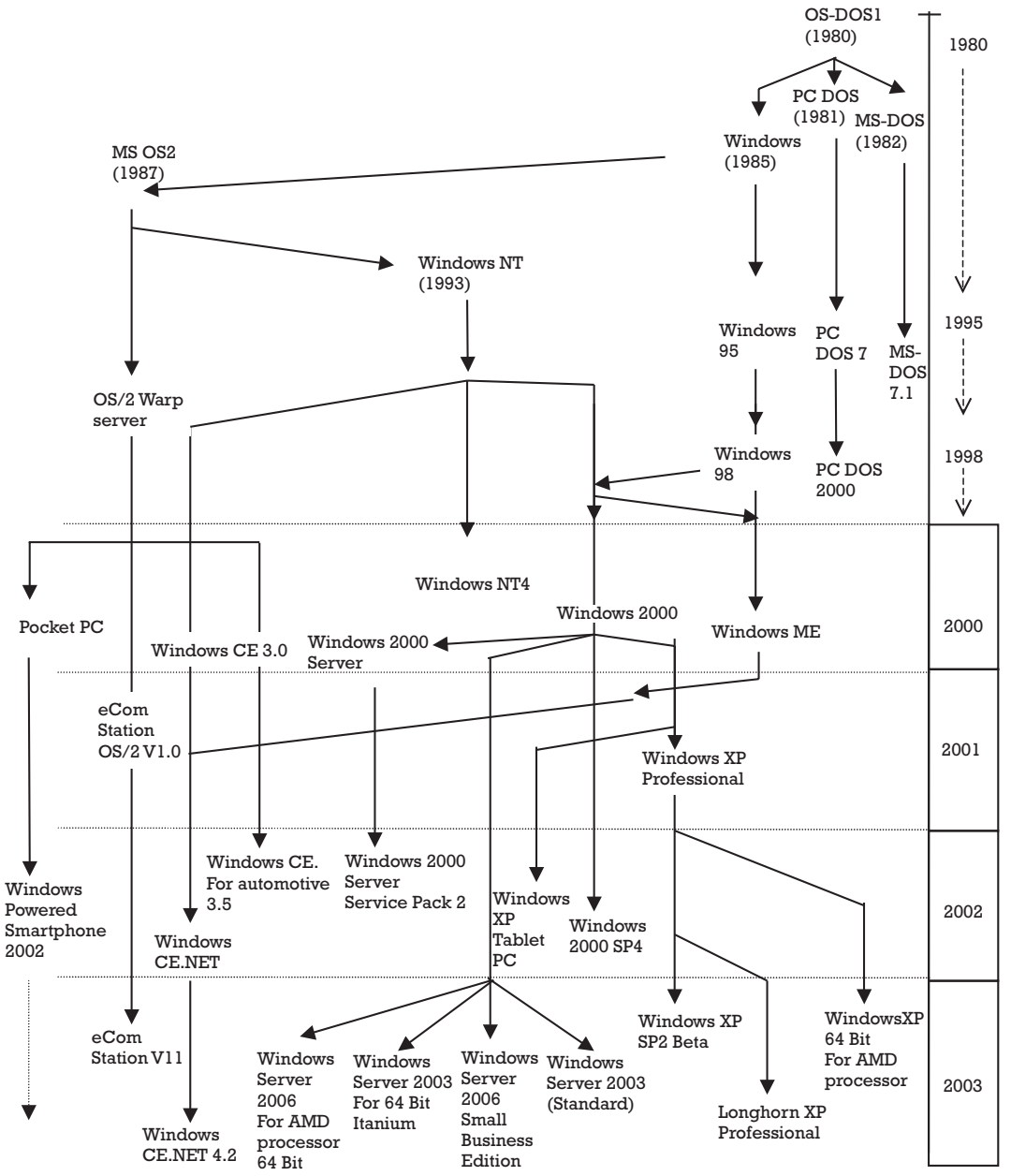


**Figure 6.4** Microsoft platform and range evolution. (*After:* [38], Microsoft, and press reports compiled by Eric Viardot.)

represent about 15% of SAP's 2003 revenues, up from less than 10% 2 years before [39].

Extending upward into a realm of higher quality products is justified if a company wants to capture a more profitable market where competitive positions are likely to change. However, this is a difficult undertaking, because the company must have all the abilities (technical, sales, and

financial) necessary to assure a new positioning in its new market segments. In addition, it might already suffer from a low market image, because it is primarily known as a supplier of lesser-quality products. But in past years, many firms such as Microsoft, with Windows NT, or Palm, with its i705 PDA have managed to move upward from consumer product to more sophisticated and complex product for the business market.

Some firms do extend their product range up and down at the same time, like Nokia or Dell, which are currently in a growth phase. Such a two-way product range extension allows new products to capitalize on the firm's strong image of providing marketing savvy, low-cost/high-performance products with industry-standard technology and components.

In every extension case (upward, downward, or in both directions), the "cannibalization" risk of existing products is high. Cannibalization [40] is the possibility that the sales of the new product line will "devour" the sales of the company's other products. This occurs frequently in the high-tech sector, because the rate of technological change is such that the most recent product is more appealing and offers a better price-performance ratio than its product-line relatives. For instance, Motorola completely changes its cellular phone product line every 12 to 18 months while Samsung refreshes its lineup every 9 months. While some marketers consider cannibalization as a problem [41], it can also be considered a necessity for marketing high-tech products, because it helps to introduce radical product innovation, while building on the long-term success of the company [42].

Experience shows that, in this field, companies who embrace the dynamic cannibalization of their own products are also highly profitable. Rather than recreating different product lines every time, cannibalization is a way to remain dynamic by strengthening the durability of the line's name. Cannibalization can build up a basis of trust that is required to reassure buyers of high-tech products. Simply stated, cannibalization is how a successful high-tech firms stay ahead of their competitors.

The opposite of extension, the reduction of a high-tech product line, is a necessary decision when part of the line is no longer profitable. This decision can be linked to a structural insufficiency of demand, to overly optimistic predictions that overestimated the number of customers in a segment, or to difficulties in reaching these customers, especially for products that have no predecessor. This is also often the case for older products that are no longer in demand. Consequently, managing a range of products has to pay close attention to the products' life cycles.

## 6.3 Managing a high-tech product according to its product life cycle

The importance of the product life cycle must be examined via the changes in markets and technology, because a high-tech product exists not only because it meets a market need but because it is closely related to a technology.

We saw in Chapter 1 that the product life cycle is the mirror image of the changing needs that the product satisfies and reflects the customer diffusion of innovation curve (see Figure 6.5). At its introduction, the product must convince the innovators and the forerunners because as soon as they buy the product and make it popular, a larger majority will be interested in the product. Sales will increase until the late majority has adopted the product and its level of sales stabilizes. Finally, the eventual decline will be accelerated by the arrival of a new technology.

Furthermore, fast-changing technologies and the customer's failure to understand a technique encourage fads for a given product. As many product managers know, in the consumer and industrial high-tech world, the product life cycle is quite similar to that of "faddish" products: Both have a quick growth stage and a sharp decline.

For example, over the last 10 years, the average life cycle of the PC has decreased from 4 years to 9 months. At a given time, 70% of the products in the portfolio of a typical PC vendor have been introduced in the last 6 months. Consequently, manufacturers must juggle powerful suppliers' demanding lead times as high as 4 months (like for disk drives) and distributors unwilling to carry large inventories. Other industries such as mobiles

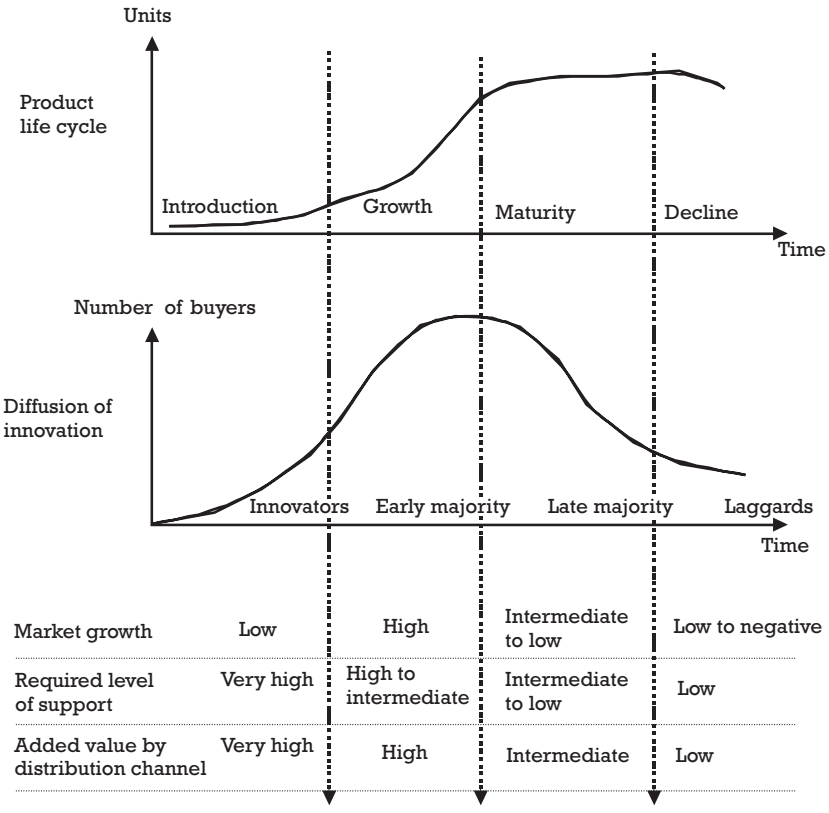


**Figure 6.5** Product life cycle and diffusion of innovation.

phones, consumer electronics, and publishing, as well as fashion and sporting goods, face many of the same problems.

Siemens has even made the decision to reduce its Xelibri mobile phones' life cycle on purpose. The Xelibri phones are marketed as fashion accessories, with spring/summer and fall/winter collections. Each collection consists of four phones only; they are available in limited quantities and have a life cycle of 12 months, significantly shorter than average mobile phones.

The product life cycle theory is sometimes criticized for two reasons. On one hand, it is very difficult to identify stages because they are led by sales that can be influenced by marketing activities. On the other hand, there is no reliable way to identify when stages actually change, particularly to identify signs of maturity or decline.

Nevertheless, in the high-tech-product world this model appears to be very useful to the product manager, not so much for making market predictions, but rather for planning and preparing strategic product management decisions. Every stage of a life cycle requires different actions, as we will now examine in detail.

### 6.3.1 Introduction stage

Launching a new product is probably the most important job for the product manager of a high-tech firm, because it happens so frequently compared to traditional industry where a product can stay on the market for many decades. For instance just for the 2003, Gateway planned to launch 50 new products in 15 categories, from connected DVD players to plasma televisions, to PDAs.

It is also the most difficult part of the product management and actually many new products bomb on the market, because of an ill-conceived introduction. Out of 62 high-tech CEOs and presidents, all ranked product launch as critical or at least very important to their business. But only 15% rated their overall satisfaction with their product launches as "high," while 54% rated it as "moderate" and 31% rated it as "low" [43].

A high-tech product actually exists long before the company introduces it to the marketplace. Whether the market demands it (market-driven) or technical innovation encourages it (product-driven), the product is always part of a prototyping phase that verifies the response rate of the needs of a test market in a certain segment. So this pre-introduction stage is also the time to check every detail of the readiness of all technical manufacturing and of associated services (for example, documentation and training).

Theoretically, logistic problems do not account for low initial sales. Only two main factors can: the low number of buyers ready to be innovative and the product's initial high cost as a result of the need to break even with research and development costs.

Accordingly, the main challenge of a market introduction is to reduce a new product's risk—a risk that is higher because the product is innovative,

for the company as well as for the customer—while increasing its diffusion. The analysis of successful product introductions shows that several strategies are possible and can be executed at one time.

- Aiming at innovators who are tempted to buy the product immediately is a top priority. For techies, branding is not important; what they are looking for is a new product that will put them ahead of the pack [44]. They will listen early on to opinion leaders and visionaries, such as the technical analysts and gurus, as well as some admired beta-test companies, research laboratories, and universities. For instance, in order to promote its new Java programming environment in 1995, Sun Microsystems set up an organization of technology evangelists, a group of top guru engineers whose main was first to inform and share in the passion for Java with developers around the world, mostly in labs and universities. Once Java was firmly adopted by those innovators, Sun Microsystems then used this customer basis to expand into other industrial and banking markets.

  Some new products experience difficulties identifying these innovators who have certain distinct psychological characteristics. Innovators among consumers are often people with certain levels of education, who read certain publications and earn a certain income. Industrial customers are companies that are very performance-oriented, with a strong market power, and that practice state-of-the-art technology.

- Educating a part of the target market to which the advantages of the new technology are explained is also a good technique. It establishes credibility because informing potential customers centers on technology whereas traditional promotion centered on the product. In the beginning of the 1970s, when no one completely understood the potential of microprocessors, Intel developed a large program of seminars and brochures that described and explained the infinite variety of possible applications. Today, firms such as Cisco Systems, Agilent, and IBM offer e-seminars or Webinars (i.e., a live interactive presentation and training session about its products over the Web) reaching an even bigger number of would-be customers, while saving time and money. The effectiveness of those Webinars has yet to be measured and proven, but they are getting more and more popular as a marketing communication tool in the high-tech industry.

- Targeting users of similar products also pays off because it minimizes the transfer costs. For instance, in 2002 IBM aimed to lure users of Sun Microsystems's Unix servers to convert to IBM's Linux systems, built around Intel processors. IBM's Solaris-to-Linux program included a step-by-step blueprint for moving to Linux models, as well as a team of systems architects, database administrators and project managers to help users with Linux testing and deployment.

Furthermore, experience shows that users of similar products are often forerunners, or market indicators. For instance, in Europe, the forerunners for camera phones also appeared to be owners of DVD recorders and video-game stations.

- The approach can be more direct by aiming, whenever possible, at users of the current competing technology, as when Thomas Alva Edison offered his electric lighting system by voluntarily duplicating all of the existing forms of gas lighting. However there is always a risk of confusing the already established customer base, few of whom are innovators but most belong to the early or late majority. These users can become frustrated with the existing product, whose shortcomings are apparent, without having any inclination to buy the new product. The key here is to make the transition between technologies as smooth as possible. For instance, keeping the QWERTY keyboard as a common feature of manual, then electric, and now computer-based typing systems has clearly blocked the adoption of new technology by typists. Similarly, the addition of a mouse to computers has facilitated the adoption of computers by users who had no previous typing experience and were relying only on pen technology, to write letters and other documents.

- Spreading a successful product image is a good approach because success attracts success and more quickly convinces customers who only ask to be reassured. A costly promotion campaign is necessary to establish a strong image. For instance, after a media blitz costing about $200 million Microsoft managed to sell 1 million copies of its new version of its operating software in less than 4 days. However, in 2001 Microsoft went even bigger: It committed to spend $500 million for promoting its new Xbox game station worldwide, twice the marketing budget of its rival Sony the previous year. However, the ultimate launching of a product to date is that made by Microsoft for Windows 95, 10 times less than what it took to sell the same number of copies of its previous MS-DOS version.

  Word of mouth is even more important than advertising, on-line or off-line, especially with younger customers. A 2002 survey of "Netizens" in 19 cities around the world with heavy penetrations of wired Internet usage and/or mobile, wireless devices, asked: "Where did you first see or hear about the last technology product that got you very excited?" 40.5% of respondents cited a friend, family member, or coworker, while 15% of respondents named a magazine article and only 4% named a print ad, another 4% chose a TV ad, and 1% cited an outdoor billboard.

- Publicly announcing testimonials and recommendations of well-known organizations and companies that have already tried and adopted the product will present a credibility that can convince hesitant consumers. In order for this method to succeed, prestigious customers must first agree to participate in a beta test, which they will rarely refuse

if the innovation is of interest to them [45]. For obvious reasons, testimonials are even more important for challenger and smaller players in a market, because today everyone is expecting IBM, Oracle, or Microsoft to come with the name of large companies already using one of their new products after testing.

- Other possible market introduction strategies are interactions with opinion leaders, such as journalists and consumer advocate groups; free trial uses, leasing possibilities and sharing technology with other suppliers before the launching of the product to make it a de facto standard (e.g., Philips worked with Sony, Hitachi, Akai, and Panasonic on a universal video laser disk, and Sony negotiated an agreement with Aiwa, Sanyo, and others to sell its 8-mm camcorder; see Section 2.2.3 for other examples).

All those actions share the objective of achieving the acceptance of a new high-tech product and launching this product as quickly as possible to more risk-averse, less-innovative customers who form a large part of the market. It is their acceptance of the new product that will make it a success from business and financial standpoints. The failure of the Digital Compact Cartridge (DCC) launching by Philips NV illustrates the point. Philips wanted the DCC technology to replace the analog (cassette) tape technology, just as CD players replaced analog record players. To ease the transition for customers, it designed the DCC tape decks to play both analog and new digital tapes.

However, Philips performed poorly when trying to sell the benefit of digital recording technology, because it never mentioned the compatibility of the two technologies. At the same time, its main competitor, Sony, was introducing its minidisc system, another incompatible digital recording technology. As a consequence of this confusion, few consumers switched from analog cassette tapes either to the DCC system, or to the minidisc system. Furthermore, Philips had priced the DCC tape player quite high, between $900 and $1,200 per unit, which did not help its market entry. Overall, the failure of the launch prevented Philips from generating increasing returns, and the DCC technology ended up locked out of the market.

### 6.3.2 Sales growth stage

During this stage, the number of customers and sales increases. The company benefits from the experience effect, which lowers its unit costs and allows it to recover its research and development costs. Prices tend to decrease fairly quickly, which increases demand while raising entry barriers for competitors who may be unable to show a profit on a long-term basis at this low price.

Usually, high-tech products experience steep sales growth phases. For example, from 1989 to 1995, the market for battery components increased by more than 11% of revenues. Likewise, from 1990 to 1995, the compound annual market growth rate was 15% for semiconductors, 18% for PCs, and 32% for flat panel displays.

Figure 6.6 illustrates the PC life cycle in the United States and shows a steep growth phase from 1991 to 1999. It also highlights how the U. S. market started to mature after 2000, partly because of technology limits in things like hard drives and communication speeds, making a year-old computer as good as a new one and stopping the growth phase.

To sustain the growth phase, marketers must stimulate increasing returns by expanding the installed base of customers, usually toward mainstream customers, and looking for new market segments. They must understand the key drivers, such as standardization, interoperability, dominant design, dominant image, or whatever will help them create a reinforcing feedback loop to get more customers. Figure 6.7 illustrates the typical example of Linux, which has been in a significant growth phase since 2002.

Today, the vast majority of customers buy Linux because of the application programs that run on it. The quality and quantity of those programs is constantly increasing, because software developers are always designing new programs that run on Linux; its installed base allows them to aim at millions of potential customers. Likewise, the availability of new applications and the number of existing Linux users motivate new customers to buy, further expanding the installed base.

To keep such a growth cycle going requires the erection of high genuine or perceived switching costs to competitors for business partners and final customers. Thus, in the product growth phase, a company will have to increase its distribution channels, as well as its communication. However,

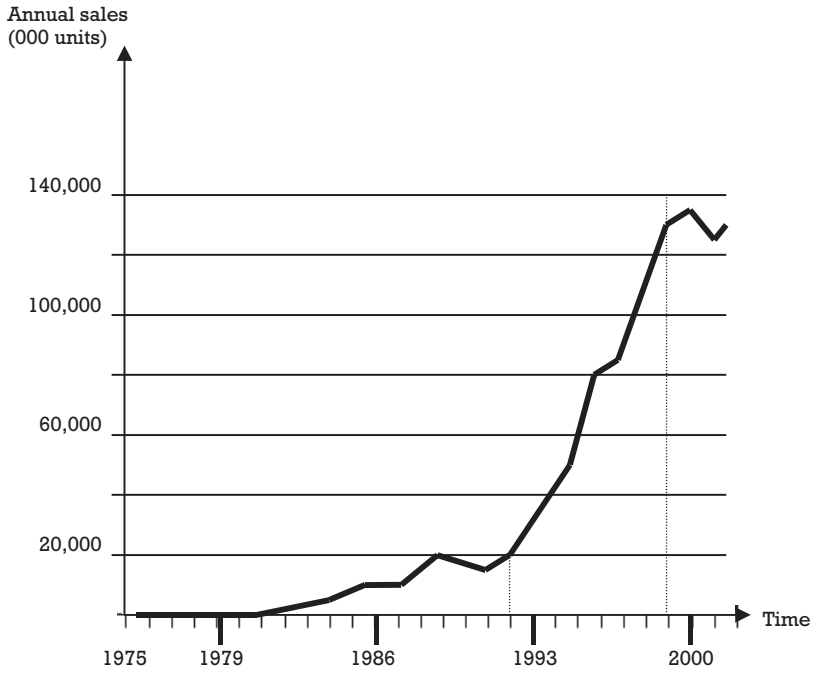


**Figure 6.6** The PC life cycle in the United States. (*After:* [46].)

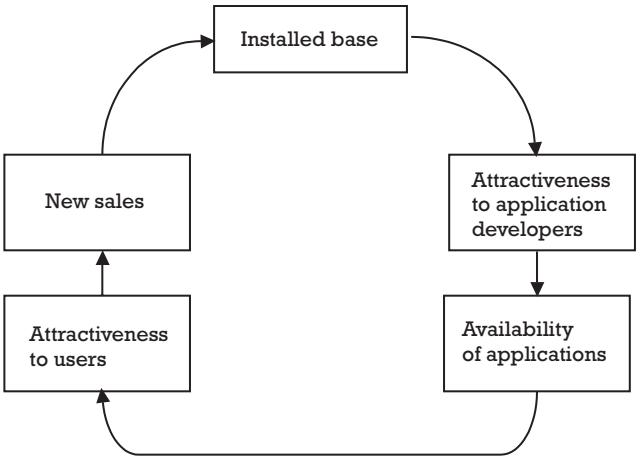


**Figure 6.7** Managing the growth stage: the case of Linux.

these actions have high costs, and the company must decide between market share and profitability within the limits of the technological possibilities.

### 6.3.3 Maturity and decline stages

When facing flat sales of a product, the product manager must analyze the reasons for this sluggishness. If the reason involves a simple sales issue related to price cuts, sales promotions, remotivation of the sales force, or restructuring distribution, an adjustment will suffice to boost growth. For short-term planning purposes, in the maturity stage, the product manager must also research whether he or she can try to modify certain product features (physical characteristics or the entire product) or enter new market segments.

Often this flattening of sales evolves into a decrease in sales, which only results in the introduction of a better-performing product or technology that takes some time to spread throughout the market. For instance, pagers were killed at the end of the 1990s by the SMS function made available on the vast majority of cellular phones, making them useless. Another reason is the change in customer needs. A European leader in the cellular phone handset market at the end of the 1990s with its highly technical products, Ericsson was unable to adapt to new customer expectations and offer products as simple, flashy, or convenient as Nokia or Motorola. After its phones division experienced a drop of 52% in the first quarter of 2001, Ericsson pulled out of manufacturing in 2001 and teamed with Sony for new product development. The last reason is the impossibility of following competitors in a price war. For instance, in 2001, Idaho-based Micron Electronics exited the PC business, because the price war launched by Dell had reduced gross margins and was draining its cash reserves.

In any of these three cases, the company is better off if they anticipate these changes and are in a position to launch a new generation of products.

The high-tech world is filled with failed companies who could not or did not know how to adapt fast enough.

This decrease in sales then causes manufacturing overcapacity and sinking profits. A decision has to be made, though cancelling a product is never easy. Besides a company's sentimental relationship with a product, certain customers might want the product to be continued because it perfectly corresponds to their needs and because they use it regularly. For example, mainframe computers have been on the market for more than 50 years, and face competition from HP upper-end models that have "mainframe-like" capabilities and 64-bit Sun Microsystems servers, which can perform many of the functions of mainframes at a fraction of the cost. Still, many customers praise the reliability, security, and adaptability of the refrigerator-sized machines. In 2002, IBM made money with its mainframes, but with revenue down 16% from the previous year, Big Blue decided to revamp its product line. They introduced a 64K-technology for its new zSeries, a move that was not made by its direct competitors, Amdahl and HDS. In 2002, aiming at the 1,500 high-end customers running large data centers who make up the top 5%–10% of the installed mainframe base—including major phone companies and financial services firms—IBM launched the T-Rex for the average price of $1 million.

Selling a declining product is always costly, because the company must produce special series, maintain a parts inventory, and keep technical and sales specialists. An interesting solution is to sell a line of declining (but profitable) products to a company that wishes to continue these products for a certain market, like when Thomson sold its medical electronics activity to General Electric or DEC sold its database to Oracle.

However, sometimes lame-duck products have to be interrupted. That was the case, for example, of Sega, which killed its hardware console game, the Dreamcast, because it was no longer successful and profitable enough, compared to Sony's and Microsoft's competing products. Once the decision to phase out a product has been made, it is the marketing' department's responsibility to plan, in close cooperation with other involved services, the exact date for the last sale of a product. The goal is to allow sufficient time to convince customers to change their current product for a new, higher-performance product by using attractive sales terms to facilitate their decision.

## 6.4 Summary

In order to match products to customers needs, marketers must understand the three dimensions of a high-tech product or service: its essence or basis for legitimacy; its physical attributes (characteristics, brand, level of quality); and the complete shell, including the related services and complementary products. Every dimension must be handled by the product manager in the scope of the marketing mix development.

The essence is the product's raison d'être and the product manager must make sure that the positioning will reflect this essence, matching a need that

his or her product can satisfy. He or she must develop the product's characteristics while improving the product according to customer expectations and perceptions of the product through design. The success of a product relies a lot on an effective branding strategy in order to make the product closer and attractive to the customer and to accelerate its acceptation by the market. Also, the product's quality should be given extra attention because a defect could damage the reassuring image of the company. Finally, the product manager must manage the total offering of the product in order to maximize the value delivered to the customers. This product's shell includes not only the services—such as delivery installation, after-sales, or financial services—but also complementary products, which must be managed synchronously with the product itself.

A product usually fits in a product range or a product platform that must be scrutinized continuously so that it can be extended or reduced appropriately, according to changes in markets, environment and/or technology. In high technology, very dynamic companies do not hesitate to market new products that "cannibalize" existing products, but dynamism is not free from financial and sales risks.

Finally, many marketing decisions vary according to the product's position in the product life cycle. Launching a new product is probably the most important job for the product manager of a high-tech firm, because it happens so frequently compared to traditional industry. The analysis of successful product introductions shows that several strategies are possible and can be executed at one time. The sales growth stage forces the company to anticipate competitors' moves and to adjust prices, promotion, and distribution of the product accordingly. High-tech marketing must focus on growth and is less interested in a product's maturity and decline stages, where there is still money to be made but with fewer players and usually at decreasing profit. However, during these stages, the firm can prepare to introduce a product's successor to the market.

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CHAPTER

7

# Distributing and Selling High-Tech Products

Contents



The greatest technology is useless if it cannot be sold. Indeed a smart distribution strategy has been one of the key success factors for many of the high-tech firms that managed to survive and even thrive during the recent economic downturn. In that matter the success of Dell [1], Logitech, eBay, and Cisco Systems—among others—illustrates the fact that only when customers are purchasing a product does it ultimately succeed, indicating that the product meets those customers' needs or wants.

Decisions about marketing channels are among the most crucial decisions facing marketers [2]. The first decision is to choose how to balance push and pull marketing. A push strategy means that the different channels will promote and sell the product to the customers. A pull strategy relies on advertising and promotion directly to the customers motivating them to come and ask channels for the product. Usually, a push strategy makes sense when brand loyalty is low, when the choice of the product is made in the store. A pull strategy is best when customers choose the brand before going to the store, because of a strong brand loyalty or a high involvement for the product.

The push/pull decisions have a significant impact on the other elements of the marketing mix, as well. The communication strategy will be different if a company decides to go directly to the consumers, as opposed to going through various intermediaries. Similarly, the pricing strategy will be affected by the selection of distribution channel. One may estimate that the distribution channels account for 25% to 40% of the retail price of goods and services in high-technology businesses, while the sales channel represents between 15% to 35% of the final sales price for industrial products. Consequently, distribution channels managed efficiently can have a significant impact not only on sales but also on profit margins.

Channels may also have an impact on product design, because some large distributors have enough power to impose their own requirements on their suppliers. Finally, a channel strategy requires a long-term commitment vis-à-vis other partners. Once a contract has been signed with a national or international distributor, for instance, a company cannot back off within 1 day and switch to another channel. Conversely, it takes a long time and experience to build an effective Internet channel or an efficient sales force.

As we shall see in this chapter, if the essence of high technology is considered in the process of creating a strong distribution strategy, its characteristics will impose certain priorities and choices in the selection of the various channels [3], as well as in the effective management of those different channels [4]. In addition, we dedicate a specific section to the management of a proprietary sales force, which is a very common characteristic of B2B high-tech firms.

## 7.1 Selecting distribution channels for high-tech products

Selling a good or a service requires the combination of three distinct channels: a sales channel, a delivery channel, and a service channel. Those channels can be joined together or can be discrete from one another. For instance, successful direct marketing firms employ the Internet, the phone, and mail as sales channels, express mail services as the delivery channel, and regional maintenance people as the service channel. Those firms integrate all the information about customers obtained through those different channels thanks to sophisticated customer relationship management software programs (previously introduced in Section 3.3), in order to develop a complete overview of customers' needs, wants, and requests.

For each of those three channels, the strategic decision always will be between using a direct (in-house) channel, belonging to the firm, or a third party indirect (outside) channel, or a hybrid solution combining the use of direct and indirect channels. This comes at a time when new channels like the Internet and on-line services continue to emerge [5], and new management tools, like data networks tracking in real time the inventories of all distributors in a market, have combined to speed up the evolution of more traditional channels.

As a matter of fact, the majority of the high-technology companies use their own sales forces to sell products directly to customers. However, the most successful organizations also count on other distribution channels in order to reach all the customers of a targeted market segment in the most efficient way [6]. Today, for instance, value-added resellers, system integrators, and distributors are becoming more prominent in the distribution of electronic and telecommunication solutions. For instance, Cisco Systems depends on its 35,000 partner channels for more than 90% of its revenues [7].

Selecting a distribution channel is very important because it can make or break a product, since distributors are part of the reinforcing loop leading to increasing returns, as seen in Chapter 2. Inasmuch as their revenues depend on the size of the market they can serve, marketers tend to concentrate on the solution that appears to produce the most potential buyers. For instance, in addition to the application developers, distributors have been a major force behind the success of Microsoft Windows and the decline of Apple Computer.

Companies must continuously reevaluate their distribution choices to maintain the most efficient networks. Take the case of Logitech. Today retail outlets account for 85% of Logitech's sales, while just 15% stem from Original Equipment Manufacturer (OEM) partnerships. However, until the late 1980s, it was the opposite: The OEM business outpaced retail and the company believed that its retail business would soon die, because every PC would be sold with a mouse. In contrast, OEMs figured out that PC prices were key for consumers, thus they kept up distributing PCs with standard keyboards and mice. Consequently, Logitech stuck with its retail business providing them with products slightly ahead of those sold by its OEM partners, such as optical wireless keyboards and mice.

Five selection criteria can assist a marketing manager in his or her channel-design decisions: the size of the market, the cost of the distribution network, the type of product to be marketed, the degree of control on the distribution channels, and the channel's flexibility.

### 7.1.1 Channel-design decisions according to the size of the market

The size of the market and the variety in customer profiles often justify the use of indirect distribution channels so as to eliminate gaps in market coverage. This is even more important for high-tech products, especially when they are entering the growth phase at full speed, meaning that they try to reach the majority of mainstreams customers, which make up the bulk of the market. At that time, it is necessary to add channels and even sometimes to switch from one category to another [8].

The computer market, which unquestionably follows this pattern, has gone through four characteristic phases. During the first phase (the 1950s), the systems were sophisticated and potential customers were few; this corresponded to direct sales through contact between sales engineers and customers. From the 1970s on, the arrival of minicomputers and the increased number of users led to the development of external distribution channels, usually in the form of OEM, which added specific applications to computers before the actual sale.

The development of microcomputers during the 1980s led to a greater use of distributors, who became the key success factors for Apple and Compaq. Similarly, the popularity of microcomputers brought about the development of direct marketing. Dell was the first company to sell its computers directly by mail order without any physical intermediary and has since been imitated by a score of other firms.

Since the onset of the 1990s, large computer firms that want to reach a greater variety of market segments have to manage different marketing structures. These companies sell some of their smaller products, such as servers or PCs, through authorized dealers, establish marketing agreements with distribution chain, such as Comp USA, Computown, or U.K.-based Tiny Computers, and are in contact with dealers in the used computer market. For consumer goods such as MP3 players, digital cameras, or PDAs, vendors such as HP, Samsung, and Sony also use electronics retailers. Major electronics retailers in the United States are Best Buy (500 stores), Radio Shack (5,300 stores), Musicland (1,100 stores), Tweeter, and Ultimate Electronics.

Sales can also be made directly from computer to computer using electronic data interchange (EDI) or the Internet, which both are experiencing strong growth.

Though worldwide market estimates vary significantly from one institute to another as shown in Table 7.1, clearly on-line B2B is bigger than B2C. Today it can be estimated that e-commerce represents 12% of revenues for telecom and technology companies. For instance, the Cisco Systems and the HP Internet sites allow prospective business customers to search for products and services, review the specifications of Cisco or HP machines, and contact sales representatives to place orders or even order directly through the Internet. Similarly, Oracle Corporation, the leading database software vendor, now distributes a new product over the Internet, as well as through physical channels. In the consumer business, Dell has implemented a direct order system through the Internet, a practice imitated by Apple Computer.

The rise of e-marketplaces has spurred the growth of on-line B2B, because this is where buyers and sellers could meet to procure products through on-line catalogs, auctions, or direct exchanges. At the outset most of the e-marketplaces were public or driven by consortia, such as Covisint or Supply On in the automotive industry, Aeroxchange or Exostar in the aviation industry, or consortium-led E2open and Converge for the high-tech industry.

However, e-marketplaces are now more frequently private, functioning by invitation only and focusing more on process than price. In fact, because partners on a private exchange already know each other they can share crucial aspects of their business more efficiently: information, production

**Table 7.1** Estimates about the Worldwide B2B E-Commerce Volume in 2003 (Millions of Dollars)

| *B2B* | *Dollars in Millions* | *B2C* | *Dollars in Millions* |
|---|---|---|---|
| e-marketer, February 2002 | 1,409 | e-marketer, February 2002 | 250 |
| Jupiter Research | 2,940 | Merrill Lynch | 1,317 |
| Computer economics, June 2002 | 1,853 | Goldman Sachs | 1,392 |

planning, inventory management, and other supply chain processes, as well as auctions. Firms like IBM or Sun Microsystems have bought a billion dollars of computer hardware components through private exchanges. More than 30% of Fortune 2,000 companies had set up their own private exchanges in 2003 and the trend is accelerating, according to AMR Research.

In B2C, on-line markets provide better visibility of what consumers are buying, when they are buying it, and from whom they are buying it; best of all, they bring this information instantly to marketers. Some firms such as Nedstat, NetIQ, SteelTorch, and Red Sheriff are providing marketers with real-time information about what, when, and where customers are buying. In a way, those firms are the Nielsens of the Internet. On-line businesses also provide better margins since on-line commissions tend to range from 5% to 10% of sales according to the category of the goods [9].

On the other side, privacy concerns may impede this new customer visibility. In the United States, Microsoft was compelled to halt its automatic downloading of information about user system configurations as part of the process of registering from Microsoft Network. In France, getting electronic information on consumers or businesses is severely restricted by law: Anyone always has the right to see the content of the information stored and may refuse to have this information used for business purposes, such as being listed on a customer database.

Figure 7.1 illustrates and summarizes this development of channel-design choices and its consequences in terms of the organization for a major computer vendor. The increase in channels parallel the computer technology life cycle as much as it is necessary to reach more mainstream customers in the early or late majority. The problem with running so many distribution channels is that they overlap on customer reach and, as a consequence, risk conflicting with each other. The solution for avoiding such a difficulty is to differentiate products and tailor margins to distinct retail channels, like Packard Bell NEC has done. In 2003, Packard Bell NEC introduced a distribution plan, dubbed "NEC Now Program," allowing more than 250 qualified resellers and Value Added Reseller (VARs) to deliver notebooks and other products directly through direct access to NEC's build-to-order manufacturing plants. The different channels are not competing because customers pay the same price, whether they purchase direct or through resellers.

### 7.1.2 Channel-design decisions according to the cost of the distribution network

Besides the size of the market and its related volume of sales, the second selection criterion is obviously cost. Not only should the absolute value cost be considered but also the cost per customer in order to evaluate the profitability of different choices. The estimated sales volume can indicate the most appropriate channel (see Figure 7.2). Actually, the use of indirect distribution means lower fixed costs than the use of direct distribution such as a sales force or the Internet; however, variable costs will increase more

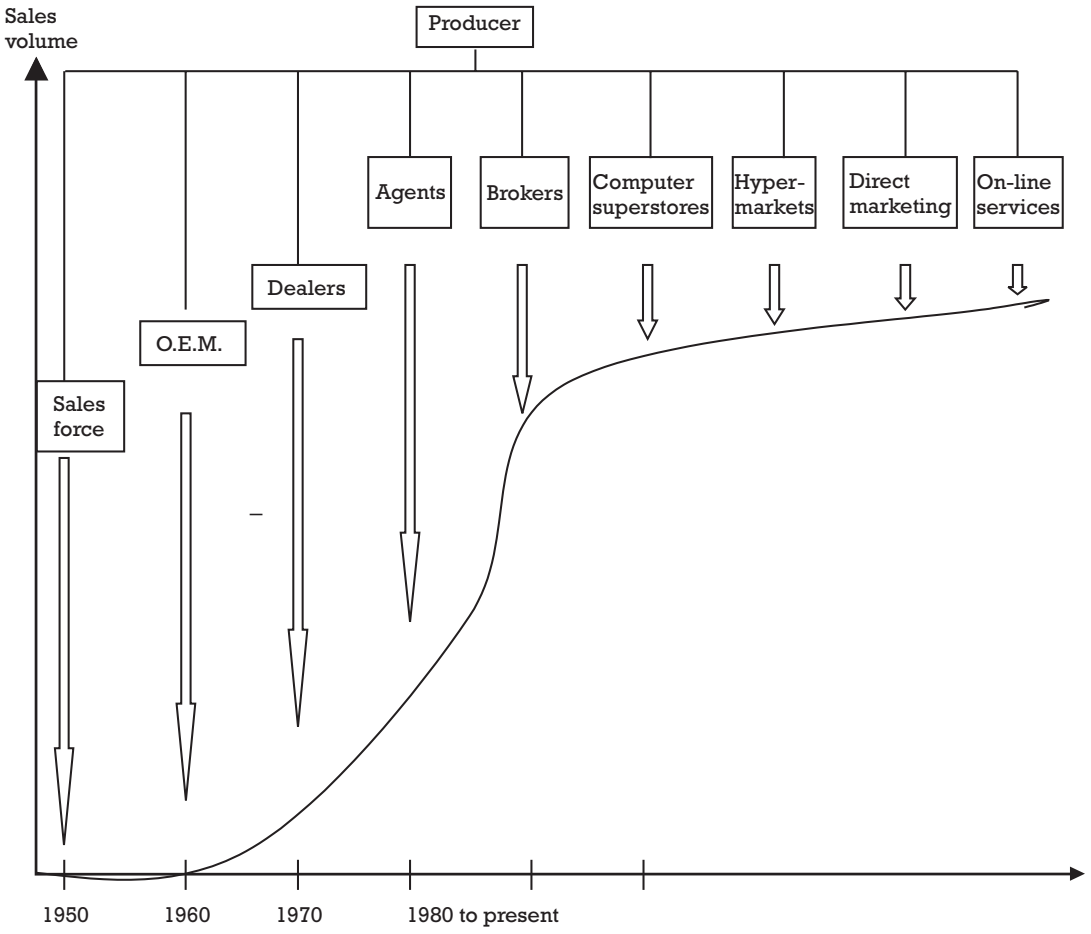


**Figure 7.1** Evolution of distribution channels for a major computer vendor.

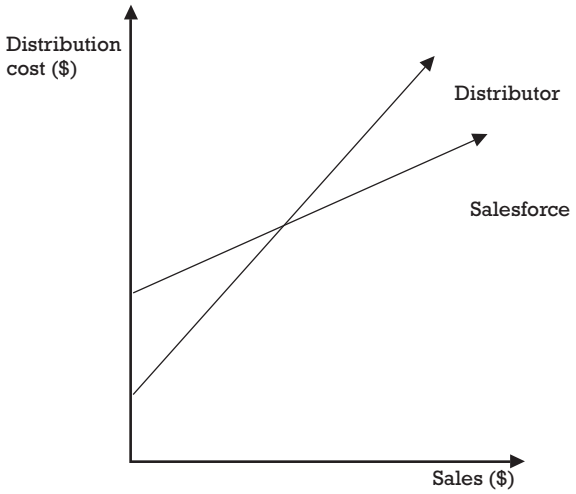


**Figure 7.2** Selling or distributing: profitability analysis.

quickly because a distributor's payment represents a percentage of the total sales revenue. An instructive example is the evolution of Dell and Gateway distribution strategy, which successfully pioneered a direct "build to order" model when the traditional PC vendors such as IBM, Compaq, and HP were relying on an indirect "resellers" model.

In 1990, Dell decided to add "resellers" to its direct-sales channel in order to boost growth. Dell PCs were distributed through retailers such as BestBuy, SoftWarehouse Superstores, Wal-Mart, and Staples. In 1994, the company decided to pull the plug from the indirect channel, after considering its associated cost and the reduced gross margin. On the average, the annual selling, general and administrative (SG&A) expenses for running one retail store total about $2 million.

Gateway made a different move. In 1996, it decided to create its own retail chain, Gateway Country Stores, with about 250 stores in addition to its direct channels. The rational was to make customers more comfortable with purchasing PCs while offering the best presales and postsales services.

Very quickly, the cost of its strategy had a direct impact on the total SG&A expenses of Gateway, while the volume did not grow as fast as the direct channel. Both sales and profits suffered, especially compared with Dell, which was at the same level as Gateway in 1996 and had made a clear difference in 2001 as shown in Table 7.2.

### 7.1.3 Channel-design decisions according to the product characteristics

High-technology products can be divided into two categories: nonstandardized products and standard products. Nonstandardized products require a direct sales force. Because these products are manufactured on request for a

**Table 7.2** Evolution of Dell Versus Gateway Revenues and Operating Income

| | | *1994* | *1995* | *1996* | *1997* | *1998* | *1999* | *2000* | *2001* | *2002* |
|---|---|---|---|---|---|---|---|---|---|---|
| Dell | Net sales (dollars in millions) | 2,873 | 3,475 | 5,296 | 7,759 | 12,327 | 18,243 | 25,265 | 31,900 | 31,200 |
| | SG&A (percentage of net sales) | 14.7 | 12.2 | 11.3 | 10.6 | 9.8 | 9.8 | 9.4 | 9.8 | 9.6 |
| | Operating income (percentage of net sales) | –1.3 | 7.1 | 7.1 | 9.3 | 10.7 | 11.2 | 9.1 | 8 | 7.2 |
| Gateway | Net sales (dollars in millions) | 2,701 | 3,676 | 5,035 | 6,294 | 7,468 | 8,965 | 9,252 | 5,937 | 4,171 |
| | SG&A (percentage of net sales) | 8 | 9.7 | 11.5 | 12.5 | 14.1 | 13.8 | 16.7 | 34.1 | 25.8 |
| | Operating income (percentage of net sales) | 5.2 | 6.8 | 7.1 | 2.8 | 6.6 | 6.5 | 5.5 | –19.9 | –12.3 |

particular customer, personal contact with the users is necessary. The sales force has to be very knowledgeable about the product and its application, to help customers understand and employ the product.

Standard products justify the use of external distributors. These products have well-defined characteristics; products such as a computer memory or a standard microprocessor are sold in large quantities and at unit costs much lower than those for nonstandardized products, justifying the use of distributors.

For products that are neither entirely standard nor truly nonstandardized but rather in between these two categories, a marketing channel should be selected depending upon the technical complexity of the product and the need for customer service depending upon the distributor's ability.

On one side, if a company does not have enough resources to provide any customer service, it should depend upon its distributors. On the other side, if the distributor is not able to perform customer service, the product's or the technology's quality image can be seriously jeopardized, which in turn can challenge an entire marketing strategy. It is said that Michael Dell started Dell Computer to sell PCs directly by phone to consumers after he strove to buy PCs from dealers who knew less about computers than he did. A failure in the PC distribution channel gave birth to one of the most formidable new entrants in the PC industry.

This is one of the reasons why Apple Computer changed its channel distribution strategy in Europe at the end of 2002. Apple changed the margins that it was offering dealers. It reduced the basic margin of small, independent dealers from seven to 1% or 2%; at the same time, it significantly raised the margins for large dealers providing customized solutions, demo facilities and after-sale support with a well trained staff and third-party products stocks. Apple's goal was clearly to enhance "the development of the best possible experience for our customers" according to Mark Rogers, Apple U.K. director.

### 7.1.4 Channel-design decisions according to the degree of control over a distribution network

Some channels decisions are dictated by the bargaining power of the company. Actually some distributors are "open" and willingly share their customer and price lists as well as any other information about customer. But others are so independent that they are unmanageable. They are secretive about not sharing any information and carry out their sales policy as they think best. This has been the case recently in China on the PC market [10]. Many western PC makers have found that most of the local distributors were not able to provide technical support, customer service or maintenance services, contrary to what they claimed. The most capable distributors have quickly been taken over by leading Chinese PC manufacturers, such as Legend, which had cultural advantages. Furthermore, when a distributor is successful, it has a financial interest in being secretive and in handling its own marketing policy.

However, it is potentially dangerous for a manufacturer to see a growing barrier between itself and its market because it would miss out on customer feedback. Furthermore, its technology can be copied by or through the distributor, which the manufacturer could fail to realize until the distributor cancels an agreement. For instance, Legend, the leading PC maker in China, started in 1994 as a distributor of foreign PCs. Six years later, it moved to making and selling its own technology and quickly took control of the booming Chinese market. By 2003 Legend had more than 27% market share, $3 billion revenues, and more than 3,500 sales points.

Ultimately a strong distributor may become a direct competitor. For this reason, in July 2002 HP and then Cisco in October 2002 ended their distribution agreement with Dell. Besides being a distributor for their digital projectors and communication switches, Dell had developed its own line of low end products in the two previous years. Some of those products were competing head to head with high end (and profitable) HP or Cisco equipment, especially in the large business, corporate customers segment.

### 7.1.5 Channel-design decisions according to the flexibility of the distribution network

A distribution contract is often specifically for a fairly long period of time. A consumer electronics manufacturer could not easily change from a specialized sales force to direct sales through superstores.

However, recruiting and training a network of distributors takes time and requires an investment since this network cannot be put into effect immediately. In the high-technology-product world, product ranges follow each other at a high rate and market segments are constantly changing, which makes establishing a distributor network even more difficult.

In the telecom or the computer industry, distributors have replaced a traditional sales force but are now threatened by direct marketing channels, such as phone or the Internet. However the most successful marketing companies do not throw out the baby with the bath water. They know that it takes time and energy to set up, train, motivate and manage a channel. Consequently they try to extract the maximum value of their different channels instead of turning one off, as soon as it is seems to be less effective.

For instance, in 2002, Cisco initiated some major changes in its distribution strategy in Europe, as well as in Middle East and Africa. Among its distributors, Cisco differentiated two different categories and created 7 Cisco Distribution Partners (CDP) and 10 Cisco Authorized Distributors (CAD). In that two-tier scheme, CDPs only have a direct purchasing relationship with Cisco while CAPs procure Cisco products from a CDP and no longer directly from Cisco. Except for procurement, CDP and CAD have a direct relationship with Cisco for information, service and expertise.

Such an organization actually means that CAD can focus more efficiently on the selling of services and Cisco solutions while relying on CDP for the logistic and supply side. It provide them with much more flexibility, faster

product lead time, no more inventory costs and risks, as well as freeing their working capital for use in developing their business.

As for the CDPs, they get a better use and profitability from their fixed cost infrastructure through larger shipments. They also get the opportunity to generate new revenues on activities such as configurations, staging or private label; finally they increase their customer base to include CAD. By offering win-win solutions and maximizing the synergies between the different categories of distributors this program has been extremely successful. It has allowed Cisco to increase its market share so far.

## 7.2 Managing distributors of high-tech products

The decision to sell products through a distributor is only one step in the process. A distributor must be selected, directed, and evaluated. Again, the characteristics of high technology impose slightly different criteria compared to those of more traditional products.

Every company that is looking for a distributor judges that distributor on its sales experience, financial situation, image toward customers of the target markets, the number and quality of its sales people, and the quantity and brands of its current product portfolio. Moreover, since high-technology products have a high degree of innovation, a distributor must have unquestionable knowledge about a product to be able to respond to customer questions. Due to the frequent and rapid changes of high-technology products, a distributor must also be able to guarantee almost immediate availability in order to respond to demand at the right time. A distributor who sells technologically outdated products will see his customers go to competitors translating into lost sales. Usually, lost sales are largely underestimated. One computer manufacturer approximated its lost sales at 5% to 10% of total sales, eventually to realize that they were actually between 15% and 20%, almost two or three times its original estimate.

Furthermore, obsolescence is especially quick for some high-technology solutions with high variable costs, like computers or consumer electronics. Cellular phones or PDAs, for instance, may lose as much as 10% of their value each month; so after 7 months, their value is more than halved. Thus, today major cellular phones or PC distributors have negotiated the right to return unsold products to the vendor at no cost.

Unquestionably, the best solution for restraining the impact of lost sales and obsolescence is to gauge them by running periodic customer and distributor surveys. Consequently, inventory and order management for high-tech products is obviously more sophisticated than that for standard products and is fairly similar to the management of fashion stores. For example, one high-tech company received first-month orders for its latest products surpassing its manufacturing capacity by more than 25%. It decided to adapt by increasing both component stock and production. However, 3 months later, orders plummeted, creating an enormous inventory. The product ended up being a flop. What happened was that tight initial

capacities had actually boosted early demand for phony orders placed by distributors concerned about short supplies. Then, products did not move because the market was not buying, but the producer did not figure that out and wrongly decided to expand production on the sole basis of first impressions. Such a situation explains why the most successful B2C high-tech companies have adopted the "build to order" model. By doing so, they have managed to cut their inventory cost dramatically and boost their cash flow and profitability while improving the satisfaction of their customers.

Finally, the high-technological content of these products calls for technical know-how and a professional organization. These two requirements are often important in assuring the quality of customer service. Manufacturers who are looking to engage distributors often stumble on this last criterion because customer service entails different skills than sales.

However, customer service is a basic necessity for succeeding in high technology because customers must be assured of quality products that confirm their confidence in the manufacturing company. The best marketing plan for a highly technical product can be instantaneously ruined by a distributor whose customer service does not respond quickly and correctly to the frantic telephone calls of a customer demanding the repair of his or her DVD reader, digital camera, or 3G cell phone. Usually, the solution is to train technicians to make them more competent, but if their compensation is based on the quantity of services delivered rather than the quality, extra training may backfire and create a negative feedback cycle, as illustrated in Figure 7.3, because it erodes their working time and puts them under time pressure. Accordingly, technicians will make a slapdash diagnostic, falling short of detecting problems early and, hence, leaving customers more unsatisfied than before. High-tech products require that distributors make use of more and better marketing, financial, and human resources in order to respond efficiently to these additional constraints of high technology.

Manufacturers, however, must also devote time to helping distributors assume these additional responsibilities. Every company must keep in mind that an intermediary is an independent company and more a customer representative than a manufacturer's "puppet." An intermediary is interested

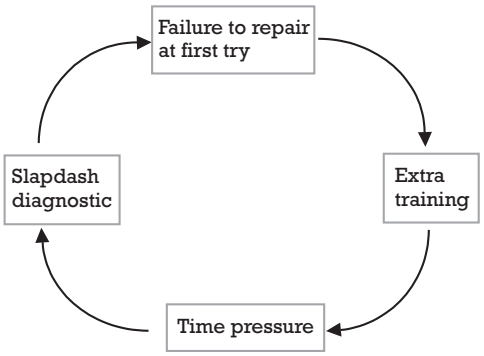


**Figure 7.3** A negative feedback loop in distributors' training.

in selling products that customers will buy from it and, hence, in making it a profit. For example, a high-technology company like Hi-Shear Industries, an American subsidiary of the French group Lisi Aerospace, learned this the hard way. Originally, in the military aerospace business, Hi-Shear exploited its original technological know-how to build a new activity in automotive braking cable and fastener. Contrary to the military markets, automotive OEMs demand suppliers to significantly decrease their prices as long as volume is building. Thus, when Hi-Shear thought it had its distributors locked in the same way as its military customers and tried to increase its penetration prices, the distributors reacted strongly and almost put them out of this business. Thus, Hi-Shear had to adapt quickly to its new distribution channel.

A distributor is not instinctively sensitive to these requirements of technical knowledge, optimal product management, and quality of service but should be made aware of different incentive programs [11]. A partnership should be set up with marketing objectives, inventory management, and

**Case Study: Cisco Distribution Program**

In 2002, Cisco introduced two new initiatives to make business easier for its distributors and its corporate customers.

Before that time, Cisco provided education and information to channel partners but left them alone in the deployment at the customer's location. The Partner Consultative Support program setup in 2002 included:

- A new Web portal for partners;
- A leasing program for demonstration lab equipment;
- A process to call on Cisco engineers to help out with deployments of new technologies at customer sites;
- A more efficient system for setting up and renewing equipment service contracts.

A second program, labeled Services Management System (SMS), aimed at the simplification and the automation of the process of getting a support contract. Up to that time, customers received a packet of papers with a new product; they had to fill them out and return them in order to register the product before getting the service contract. With the SMS programs, customers but also resellers and product distributors can sign on and renew service contracts on-line. In addition they can trail the life cycle of a service contract on-line from purchase date through contract renewal.

Question 1: What are the benefits of those programs for Cisco vis-à-vis its distributors?

Question 2: What are the opportunities and risks of those programs for Cisco distributors?

promotional activities that are established by both parties, taking into account each other's needs.

It is the responsibility of the marketing and sales departments [12] to monitor and manage distributors, organize training sessions for new products, present previews of new technologies, plan sales promotions, and verify that distributors' technical questions are answered by the company. This entire operation is usually secured by a contract in the form of a joint marketing plan (JMP) or common marketing plan (CMP), and it means that creating and maintaining a successful partnership requires resources.

The final step is to monitor distributor performance, and clearly sales quotas as the only criteria do not suffice in the high-technology industry. A marketing manager must monitor the level of inventory and its rotation, the quality of customer service operations, and the training level of salespeople and must follow up on sales promotion campaigns. A marketing manager must also ensure that the distributor has correctly reported information on the customer, price, and product according to a previously determined format. This useful data could be needed to prepare new product launches. The best distributors can only be rewarded if they fulfill all criteria with an exceptional effort.

Figure 7.4 illustrates the ideal ranking of skills that the marketing managers of successful high-tech firms expect from their distributors. Market knowledge is clearly considered as the most important skill, which comes before good image, active selling or maintenance capability.

One last word about organization. Due to the dramatic impact of the distribution channels on the revenues, the profitability, the customer satisfaction or the manufacturing activity, the smartest high-tech firms always make sure that the responsibilities for channel management belong to upper level sales managers [13].

## 7.3 Selling high-tech products

In 2003, Boeing beat Airbus and won a $4 billion contract with Air Tran Airways, to supply at least 60 jet planes. The same year, Airbus signed a $20 billion deal with NATO, its largest contract so far in Airbus history. In January 2003, IBM finalized a $5 billion 7-year outsourcing agreement with JP Morgan Chase, its largest-ever contract. In April HP signed a $3 billion outsourcing deal with Procter & Gamble. Here are some examples of recent mega-deals for high-tech products or services. The sheer size of those contracts underlines the importance of the capacity of some successful high-tech firms to sell complex and strategic solutions to some very large customers.

Indeed, all the successful high-technology companies that sell to organizations or businesses do rely on a direct sales force. Most notably, in order to improve their relationship with their main customers and to compete more effectively, they have set up key account management structure and programs [14]. Instead of assigning one sales representative a geographic

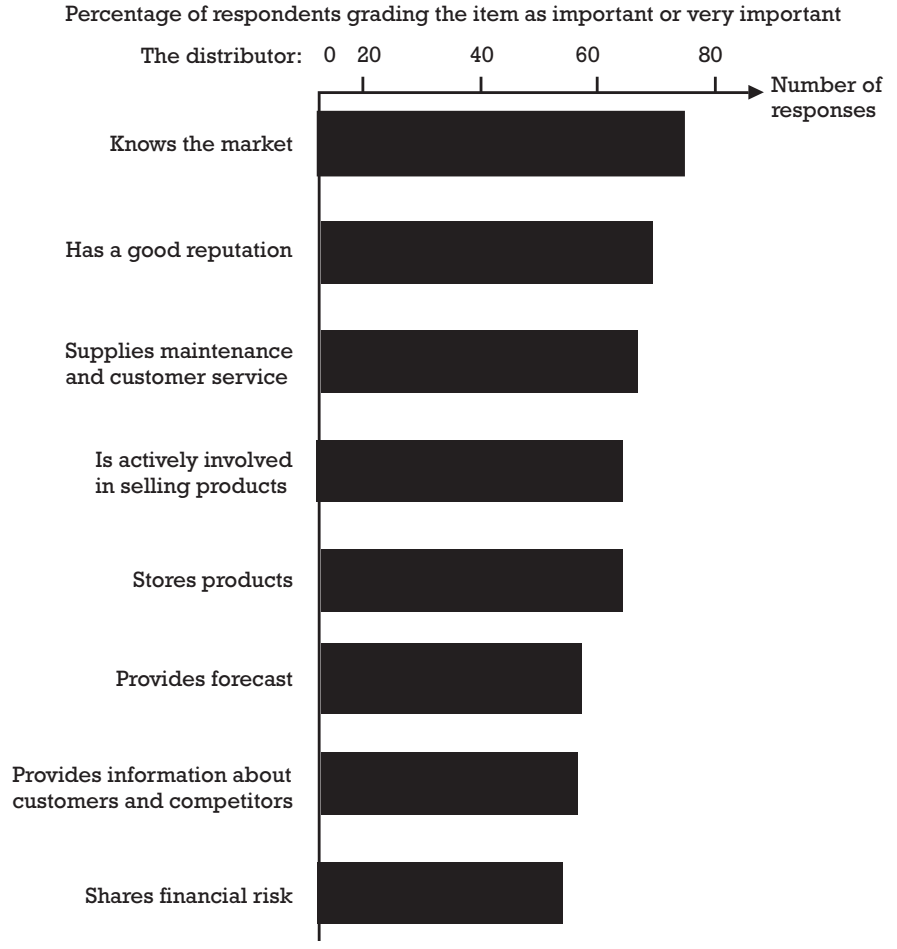


**Figure 7.4** The perfect distributor for high-tech products according to marketers. Percentage of respondents grading the item as *important* or *very important.*

territory, successful high-tech firms have dedicated their representatives around a few key large accounts. Those key account managers talk to the various contacts within the large organization, from users to top management, and represents the complete capabilities of the supplier as well as the main/unique interlocutor. Winning key account managers possess very high level selling skills and experience [15].

However, setting up a direct sales force does not translate automatically into extensive market coverage. Indeed, in many high-tech companies, one may estimate that roughly 20% of personnel work in sales, of whom 25% are salespeople spending about 25% of their time face-to-face with customers. That means that such companies spend a little bit more than 1% of their time dealing with customers, and this does not include the time spent at customer locations by maintenance people, which may represent up to 8% of company time.

Consequently, to be truly effective and productive, a direct sales force must be run very professionally to leverage its various activities. To do so, some firms have even put a code of professionalism in place.

Though technology is adding complexity to the selling process [16], basic sales principles can be applied, but require some optimizations related to the characteristics of high-tech products. Personal selling consists of three main activities: prospecting, negotiation, and customer follow-up. Prospecting is performed for new customers; negotiation should lead to a contract or the achievement of a business goal; customer follow-up assures that the customer is satisfied and that a long-term relationship can be maintained. One of the beauties of a good follow-up process is that it allows skipping the prospecting phase for any new purchase or RFP. Indeed, if a customer is satisfied, he or she will favor an existing trusted supplier when considering the purchase of new equipment or services. On the other side, if he or she is not happy with the supplier he or she will turn automatically to other vendors and the sales representative will have to embark on a new, sometimes risky and definitively time consuming, prospecting phase. All the best sales representatives know that the time they are spending in follow-up is not wasted even if it is not immediately followed by bookings and orders. They see the nurturing of their customers' loyalty as an investment for the future.

In addition to these three main activities, every salesperson relies on support activities during the entire sales cycle; he or she must communicate in order to maintain contact with the customer; he or she must know how to manage all data received about customers, competitors, and the market; and he or she must secure logistics, from meetings to the installation of a product at the customer's location. All these activities are combined to form a sales chain whose sole purpose is to succeed in completely satisfying the customer (see Figure 7.5).

High-tech products are sold according to this general model. As we are going to see, early prospecting is necessary to understand, from the beginning, what the market wants. The high degree of innovation calls for teamwork during the negotiation but also during the rest of the entire sales cycle. The high technological content requires a high level of service: The sale of a high-tech product does not end with the signing of a contract; installation, follow-up, and maintenance operations are also crucial. High technology also makes its mark on the salesperson's support activities [17].

### 7.3.1 Prospecting: the importance of qualification and probing

Because high-tech products are very technical, salespeople must start working with potential customers early on in order to influence their technical decision. This is even a greater necessity for systems that are subjected to a bidding process.

Whether dealing with the purchase of sonar, a satellite, a robot, or a missile, a salesperson must identify these plans early on before the official bidding process starts and he or she must work with operational managers to

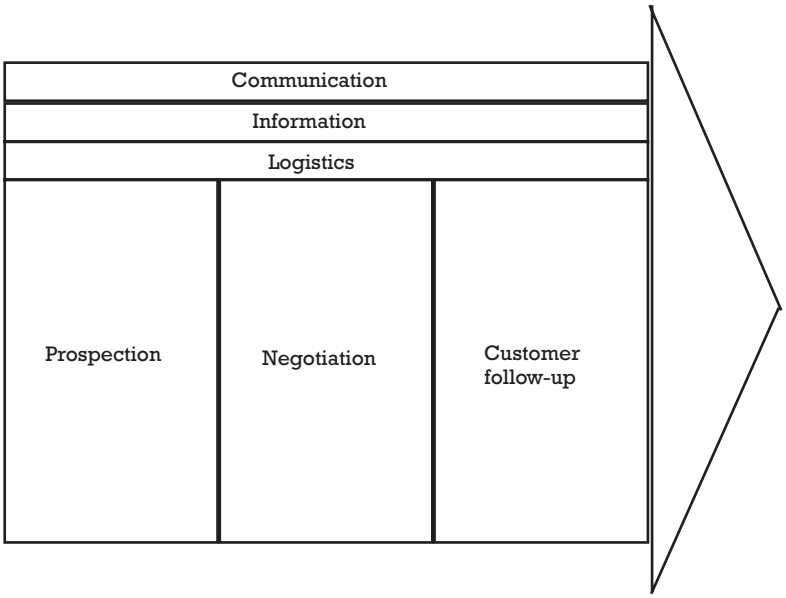


**Figure 7.5** The six sales activities.

guide them in their definition of technical standards. When the bidding process officially starts, it is often already too late. This explains why, for instance, when Brazil wanted to buy satellites, the product description more closely resembled Hughes Aircraft's American satellites than those manufactured by Aerospatiale.

One of the paradoxes of industrial high-tech products or services is that new products succeed each other quickly even though each product needs a long preparation phase and has a longer life cycle due to a better production process. For instance, even though each new model incorporates the latest novelties, the life of a satellite has not decreased: the life of a satellite now averages 13 years compared to a life of 3 to 7 years, 10 years ago; and the sale's life cycle will last between 12 and 16 months before the final order is signed.

A salesperson must know how to manage this time lapse by finding in advance customers who might have a project (and a budget) to which he or she could respond. In order to do so, a salesperson must continuously look into the future and build a customer portfolio by analyzing each customer's and prospect's potential through the use of a qualification checklist (which will be discussed in the next section). This salesperson must sometimes even be able to refrain from selling if optimum requirements have not been met. So the salesperson of high-tech products is not a simple order taker but a true marketing representative who understands customers, can anticipate their needs, and is able to propose suitable products.

In this perspective, listening skills and the mastering of sales dialogue are of primary importance to be an effective sales representative [18]. Indeed, there are still some moments in a negotiation process where it may be

important to play hardball, especially at the time of closing of the sale. However, most of the best sales reps do have a unique ability to ask the questions that get the sales, following the ageless Socratic method [19] permitting the customer to develop his viewpoint and to express its needs, wants, and expectations.

They also know how to qualify the value of a customer or a project in order to spend their precious time on the project or the customer, which offers the maximum value. Indeed, the most efficient and successful sales reps or large account managers are usually those who know exactly how to manage their time and energy and do not waste a moment with customers who are not willing or ready to purchase a solution.

Qualifying a customer is a means of being certain that the salesperson has all the necessary information to make a sale and to evaluate his or her chances of success along five criteria: the client's budget, needs, order and delivery schedule, decision-making process, and attitude toward competitors and suppliers. When any of the information in these five categories is missing, the sales representative must recontact the client in order to fill in the blanks. Negative responses represent additional difficulties in convincing the client to buy. Hence, it is only after this information has been collected that the salesperson can realistically evaluate his or her client portfolio and decides on plans of action. Sometimes, it may be best to turn the sales down because the customer is not good enough [20].

Qualification is indispensable because it corresponds to the "right" questions that exceptional salespeople know how to ask. It is so effective that one may wonder why all salespeople do not systematically use this approach.

A checklist of qualification questions follows.

### Budget

- How will the purchase be financed?
- Is the client ready to purchase or rent?
- Is the client creditworthy?
- Will the client accept our terms of payment?

### Needs

- Does the prospect have a good idea of their needs?
- Do they welcome advice?
- Will a formal and official call for bids be made?
- Can other sales to the same client be foreseen?

### Schedule

- Do we know the exact schedule of the project?
- Is the scheduled order date realistic?
- Is the scheduled delivery date realistic?
- Is the client's schedule in line with ours?

Decision-making process

- Are the more important decision makers in favor of the purchase?
- Is an advisor involved in the purchase decision?
- Do we know the decision-making process?
- Do we know who decides? The financier? The technician? The user? The consultant?

Us

- Do we really want to sell to this client in this market?
- Do we have the "right" products and solution?
- Are we a privileged supplier?
- What is our competitive edge?
- Do we have the support of some of the key decision makers?
- Do we have the references necessary to convince the client?

### 7.3.2 A teamwork approach

During the entire negotiation phase, the technological content of a product as well as the amount of the orders in question and the need to reassure the customer's multiple buyers by answering all questions lead the salesperson of a high-tech product to call upon specialists. The salesperson must show leadership and organizational talents and be able to use either at any given time [21].

Consider the case of a sales engineer who sells a computer mainframe, for instance, such as the $1 million IBM T-Rex (also known as "Galileo" or G8), specially designed for serving demanding applications for large data centers. The salesperson does not work alone in making the sale (see Figure 7.6). First, he or she will call upon production engineers who can explain to the customer, with an emphasis on technical details, the manufacturing process and the product's components. The sales engineer will even organize one or more meetings with R&D engineers who work at different locations. These R&D engineers will explain to the customer, who has promised (in writing) not to disclose this information, the new technologies that will be used for the design and manufacturing of this new computer.

The customer will then meet software specialists if he or she is concerned about the applications or programs that can be run on this machine. In this case, database specialists, network experts, and management-software program gurus (or molecular modeling professionals, according to customer needs) are brought to the customer's location by the sales engineer, who sets up all the necessary meetings.

This computer demands certain specific installation requirements such as the minimum size of office space, heat-resistant insulation, and certain electrical standards. Then the sales engineer will organize meetings with the customer's building service, at which installation specialists will answer

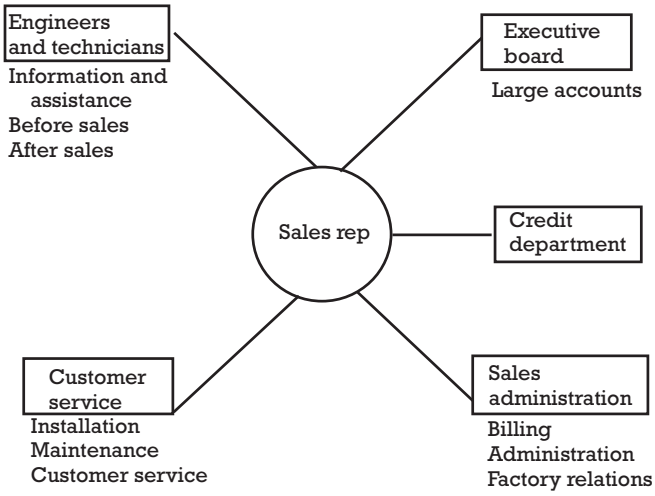


**Figure 7.6** Sales team for a mainframe computer.

questions and examine the location to determine if it is well suited to the machine.

The delivery waiting period now becomes an issue. Usually, the customer wishes to be able to use the computer as quickly as possible. A competitor has possibly already contacted him or her about the possibility of installing the equipment more quickly. The sales engineer asks an administrative manager who is in continuous contact with the company's factories to obtain the best delivery times for this machine.

All that remains is the question of financing. After receiving a price quote, the customer is interested in finding out about possible credit terms. If so, the sales engineer will organize a meeting with the manager of the branch that specializes in financing computers, who will detail the leasing and credit terms.

In some cases, due to the size of the order and the strategic impact of the mainframe solution on the customer's business, the decision will be made at the top level, not only by the MIS manager, but also by the marketing VP or operation VP and/or the financial VP, even sometimes the CEO. In that case, the technical features are less important that the strategic benefits for the customers, in terms of revenues, customer satisfaction, profitability, and security. A good sales rep will have the ability to convince the top decision makers [22]. Sometimes the salesperson will not have enough status/influence within his or her own company to close the deal, and will have to mobilize the top management of the company to help win over the customer.

When a reassured and informed customer finally places an order, he or she will have spoken with at least a dozen different specialists but always under the watchful eye of the sales engineer. Consequently, the sales engineer should be a true leader, capable of explaining to every "in-house" specialist what the future customer is expecting.

### 7.3.3 Customer follow-up

In order for the customer to enjoy the maximum benefits of a high-technology product's potential, he or she should have at his or her disposal training and technical assistance, followed by technical support for maintenance and repair. If not, there is the chance that the product will lose its appeal and its manufacturer will lose out, because the customer suddenly feels cheated, especially if he or she already felt uneasy about a technology that he or she did not always understand.

One of the basic tasks of a salesperson is to know how to maintain the customer's confidence, even after the order has been signed. The salesperson must know how to cooperate with various customer services and, if necessary, take charge of these operations to assure that the company's different departments maintain an impeccable service quality.

However, the salesperson's job does not stop at this point. The salesperson must be able to develop customer loyalty by building a long-term relationship based upon trust. He or she must be perceived not as a salesperson but as an advisor who focuses on responding to customer needs and wants within the company's means. Therefore, the salesperson must keep in contact with customers.

However, this is not always the case. A recent U.S. study pointed out that, during a 1-year period, almost 40% of current customers were never contacted (neither by phone nor in person) by the salespeople of the companies where they bought their products. Many salespeople forget their customer base, even though it could be rich in potential, and instead spend time on unsure prospects.

More than in any other industry, the sale of high-technology products requires a sales representative's consistency and professionalism to break down the barriers of uncertainty and hesitation and to help customers faced with innovation and technology.

To establish a reputation as an advisor, a salesperson must become a market specialist; he or she must understand the customer's business by making use of all available resources. For example, IBM has developed a strategic advising unit for customer service purposes, IBM Business Consulting Services. IBM's sales engineers can call on an industry-focused consultant who will visit customers and meet with the board of directors about their strategic and development problems, competitive analysis, or intermediate planning. The objective is not to talk about computers, which is of little interest to these executives, but to see how the solutions from IBM—hardware, software, and services—can bring a competitive advantage to the company and make it even more profitable and competitive. Accenture, EDS, and HP are offering the same kind of industry expertise, which is a valuable asset for the sales reps or the account managers.

In addition, researchers in the R&D department of the salesperson's company can invite researchers employed by potential customer organizations to visit the firm. Transfers of technical information and perspectives on

future developments often arise at these types of meetings and can contribute to building trust and a productive business relationship.

Finally, a customer can function as a referral source and convince potential customers of his or her satisfaction with a purchase. Research shows that referred sales are a preferred sales method in high technology. A satisfied customer is the best spokesperson to convince a prospect of a slightly frightening technology. This spokesperson cannot be accused of being biased because, unlike the salesperson, he or she does not have a business interest in the operation.

### 7.3.4 Support activities

The importance of a technology also influences the support activities of a salesperson of high-tech products. For communication purposes, the salesperson must translate the overabundance of frequently very technical information in documentation into a language that is understandable to the customer. Concerning information, the salesperson's knowledge is invaluable for the marketing department because the salesperson is in continuous contact with the market and represents the most significant source of information in the absence of truly reliable and updated market studies. In the case of logistics, the salesperson is often the person who coordinates numerous and often complex operations concerning transportation, delivery, and product installation at customer's sites.

Every sales representative for high-tech products must spend time with existing customers to build their confidence in the company, to find new sales opportunities, and possibly to ask these customers to speak about their positive experience to new prospects. Figure 7.7, which is based on interviews that I conducted, shows how much time spent face-to-face with the customer can increase sales in a software firm offering solutions to business customers.

Likewise, sales people can add to the amount of time spent with customers by using several tools [23]:

- Laptop computers and cellular phones to work outside of their offices;
- Automated systems for making proposals, price quotations, and order entries;
- On-line company databases to answer directly technical or financial questions from customers or prospects.

In doing so, sales representatives increase the volume of sales calls and improve the quality of each single call while decreasing its unit cost.

As a consequence, selling high-tech products often demands a high level of competency and, as a result, a higher profile and education compared to other industries. The company should take this into account when recruiting, managing, and evaluating its sales force. More specifically, this means that the company must offer an attractive level of compensation to recruit

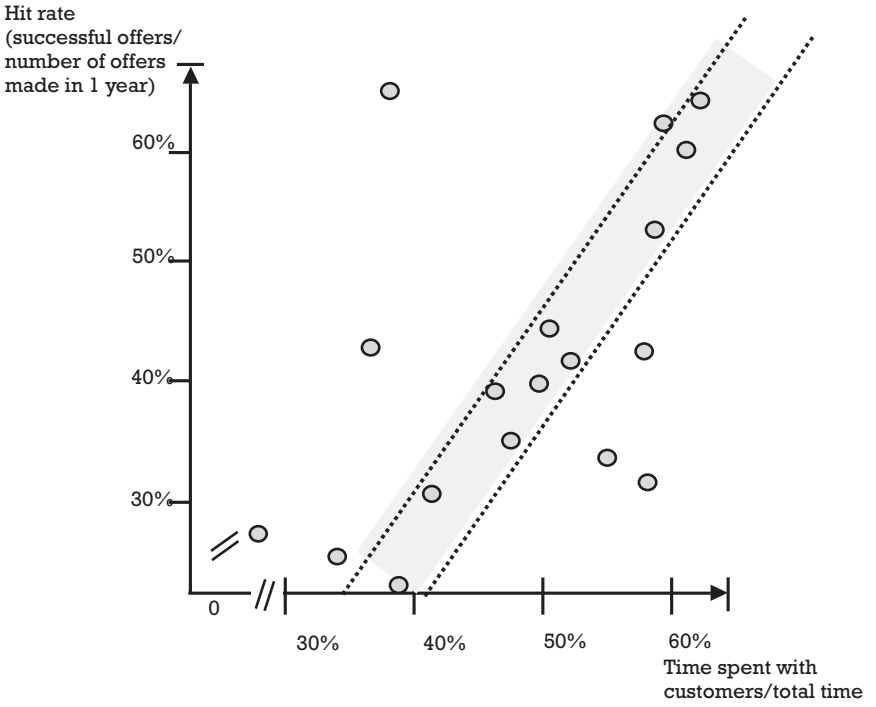


**Figure 7.7** Impact on sales of the time spent face-to-face with customers for 18 sales representatives of a major telecommunications services firm.

interesting candidates. Then, the type of compensation must not only reflect results (orders) but also the need for quality relationships with customers and the desire to remain with the company on a long-term basis.

Many high-technology companies have compensation systems with a fairly high percentage of fixed salary compared to commission (on the average, 80% fixed and 20% commission). Some companies even offer an income completely based upon salary so that salespeople are not tempted to sell just anything to assure them of an income at the end of the month.

Finally, salespeople must be continuously well informed and trained [24] about new products in order to present them intelligently to their prospects and customers and to answer their questions correctly. However, staying well informed about new products is not an easy task, because product catalogues are often drastically changed in the high-technology industry due to the frequent launching of new products. Furthermore, many salespeople merely keep up with products that they already know well and that tend to sell, and propose only those products to their customers. This behaviour impedes new products with which the sales force is less familiar and encourages a dangerous habit.

Consequently, the rate at which new products are announced and the high degree of innovation of many high-technology products require a hefty investment in the training of salespeople, such as in the information systems business where companies invest between 10% and 15% of their

salary budget on training, of which a large part is dedicated to their sales force. This high level of training costs can also be found in other high-technology sectors.

Besides, one of the roles of the marketing department is to supply the sales department with the necessary resources for this training (such as instructors, training manuals, product documentation, and cassettes) to ensure that the messages communicated to the salespeople match the marketing strategy.

### 7.3.5 After-sales market

Apart from improving service and support at the initial startup of machines or systems, industrial suppliers can earn more revenue and profit from after-sales activities.

Indeed, in high-technology business more than in other industries, after-sales activity, that is, supplying spare parts and providing preventive and reactive maintenance for the installed base of customers, is very often a highly profitable business. Nowhere else can a firm so easily find a market where it usually has a commanding relative market share, while demand is stable and even predictable and entry barriers for competitors are high. According to a survey by McKinsey [25], after-sales business accounts for 13% of revenues of electronic systems companies and 8% of revenues of electronic components companies. They contribute to an even bigger share of the total margin, representing 39% for electronic systems firms, and 17% for electronic components firms.

The vast majority of the high-tech firms that managed to grow successfully during the recent economic downturn have developed after-sales services. For instance, in the United States today, Sony has more than 20 service centers for business customers and 10 factory controlled centers for consumers, as well as a Sony Direct Accessories and Parts Center, which can be accessed on-line by consumers. All those centers provide spare parts and maintenance services for all Sony's equipment.

The beauty of those services is that they can double profit margin compared to the profitability of the goods sold especially in a depressed environment [26]. In B2B, after-sales can generate three to four times the turnover of the original purchase during the solution's life cycle, especially for industrial equipment such as aircraft engines where after-sales represent 80% of the net present value versus 20% for original equipment. One must notice the opposite effect for aircraft, where after-sales account only for 30% of the net present value versus 70% for new equipment.

For consumer products, it can be estimated that when managed correctly, after-sales services can generate between 20% and 30% of the total sales. The bulk of the margin does not come from the direct repairs but from spare parts, whose margin can be more than 50%, and support and warranty contracts, whose margin may be above 75%.

For example, in 2002 Toshiba successfully implemented a new electronic post-sales selling strategy for its laptop computers. Whenever a buyer first

switched on a new Toshiba computer a Microsoft/Toshiba registration form popped up and asked if the user would like to register, then requested registration information to create a customer profile. This profile helps Toshiba to decide among five different extended warranty offers. Then the suitable offer was sent to the registrant. When the consumer agreed to purchase the warranty, he or she could do so easily through an electronic form. With this new approach, warranty sales increased 37% and average sales price increased 4% on the first month of implementation.

A very common error is to price those after-sales products or services according to their cost rather than according to its value to the customer, which is usually much higher because it is measured by the cost consequence of its failure.

For instance, the average price of a spare parts order for a communication router is about $600. However, the cost of having an Internet shut down ranges from $10,000 per day for a business or school to more than $600,000 for an e-business vendor such as Amazon, eBay, or Expedia.

In after-sales, the price is less an issue than a consideration here; the key issues are reliability, swiftness of delivery, and availability of repair and maintenance services (see Figure 7.8). Those criteria may be used to segment after-sales customers [27] according to their main requirements, which is exactly what winning high-tech companies do.

Accordingly, after-sales products and services can and should be priced to value whenever it is possible, as we will see in Chapter 9. In addition, after-sales solutions must be designed and marketed to keep out competitors—usually third-party maintenance specialists or customers' in-house maintenance units—because switching costs and convenient alternatives also have a strong influence on the value perceived by customers (see Figure 7.9). For example, a premium price can be charged for a critical component or service with no alternative on the market (pricing to value), but not for a simple part easily available close by (market price or cost + margin price). One needs to add a cautionary note which is that if "price + cost" or "value" is excessive in the customer's eyes, the supplier will be seen as monopolistic; so best pricing should always be perceived as "reasonable."

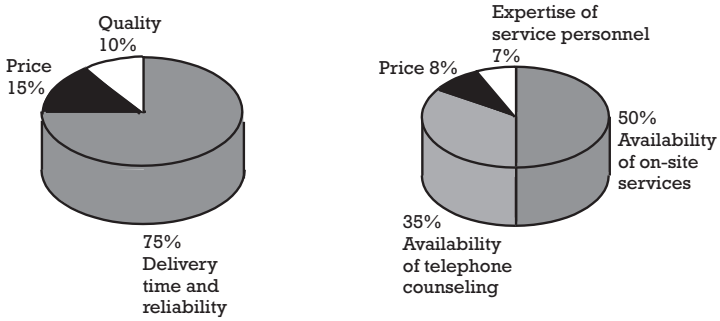


**Figure 7.8** Key buying factors in after-sales for electronic components firms. Percentage of respondents listing factor as highest priority. (*After:* [27].)

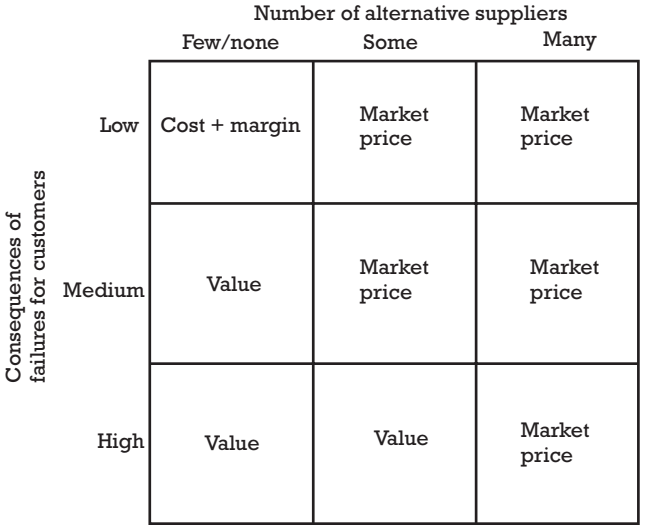


**Figure 7.9** Various pricing tactics for after-sales solutions.

Who should be in charge of selling after-sales solutions? Usually, the distribution channels, either the direct sales force or the third-party distributors, sell the after-sales services directly connected to the initial sale such as transport, installation, warranty, and training programs. However, experience shows that they are no longer interested in selling after-sales solutions during a product's operational life unless they have strong financial incentive to do so. They are more interested in selling new original equipment and services. Accordingly, one solution is to set up an independent organization, such as a service center or an after-sale department with its own marketing and sales organization, dedicated to after-sales solutions.

Clearly, because the after-sales unit may be perceived as a competitor by the distribution channels—direct or indirect—it must not overlap with the sales department when dealing with customers, so as to avoid confusion and conflicts. However, the risks of a conflict of interests are usually limited; especially when the service center can serve local distributors by supplying them with parts that they prefer not to store, or when the booking of after-sales sold to a business customer are also credited to the sales representative in charge.

## 7.4 Summary

A smart distribution strategy has been one of the key success factors for many high-tech firms, which have managed to survive and even thrive during the recent economic downturn.

Marketing channels decisions are very crucial decisions facing marketers [28]. The first decision is to choose how to balance push and pull marketing, because this choice has a significant impact on the other elements of the marketing mix.

Selecting distribution channels for high-technology products depends upon the size of the market, the cost of the distribution network, the product characteristics, the level of control on the network, and its flexibility. Many high-tech products require distributors to make use of marketing, financial, and human resources that are superior to those needed for more traditional products. The marketing manager must therefore know how to select, manage, and evaluate distributors.

When a sales force directly sells high-tech products, preliminary prospecting is needed, followed by teamwork that facilitates a salesperson to call upon numerous specialists, and finally, an emphasis on customer follow-up in order to reassure them of a new technology. The importance of a technology similarly shapes the salesperson's support activities, for communication, as well as for information processing and logistics.

Selling high-technology products often demands a high level of competency and as a result a higher profile and education compared to other industries. The company should take this into account when recruiting, managing, and evaluating its sales force.

Finally, high-tech firms can earn more revenue and profit from after-sales activities since those services can achieve profit margins double that of the profitability of the goods originally sold. In after-sales, the price is less an issue than consideration; the key issues are reliability, swiftness of delivery, and availability of repair and maintenance services. The most effective organization is to set up an independent business, such as a service center or an after-sale department with its own marketing and sales organization, dedicated to after-sales solutions.

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CHAPTER

# 8

## Contents



# Communication Strategy for High-Tech Products

Investing in marketing communication, or "marcom," is one of the secrets of the high-tech firms that seem to flourish during the economic downturns. While most of their competitors cut on communication costs in order to save money, the successful firms increase their communication to grow their market share. That does not mean to expand their advertising budget drastically. To be sure, some large companies spend heavily in advertising to knock down their competitors. Table 8.1 introduces the biggest communication spenders in the United States. To this list, one could add Samsung Electronics, which launched a $400 million global ad campaign in 2002 with $70 million for the North American market.

However, the sheer volume of money is not the ultimate indicator of performance; some highly successful companies have managed to achieve recognition through creativity and publicity. One of the most famous high-tech brands in 2003 was Google, the well-recognized Web search engine that has achieved this position mostly through word of mouth and quality. Amazon, eBay, and Yahoo have also achieved immediate recognition on low advertising budgets. Those Web-based firms have managed better than their competitors to ride the wave of the Internet. They have been able to generate buzz among "influencers" instead of relying solely on traditional advertising. The excitement and passion they have generated has translated into sales.

For that matter, they are just following the previous generation of successful high-tech champions, such as Intel, Microsoft, Intel, Compaq, Cisco Systems, and others. Those firms were first talked about in the pages of the *Wall Street Journal*, the *Financial Times*, *Business Week*, *Forbes*, and *Fortune* magazines. Only once their brand image was established did they spend money in advertising to maintain that image and notoriety.

**Table 8.1** The top Advertising Budgets from High-Tech Companies in the United States

| | *2002 ($ million)* | *2001 ($ million)* | *%Change* | *% of Total U.S. Sales* |
|---|---|---|---|---|
| Verizon Communications | 1,527 | 1,395 | 9.5 | 2.26 |
| Microsoft | 909 | 927 | (1.9) | 4.35 |
| ATT Wireless | 873 | 905 | (3.5) | 5.58 |
| Sprint | 863 | 1,098 | (21.4) | 3.24 |
| IBM | 832 | 938 | (11.3) | 1.59 |
| AT&T | 815 | 878 | (7.1) | 2.15 |
| HP | 736 | 524 | 40.6 | 3.16 |
| Dell | 511 | 438 | 16.5 | 2.04 |
| Deutsche Telekom | 509 | 303 | 68.3 | 8.91 |
| MCI | 371 | 519 | (28.4) | N/A |
| Intel | 345 | 444 | (12.0) | 4.48 |
| Nextel | 320 | 286 | 11.8 | 3.67 |

*Source*: [1].

Any company in the high-tech business must communicate to make its products known to targeted customers and to strengthen its solutions positioning. However, the specificity of high-tech firms imposes a certain number of restrictions, from the development of a communication budget to the planning of communication campaigns, including the use of different media. Furthermore, preannouncement as well as public relations, corporate advertising, and viral marketing (word-of-mouth marketing, which pushes people to pass along a message) have a particular importance in the communication strategy of high-tech products.

## 8.1 Communication for high-tech products

The three main characteristics of a high-tech product—technology, rate of change, and innovation—have an important impact on the communication strategy for the selected market segments.

First, it is essential for the company to interpret the product's high-technological content in terms of how well it meets the customer's needs and wants. A typical error is to communicate about the characteristic of a product instead of its main benefits, for the mainstream customer. Second, because products change rapidly, marketing departments need to let target customers know when new models of product are available. All the winning high-tech firms have strong preannouncement strategies [2], as well as know-how, as we will detail in Section 8.5. Third, in the case of a disruptive innovation, the company must explain the new technology and provide a vision of the future, as well as the added value this new technology gives the customer [3].

Furthermore, because the customer's main purchasing criterium for high-technology products, besides price, is confidence in the selling company (see Figure 3.1 in Chapter 3), this criterion determines a very specific communication style. In B2B, the most successful high-tech companies tend to be reassuring and instructive.

In B2C relationships, leading high-tech companies tend to emphasize novelty and fashion, such as Nokia, Samsung, and Vodafone, among others. On the other hand, Ericsson and British Telecom, for example, failed to win over consumers because they focused their message more on technology and quality, as they had done previously with professional customers.

Finally, the targets of any communication campaign for a high-tech solution are heterogeneous; not only should the person (user) who defines the need be reached, but also the person who recommends a solution or a brand (advisor) and, last but not least, the person who signs the check (decision maker). Interestingly, this is true not only in B2B, but also in B2C: most of the consumers of electronic goods, such as video-game consoles, PCs, Internet services, or cellular handsets, are children who do not have the money to buy those items. The communication strategy must reach not only these children, but also their parents or family members who pay the bills, in order to market the product effectively. These specifics for high-tech products can be found when setting and then allocating the communication budget.

## 8.2 Setting a communication budget

The recommended method for developing a communication budget is the so-called objective-and-task method, where marketers first define their specific objectives, then determine the tasks that must be performed to achieve these goals, and finally estimate the costs of the necessary resources to perform these tasks. This method has the advantage of spelling out assumptions about the relationship between dollars spent, exposure levels, and sales.

Unfortunately, in the high-tech business, this method is not of much use, because most related data are not easily defined. The makeup of the target market (consisting of innovators and early adopters) makes it difficult to assess the exposure cost of a message and even more difficult to assess the number of exposures to the message that are needed before a part of the target market decides to try the product.

Consequently, advertising budgets are very often determined pragmatically as a percentage of sales figures or sales forecasting or advertising budgets of previous years for similar products, if available. One should note that the amount of advertising varies significantly depending upon the type of business. Telecommunication and computers companies are big spenders while, aerospace, energy, or biochemical firms spend relatively little money in advertising and communication.

The key point is to be able to react quickly and with flexibility to any major change in the market while taking into account any move from the

**Case Study: IBM**

In 2002, IBM decided to spend $350 million—one-third of its total advertising budget—on a new campaign designed to publicize the company as a whole.

The tag line of the campaign was "E-Business is the Game. Play to Win." The communication strategy included a mix of various "measured" media (i.e., whose audience can be measured as opposed to unmeasured media, which includes all the communication toward distribution channels), such as TV ads, daily and trade print media, outdoor venues, radio, on-line, and direct marketing.

Multiple-page ads in newspapers such as the *Wall Street Journal* advertised numerous company divisions. Other print media, outdoor venues, and radio showed specific large customers, including Bank of America or Saks, which explained how they were "playing to win." Other print ads put in banking, retail, and automotive publications promoted IBM's solutions for those specific industries.

Designed by the ad agency Ogilvy & Mather, the advertising campaign had messages such as "E-business. It's the only game in town," and "Downtime means losing profits and opportunities, so you can't let it happen. IBM Tivoli software allows you to predict the business impact of the technology you're responsible for, so that you can make smarter decisions today."

This was the first time that IBM ran a consolidated campaign across all of its divisions and offices and it came with its biggest budget for a corporate campaign so far.

Question 1: How did the IBM campaign fit with the main characteristics of IBM's high-tech products and services?

Question 2: What are the pros and the cons for IBM to run a single cross-division advertising campaign?

competition. In 1984, Apple spent $15 million to launch Macintosh and established a new threshold considerably raising the market's entry barrier for advertising, but at the end of the 1980s, John Sculley, a former Pepsi executive, pushed for boosting the advertising budget from $15 million to $100 million. In 1998 again, Apple's new ex-CEO Steve Jobs committed about $100 million to marketing the iMac, twice the U.S. consumer ad budget of Compaq, the PC market leader at that time. The investment was worthwhile and put Apple back in the computer market. Similarly, in 2003, IBM embarked on a $200 million advertising budget—about 25% of its total advertising budget—to address specifically the small and medium enterprises (SMEs), which is one of its strategic markets.

In October 2002, Vodafone introduced its new service "Vodafone live" including transmission and reception of full-color pictures, downloading of arcade games, new ring tones, e-mail, and on-line messaging service. This

category of services was the first to be introduced on the market and Vodafone wanted both to put it on the map and to achieve significant sales. It invested in a £25 million ($38 million) public relations and advertising "Vodafone live" campaign—with TV, radio, cinema, press, and posters in the United Kingdom—that ended with more than 100,000 live! handsets sold during the last quarter of 2003.

## 8.3 Allocating the advertising budget

Experience shows that the selection of communication tools varies significantly according to a company's push marketing strategy (which pushes the product to the customer using distributors) or its pull marketing strategy (which attracts customers with advertising). This selection also depends upon whether the company sells its products or services to businesses or to individual consumers. Finally, it depends on the competitive position of the company.

For example, in September 2003 Nortel Networks decided to raise Nortel's profile among senior business executives, such as chief executive officers, after being absent from the media from more than 3 years following its crash on the telecom market and its revenues shrinking by more than 60% between 2000 and 2002. It was a far cry from it previous $50-million campaign, including television. Nortel Networks spent only $15 million on mostly newspaper and magazine advertising in business-orientated publications.

At the same time, its main competitor and outstanding leader in the telecommunication equipment market, Cisco Systems had launched a $150 million advertising campaign on the theme of "The Power of a Network" over the entire year of 2003. The goal was to boost its brand name recognition and to increase both market share and level of immediate customer awareness, in order to respond to the threat of new entrants with cheaper solutions. The campaign featured special eight-page inserts in major newspapers—including the *Washington Post*, *New York Times*, *Wall Street Journal*, and others major European and Asian newspapers—as well as advertising on prime-time programs on national TV such as *Law & Order* and *60 Minutes* and programs on cable networks that reach their target audience, such as CNN, the History Channel, and the Discovery Channel.

Figure 8.1 introduces the choices of media types by high-technology companies. The degree of importance of media starts from the top and goes down for B2B firms [4]. For B2C companies, the ranking of priorities is upside down.

### 8.3.1 Sales

Sales and sales management usually appear at the top of the market's preferred communication tools for B2B companies. This underlines the role of a direct sales force, which is to be not only a distribution channel, but also

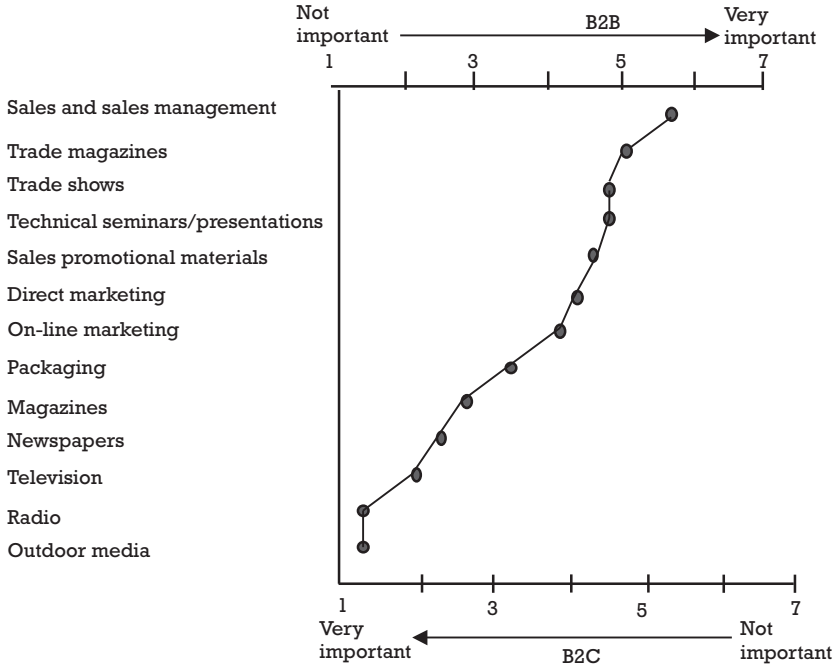


**Figure 8.1** Importance of promotional tools used by high-tech firms.

a source of communication. Actually, for some small start-ups, sales representatives are the only communication tool. Consequently, it is of the utmost importance for the marketers to make sure that the representatives exactly know the positioning and the key benefits of the products they are selling. If they have not been trained correctly, there is a strong probability that they will not communicate the right message to the customers.

### 8.3.2 Trade magazines

Trade magazines that specialize in and target a specific audience are a preferred medium when presenting an innovation or developing the advantages of a new product or a new technology. These magazines have a strong educational role. The simplest way to provide them with information is the news release, usually a typewritten copy of less than 400 words with the firm's name, address, and phone number as well as the contact person. There are also feature articles, which are longer manuscripts that are written by a member of an association, a distinguished researcher, or an executive for a specific magazine. Articles are always preferred over interviews, which are more difficult to control from the interviewee's side.

In addition, advertising can take advantage of the high level of credibility of these professional publications; readers use these magazines as tools, and this reinforces the efficiency of ad campaigns. Furthermore, communication campaigns for products can be developed using a technical angle while minimizing the risk of being misunderstood, because the readers of these

publications are familiar with technology. According to a recent survey from Reed Elsevier Business Information Research, based on its own publications, more than 7 in 10 subscribers of B2B specialized publications regularly read at least 3 of 4 issues, and more than 9 out of 10 read at least occasionally [5].

Every industry has its specialized publications that often have global coverage, like *Flight International*, *Journal of Electronic Defense*, *Jane's International Defense Review*, *European Polymer Journal*, *IEEE Communications Magazine*, or *Telecommunications Magazine*. For computers, there are more than 100 publications in circulation; some of those publications target professionals, such as *Computerworld* or *Wired*; others are aimed at consumers like *PC Magazine* or *Gamefan* magazine, as well as *Nintendo Power* or *PlayStation Magazine*, among the various video game magazines.

Other communication publications are sponsored magazines, like *IBM Think Research Magazine* or *Motorola Access*, or *Oracle Magazine,* and newsletters such as *IBM Software Newsletter* or *Microsoft Windows Newsletter.* They are distributed to customers and interested parties at no cost. Newsletters contain some useful articles and can gain respectability even though they are clearly partisan.

Companies frequently communicate at trade shows because a product's technical features, as well as its advantages to the customer can be shown more easily. Furthermore, attending customers have made the effort to come and are often more receptive to any innovation presented.

### 8.3.3 Trade shows

Trade shows are usually specialized by industry. Some are more prestigious than others, and every large manufacturer must be present in order to maintain the company's image, even if participating in the trade show yields very little. Trade shows are also large get-togethers where, at regular intervals, all market participants can be found and competitors and their activities can be observed. Often new product announcements are made at these trade shows to take advantage of the presence of journalists and the public. Examples of trade shows are Comdex for microcomputers in Los Angeles, Kunstoff for the plastics industry in Dusseldorf, Biotechnica for the biotech industry in Hannover, and the Paris Air Show for aeronautics. Most of the trade shows are open both to professionals and consumers, sometimes with some specific sessions exclusively for professionals. A few are restricted to professional only like ITU Telecom World Geneva, occurring every 4 years in Geneva, Switzerland.

The main problem of trade shows lies in the large number of attending participants and the presence of competitors who can negatively affect the messages that a company wants to communicate to its customers. For instance, ND SatCom of Germany found a better way to use the gigantic National Association of Broadcaster (NAB) show in Las Vegas. NAB is one of the biggest combined conferences and exhibitions for the electronic media communication industries with around 1,500 different exhibitors. Rather

than spend millions on a lavish booth, ND SatCom took an inconspicuous spot to install a clever satellite network demonstration that clearly showed the benefits of their solution. Ahead of time, they invited technical decision makers of key customers to visit the booth for private presentations. This introduced these customers to an unfamiliar supplier who had interesting and potentially beneficial technology.

A new trend is that of individual trade shows organized by only one company and where business partners and third-party product makers also exhibit. Apple's Apple Expo is the most famous and consumer oriented. At this type of trade show all of a company's proposed products can be presented in one large area instead of in a small booth. These trade shows, which are always very impressive, can assure that customers have faith in the organizing company (which is a very important element of choice in high technology).

These individual trade shows also offer the opportunity to organize a gigantic public relations event for customers, distributors, and journalists while ensuring that its impact will not benefit competitors. However, this type of trade show also requires sizable financial resources.

A more economical solution consists of making company visits. All large high-tech companies, from Intel, EADS, and Aventis to IBM, but many small- to medium-sized high-technology companies as well, organize trips so that their existing and prospective customers can visit R&D facilities, under a nondisclosure agreement. These visits are also part of a purchasing activity by allowing customers to test new prototypes, to find out about a potential supplier's long-term plans, and to ask questions about a new technology.

Scientific conventions are communication tools reserved for companies who sell to manufacturers of chemicals, aeronautics, or nuclear technology, for example. At conventions, researchers have the opportunity to meet and communicate their latest technological innovations. For this reason, conventions as well as trade shows provide excellent opportunities to observe the competition.

Some companies such as SAP or IBM have also successfully managed to create their own private conventions. The SAP Business Forums and the IBM forum feature experts explaining trends and directions for technology and applications as well as customers, who testify about their experience with SAP or IBM solutions. Those forums work well because they provide the kind of references that the "early majority" or the "late majority" of customers are expecting before making their purchasing decisions.

### 8.3.4 Seminars and presentations

Seminars are educational marketing tools particularly adapted for high-technology products. Oracle, one of the leading U.S. software companies, has set the standard for this mode of advertising. Every year it organizes more than 600 seminars for 75,000 existing and prospective customers. Oracle has put its seminars on-line with great success. In 2001, when the

company launched its Oracle9i Application Server software, more than 220,000 software professionals connected to the think9i e-seminars—within the first 3 months.

During a seminar, a company can thoroughly explain a new technology and customers can test drive and familiarize themselves with this technology before adopting it. A seminar explains what a technology is all about and will show that this technology functions well. A seminar is always focused on customers and not on products. Because the objective is to break a customer's natural resistance to innovation and to supply all necessary explanations, the people assigned to lead seminars are usually coordinators who have both technical experience and communication talents. The same type of profile can be found in speakers who appear at conventions.

Some seminars are also addressed to distributors. The messages are nearly identical; distributors must also be experts who can advise their customers accordingly by offering, from among all the available products, those that truly correspond to customer needs.

### 8.3.5 Sales communication material

For sales communication materials, the largest part of budgets and efforts is dedicated to catalogs and product literature. Product literature presents technical characteristics of each solution, emphasizing the idea that a picture can say a thousand words.

Furthermore, the importance of the performance factor in the purchase of a high-tech product requires the availability of a large amount of technical data in order to allow for precise evaluations. In certain sectors, such as the computer industry, aeronautics, or nuclear technology, brochures that describe a single product can exceed 10 pages. Finally, experience shows that the greater part of early majority buyers thrive on perusing technical catalogues that stimulate their desire to purchase a new product.

Videocassettes and CDs also tend to become additional communication tools. Due to their format, they lend themselves less to detail than brochures and are therefore often used for corporate communication purposes.

Sales communication materials also include promotional items, sometimes called "chachka." These are inexpensive gifts with the company's logo and product identification, which keep the company's name in front of the customer. Sometimes it can backfire, as it did with early digital watches given out by Hughes Aircraft Company in the 1970s. Even though these were gifts, customers who experienced failures and dead batteries were returning them for action. Hughes had no process for dealing with this, so the whole thing ended up a PR failure.

### 8.3.6 Direct marketing, on-line marketing, and SMS marketing

Direct marketing, based on mailings, telemarketing, Internet, or SMS (small messages services) coupled with toll-free numbers, is more often used for

products with a low unit cost, and can efficiently replace a sales force with its lower cost. Furthermore, direct marketing relies on more sophisticated database processing techniques. Direct marketing better targets the messages for particular market segments by personalizing the relationship with the consumer.

Dell Computer was the first company to sell PCs by mail only. Today, for large computer and telecommunication manufacturers such as IBM, HP, or Cisco Systems, income generated by direct order represents up to 20% of total sales revenue.

In the United States, on-line ad sales for 2003 were estimated between $6.2 billion and $6.7 billion, rising from an average of $5.7 billion in 2002. Computers and office equipment, publishing and retail, besides human resources, were the sectors that transferred the greatest share of their advertising dollars to the Internet in 2003, according to Double Click and Nielsen/Net Ratings' Ad Relevance. In 2001, in order to improve its leadership position during the technology market slump, IBM spent 15% of its campaign's budget on-line, up from 10% in 1999.

In 2002, Dell spent nearly 7% of its total advertising budget on-line and about 20% of its advertising and marketing budget for consumer products. According to David Toner, Dell's senior e-commerce manager, the cost to acquire a customer through search is a third the cost to acquire a customer through other advertising and the conversion is twice that of any other advertising channel [6]. About 70% of sales made from the Dell portals are driven by search, and not by banners or traditional advertising. In 2002, Dell started using search as a marketing vehicle to attract customers. On the first quarter it sold 2,300 personal computers through search; by the fourth quarter sales had jumped to 26,000 units.

Samsung is another high-tech company that has turned to the use of the Internet to its greatest advantage. In 2002, the company spent 10% of its advertising budget on-line, up from about 1% in 2001. It used more than 50 Web sites to flood consumers 24/7 with brand messages and real-time promotions to make retail traffic. Each ad drove business customers as well as consumers to Samsung's Web site, an 800 number and selected retailers, which are directly connected to its site through an exclusive extranet. Peter Weedfald, Samsung Group's vice president for strategic marketing, estimates that reaching 1,000 people on-line is about 50 times less expensive than doing it on TV [7].

Among Internet advertising, the so-called "rich-media" advertising has been growing quickly as it became one of the favourite ways for companies to communicate on the Net. "Rich-media" advertising brings in graphical animations, audio and video in the form of floating, cover and full-page ads that interject the Web page requested by a user. According to Jupiter Research, rich-media advertising represented 8% of advertising dollars in 2003, and could reach 22% in 2007.

Another growth area is the inclusion on the main Internet search engines such as Google, Overture, Yahoo, AOL search, MSN search, or

LookSmart. Research shows up to 98% of traffic comes through the top 5–15 search engines.

SMS Marketing is also getting more and more popular, especially in Europe and Asia where mobile phones are outpacing PCs as the most favourite electronic consumer goods. In Western Europe alone, more than 160 billion SMSs were sent in 2003 by the 60% of 250 million mobile users able to use SMS. All the major consumer brands, including the ones in electronics, are using SMS in their communication mix. Sony Computer used an SMS marketing campaign to push its Playstation2 as a Christmas gift in December 2002 and it worked effectively. All the telecommunication operators, such as Vodafone, Orange, and Telefónica, routinely promote their new marketing offers through SMS. However, Internet and SMS campaigns are becoming less efficient as customers get more and more irritated by unwanted commercial solicitations, or spam, that are flooding their e-mail or m-mail (mobile mail).

In April 2003, Microsoft, AOL, and Yahoo agreed to work together in order to develop new technical e-mail standards to make it more difficult for spam to get through to users. In the United States, spam volume has been doubling every year since 2000 and was estimated to cost businesses $10 billion in 2003, especially to ISPs. In the long run, it could threaten Internet marketing as users would have increasing negative feelings about e-mail.

### 8.3.7 Packaging

Packaging plays an important role when communicating a product's advantages and positioning to customers. For consumer goods, packaging is a very important product dimension and, as we showed in Chapter 6 for high-technology products, a tendency toward simplification and streamlining exists in conjunction with eliminating overly sophisticated and useless accessories. This trend can also be found in industrial markets. Companies must invest more and more in packaging to make their products look more attractive for decision makers or users without either technology obsessions or even mere technical backgrounds.

### 8.3.8 Magazines and newspapers

General news publications that can be used to communicate high-technology products are generally news magazines (*Time*, *Newsweek*, and *The Economist*). Their readers fit an "executive" profile and are sensitive to the innovation and prestige of a technology. These periodicals can reach users such as technical and financial decision makers. Marketers can also use daily and local newspapers that are geared toward the same type of readers. For instance, in 2002, AT&T Wireless spend $328 million, one-third of its total advertising budget and 16% more than the previous year, into local newspapers while Microsoft preferred to advertise in magazines, for more than $150 million.

Nevertheless, the style of news magazines makes technical advertising for a product inefficient. In these magazines, pictorial advertising for corporate advertising campaigns is more appropriate. The same holds true for the general economic press (for example, *Business Week* and *The Financial Times*), which targets senior executives. On the other hand, the business press (for example, *Forbes* and *Fortune*), which is more concentrated on management, allows certain product-advertising campaigns, provided they are speaking the customer's language and not imposing a technical view.

A particular segmentation and positioning can lead to the selection of specific publications. For instance, Xerox places advertising inserts in women's magazines because it assumes that doing so is a means of reaching secretaries; secretaries are often influential decision makers in purchases of sophisticated office equipment (such as color monitor microcomputers, laser printers, or intelligent photocopiers).

### 8.3.9 Television

Television is not frequently used in B2B because of its cost in absolute value; it is usually reserved for very large companies that target sizable market segments of consumers. Besides its coverage of an enormous target market at a reasonable cost per thousand contacts, television's other advantage is its ability to create a high rate of awareness very quickly. For instance, Accenture used a big slice of its $175 million largest-ever advertising budget on television in 2000 just to differentiate from its former corporate sibling Arthur Andersen and to pull itself quickly up to the level of its competitors in terms of awareness. For similar reasons, in 2001, IBM spent $100 million alone on television out of a $210 million advertising budget for its middleware campaign; the rest of the budget went for events, direct marketing, Internet advertising, and promotions.

For high-tech consumer goods, television is the most cost-effective way to reach mass audience, besides the Internet. TV appeals to senses and can grab high attention from viewers, especially from teenagers. The main downsides are its high absolute costs, its absence of selectivity (at least for the biggest networks) and some short-lived exposure.

In 2002, Microsoft spent $198 million, one-fourth of its total advertising budget, on network television. Companies that are targeting both businesses and consumers, such as IBM, HP, Nokia, and Vodafone, have found, however, that the messages they were sending on mass media like television also had a very positive impact on their professional customers, notably in brand recognition.

### 8.3.10 Radio

Radio is a secondary form of media; it has a low cost but is very limited in format because in 3 minutes it is impossible to explain a product or a technology without actually physically showing the audience. Therefore, radio is more useful for increasing awareness and especially for stressing specific

activities such as announcing a trade show, or specific promotions. In Europe, radio is one of the preferred media used by all the major telecommunication operators to reach young consumers and to introduce special offers.

### 8.3.11 Outdoor advertising

Outdoor advertising includes billboards, posters, displays, paintings, or other devices used to advertise in the open air, mostly on the street, in the subway, or along roads and highway. Outdoor advertising is clearly informative and can help to create some kind of special events useful to craft a brand image. To reach teenagers, outdoor advertising is most effective, and mobile phone handset companies, as well as operators, often use it to attract attention. For instance, Samsung started its 2002 advertising campaign unveiling a new gigantic billboard in New York's Times Square.

### 8.3.12 Communication mixes

Within the same industry, companies may have various communication mixes. For example, Figure 8.2 shows the different communication media used by the three main computer companies in the United States in 2002. One can see that Dell relies more than IBM and HP on "hot media," such as

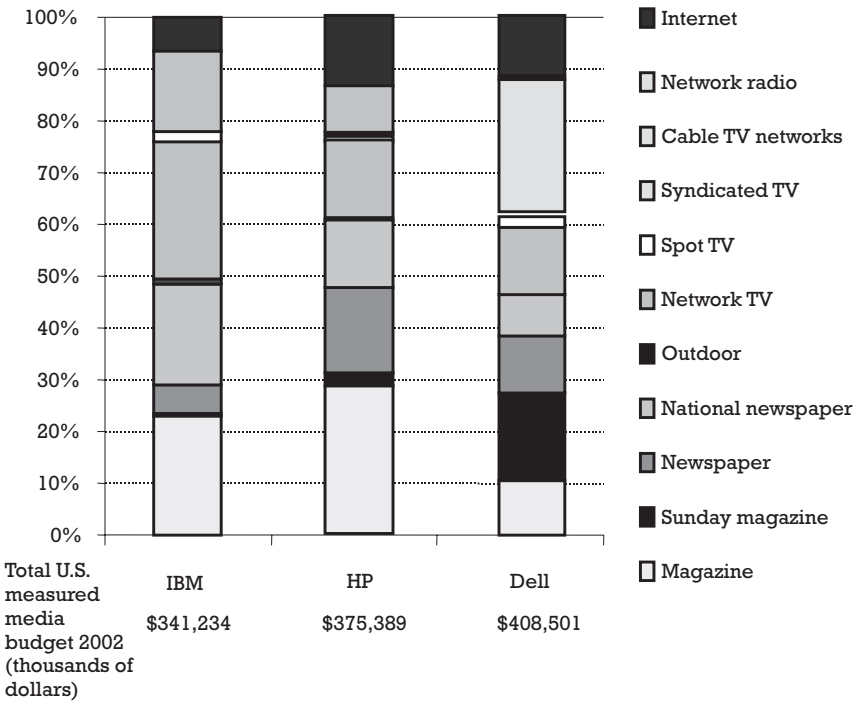


**Figure 8.2** The various adverting mix of different computer firms (measured media) in the United States in 2002. (*After:* [8] and companies' annual reports compiled by Eric Viardot.)

network radio as well as Sunday magazines in order to pull traffic onto its direct marketing channels. HP and IBM are competing more head to head in all their businesses—from PC to mainframe to software to services—but they still have a different communication mix. IBM tends to spend more on national newspapers and TV, while HP favors magazines and the Internet.

Once the advertising campaign is implemented, marketers should always try to evaluate the effectiveness of the campaign. There are various ways according to the schedule of the advertising campaign.

- Pretests are made before the campaign starts to evaluate the effectiveness of one message, usually through focus groups.
- Post-tests are performed after the campaign to measure the changes in customers compared to the initial communication objectives, which are awareness, understanding of the product, appreciation, and purchase decision of the product.

Because it is not easy to assess the direct effects of advertising on sales, post-tests are based on memory, assuming that customers are more inclined to buy a solution if they can remember an advertisement about it than if they cannot. In the recognition test, respondents are shown the actual advertisement and asked whether they know it or not. In recall tests, respondents are only asked about what they have seen or heard recently. Recall tests can be aided or unaided. In the former, respondents are shown a list of products or brand or company names to refresh their memories, while in the latter they are not given any clues.

For instance, Texas Instruments launched an advertising campaign to demonstrate the advantages of its new Digital Light Processing, a new video projection technology. Post-test surveys clearly indicated that this campaign increased the brand awareness and purchase intent among potential users, as illustrated in Table 8.2.

Although we do recommend using tests to evaluate the efficiency of an advertising campaign, marketers should be aware that advertising agencies and the published media they sell may use those surveys to serve their own interests. To eliminate any bias, the best solution is to have those tests performed by an independent third party and not directly by the advertising agency.

**Table 8.2** An Example of the Value of Post-Test Surveys: The Measurement of the Impact of an Advertising Campaign

| *Attribute* | *Before Ads* | *After Ads* | *% Change* |
|---|---|---|---|
| Unaided brand awareness | 0.7 | 4.3 | 514 |
| Aided ad awareness | 21.3 | 39.6 | 86 |
| Purchase intent | 9.2 | 18.4 | 100 |

*Source:* [9].

## 8.4 Managing promotional tools

Not all communication tools have the same purpose with regard to a purchasing decision. In the on-line services business, the main objective of a promotion campaign is to inform customers of the benefits of a little-known solution. Conversely, in the mobile phone business, the goal is to proclaim a company's value proposition as compared to the competitors' because the problem is not product awareness but inducing customers to switch from the competition. Some communication tools are appropriate for establishing awareness; others are excellent for communicating a better understanding of products and technology; even others strengthen product appreciation or finalize the purchase (see Table 8.3). Accordingly, these tools must therefore be used at different points in time.

Let us consider the case of the launching of a new product. First of all, a marketing manager must plan advertising and direct marketing campaigns in order to establish product awareness. These campaigns are followed by invitations to seminars and the publishing of papers in professional journals as well as participation in trade shows to explain a new technology and its benefits. The sales force and distributors will be invited to reinforce customer beliefs by organizing product demonstrations where they will be allowed to test, touch, and see the new product.

Trade shows, seminars, literature that can be read and reread at leisure, and packaging help to familiarize the customer with a product. These tools pave the way of the sales force and distributor by helping the customer make a choice that best corresponds to his or her needs. If necessary, actions to stimulate awareness can be planned, particularly if demand takes longer to emerge than estimated. However, in reality, because new product announcements in the high-tech industry follow each other rapidly (even if

**Table 8.3** Efficiency of Different Promotional Tools Used in the Purchasing of High-Tech Products

| | *Awareness* | *Understanding* | *Appreciation* | *Purchase Decision* |
|---|---|---|---|---|
| Sales and sales management | + | + | + | +++ |
| Professional journals | + | +++ | + | + |
| Trade shows | + | ++ | ++ | + |
| Seminars and conventions | + | +++ | ++ | + |
| Sales promotional materials | + | + | + | + |
| On-line marketing | ++ | ++ | ++ | ++ |
| Direct marketing | ++ | ++ | ++ | ++ |
| Packaging | + | + | + | + |
| Magazines | +++ | + | + | + |
| Newspapers advertising | +++ | + | + | + |
| Television | +++ | + | + | + |
| Radio advertising | ++ | + | + | + |
| Outdoor media | ++ | + | + | + |

not all products are revolutionary), a marketing manager must concentrate on the preparation of communication activities for product launches and must slightly neglect the rest.

A good communication campaign will reinforce the key success factors for product launches and should be addressed first to "innovators," explaining a new product's advantages, conveying a successful product image, or publicly announcing credible references. On the other hand, an inferior communication campaign could destroy a product.

Often, product launches are at the heart of the game. A failed product launch very often means a delay in sales and can give a competitor opportunities to take advantage of this lapse of time and jump into the market. A new product should be announced at the right time, neither too early nor too late.

## 8.5 Preannouncement in the communication plan for high-tech products

Managing communication activities is truly an art [10]. In the computer industry, IBM and Microsoft are masters of timing [11]. Most specifically, they are very savvy about the preannouncement of their product before they are ready for market.

Preannouncement, sometimes disdainfully called "vaporware" [12], is a kind of communication that aims to influence the perception and attitudes of the different market players (i.e., the customers but also the competitors, distributors, suppliers, and even shareholders and governments). While most preannouncement focus on products and price reduction, they can also be related to future earnings, forthcoming alliances, changes in licensing strategies, moves in distribution strategies [13] or future acquisitions.

Preannouncement can help to fuel demand by creating some "buzz" in the market, as mobile telecommunication operators manage to do with photo messaging through camera handsets. This service was preannounced in 2001. It was introduced in Japan and Europe in mid-2002 with great success: photo-messaging Vodafone live! signed more than 2 million customers in United Kingdom alone within 1 year, while in Japan, DoCoMo sold more than 10 million camera phones in 11 months.

Preannouncement can also help customers to plan more efficiently for their purchasing and technological development. Routinely, all the major computer and telecommunication vendors are presenting their future products to their biggest customers under a nondisclosure agreement. Some companies also use preannouncement in order to attract new distributors or complementors like software developers, for instance as Microsoft did when it unveiled its X box game console to developers in March 2000 announcing that it would not ship for more than a year. In some cases, preannouncement is used just to motivate or keep those distributors with the company.

Ultimately in the high-tech industry, preannouncement is widely used mostly to maintain a high-profile leadership position [14]. Some innovative

companies use preannouncement as a way to dissuade competitors from entering the market with similar products [15].

Others use it to counter the preannouncement or the launching of a new product, as a retaliatory preannouncing [16], in order to encourage their existing customers to delay purchasing. That was Microsoft's strategy when in 1994 IBM launched its new PC operating system Warp, which was directly aimed at the installed base of customers using Microsoft's MSDOS software: Bill Gates announced the launch of its new generation operating system Windows 95 for the beginning of 1995 and froze the market. The Warp market share plummeted in the following months and 2 years later, IBM halted any new development in PC operating software.

It has been shown that this aggressive communication strategy works well with no impact on the customers if the product ultimately delivers the feature and is available at the announced date. If this is not the case, a preannouncement campaign can easily backfire and lead dissatisfied customers to move to another supplier, and can cost the firm its reputation and credibility [17]. One of the reasons why Webvan, Boo.com, and scores of other dot-com companies crashed was because they failed to deliver on time and in quality the services they had hyped so much in advance.

Another downside of preannouncement is the immediate cannibalization of the current product line by the expected new product [18]. Customers may believe that the announced product is already available and will delay their purchasing decision to the date of actual availability. Finally, a preannouncement may give precious information to a competitor, which may try to catch up to or, even worse, to be the first to the marketplace with the product that was first preannounced by its competition. A famous example is the case of Storage Technology, which preannounced a new disk storage technology (StorageTek) in 1992 with a 1-year delivery time, but the product did not ship until mid-1994, because of various technical problems. Meanwhile, customers had turned to leader EMC and challenger IBM, which dropped its OEM deal with Storage Technology and launched its own storage product family named Shark. Ultimately, StorageTek lost $200 million.

## 8.6 Corporate advertising, public relations, and viral marketing

Different marketing studies prove that in the buying process of any product, the company's reputation is of a comparatively greater importance when the products are more complex, the business risk is higher, and the buyers are less knowledgeable. This situation perfectly corresponds to cases of high-tech products where one of the three main purchasing criteria states that buyers must have confidence in the selling organization. This need to reassure potential customers and buyers leads to a particular emphasis on corporate advertising and public relations.

### 8.6.1 Corporate advertising

Corporate advertising publicizes a company as a whole, with its subsidiaries, its people, its range of products, and its vision of the future. Corporate advertising tries to create a visual identity that can be recognized easily through all the company's permanent media (such as logos, brochures, business cards, signs, stationery, building, and uniforms) and all the other media (such as TVs, newspapers, and radio) with specific advertising campaigns.

Corporate advertising affects a company as a brand name affects a product. The goal of corporate advertising is to establish a long-term image in the minds of buyers; its messages deal with a company and its objectives. In the computer industry, IBM shows that it stands for security; Dell focuses on its business model and HP emphasizes the importance of technology in business and life—the positive influence.

Corporate advertising is interested in projecting an everlasting image with buyers. Buyers remember a permanent reference point that will not be disrupted when new technological announcements are made. A company must, of course, keep its promises for its products because, if it does not do so, it will fail. However, its corporate advertising will build the trust for customers in targeted segments. Successful companies have always invested in corporate image. Even HP, one of the most "technology oriented" large high-tech firms, had to adapt. According to its new senior vice president for global brand and communications, Allison Johnson, HP is now focusing roughly 50% of its advertising budget on brand-level advertising and the remaining 50%—instead of 100% previously—on product and price-based ads. In 2003 HP spent about $400 million on its Plus HP brand advertising and marketing campaign; that campaign underlines how HP products are helping its customers with the following tagline: "Customer + HP = Everything is possible."

### 8.6.2 Public relations

Public relations (PR) seeks to establish and reinforce goodwill between an organization and all its publics (customers, employees, suppliers, shareholders, financial publics, mass media, consumers' associations, government officials, and the general public). A specific variation of PR is the marketing department's public relations, whose goal is to obtain editorial space—instead of paid space—in print, broadcast, and electronic media to tout a product, a service, a person, or a company. The major tools in public relations are news (from creating news stories to getting them accepted by the press or a given public); speeches; events; public service activities; written materials (such as annual reports, brochures, articles, company newsletter, and magazines); audiovisual materials; and telephone information services.

Compared with advertising, public relations provides a higher degree of credibility and better efficiency when overcoming resistance to change; actually, these messages are perceived as if they were not directly sent by

the company and are therefore more readily accepted. Credibility and overcoming resistance to change are two key elements of success in marketing a high-tech product or a new technology. This was well understood by the founders of Yahoo who decided to hire Niehaus Ryan Wong (NRW), a South San Francisco public relations agency long before their Web site went public [19]. The PR campaign positioned the firm as an Internet directory, and not a search engine, to downplay the technical aspect of the company, at a time when few journalists were covering the Internet. The other inspired choice was to target mainstream reviews such as *People* to underline the positioning of Yahoo as a fun consumer product. It worked beautifully. When Yahoo went public in April 1996, the buzz was incredible: reporters came from all parts of the world to see Yahoo going public and its two founders becoming instant billionaires. In its first 6 months of existence, according to NRW, Yahoo got more than 600 pieces of press coverage in prestigious media such as *Time*, *Business Week*, and so on.

Another attraction of PR is its low cost compared to its performance. Dell, which has built a significant amount of its brand recognition through smart PR, is said to have spent $430 million on advertising versus $2 million in MPR in 2002 [20].

The emphasis placed on trade shows, conventions, and seminars, as well as editorials in professional journals, indicates how high-tech companies are aware that communication is not limited to single advertising promotions, even for consumer markets. Usually, companies provide their own development and coordination of public relations strategies, although some companies use special consulting firms, particularly when launching a new product, to maximize the impact of the event.

### 8.6.3 Word-of-mouth and viral marketing

Word-of-mouth or buzz marketing [21] is also an effective means of personal communication, which can be used to promote a product or a company. Indeed, the purchase of most of high-tech products requires a high level of involvement for a consumer or a business decision maker. Furthermore, these products are often expensive; they are sometimes risky, either from a technological viewpoint or—even more importantly—from a status viewpoint; and they are often a one-off purchase. For all those reasons, in that situation, a prospective buyer tends to ask for the opinions of family, friends, neighbors, or independent experts. A positive answer will prompt the purchase.

To accelerate word of mouth, some Internet companies are using viral marketing [22] to draw attention to their sites. The typical example is Hotmail: All the e-mails sent using this service had a tag for Hotmail at the bottom of each message. By clicking on the tag, recipient could access directly to the Hotmail site offering free e-mail at a time when users had to pay for getting an e-mail address at other Web sites. The promise was clearly enticing and those responding could sign up instantly. Hotmail fame expanded dramatically and exponentially. Hotmail went public in July 1996. It got

about 20,000 subscribers within 1 month, 100,000 subscribers after 4 months and 1 million after 7 months. One year later, it had enlisted 12 million subscribers with a communication budget of only $500,000. In the same time, its direct competitor Juno had spent $20 million to draw less than half of Hotmail's users. In 1997, Microsoft bought Hotmail for $650 million. By 2002 Hotmail had more than 110 million users.

In conclusion, one should note that the number and variety of communication tools, messages, and audience make necessary the integration of all these elements within a comprehensive strategy and organization. The American Association of Advertising Agencies defines this as integrated marketing communications (IMC).

High-tech firms that market successfully have moved a significant part of their communication budget and operations under one advertising agency. In 1994 IBM moved all its advertising from 78 different agencies all over the world to Ogilvy exclusively. Similarly, in 2002, Samsung consolidated its advertising from 54 different ad agencies to only one—Foote, Cone & Belding. A unique communication agency allows a company to project a unified message worldwide, and it can better coordinate and maintain more cost effective media operations. Overall it strengthens the brand image and makes the communication strategy more efficient.

However, many companies still do not coordinate their communication efforts. They rely on different communication specialists without any coordination, translating into multiple and different messages pushed through different channels at various times and leading to customer confusion, misunderstanding, or dismay. After its merge with Compaq in 2002, HP started to consolidate its advertising agencies. Currently HP uses different lead agencies, namely, Goodby, Silverstein & Partners for worldwide brand advertising development, the Publicis Groupe Worldwide for products and solutions advertising, and OptiMedia for media placement.

## 8.7 Summary

Investing in communication is one of the secrets of how some high-tech firms have managed to flourish during the recent economic downturn. The three main characteristics of a high-tech product—technology, rate of change, and innovation—seriously impact the communication strategy for the selected market segments.

Traditional budget-setting techniques cannot always be applied to high-technology products. When determining a budget, flexibility and pragmatism are important. The key point is to be able to react quickly and with flexibility to any major change in the market, while taking into account any move on the part of the competition.

The selection of communication tools depends upon whether the company sells its products and services to businesses or to individual consumers. This selection also varies significantly according to a company's push marketing strategy or its pull marketing strategy.

Communication tools must be adapted to selected objectives. Some communication tools are used to establish awareness or reinforce support while others can explain a product or will help finalize a purchase.

Additionally, preannouncement, public relations, corporate advertising, and viral marketing are particularly important in the communication strategy of high-technology products. They provide an additional credibility for a company and are influential when overcoming resistance to change.

Finally, the number and variety of communication tools, messages and audience make it necessary to integrate all of these elements within a comprehensive strategy—defined as integrated marketing communications (IMC)—and an all-inclusive organization. Accordingly, the best high-tech firms have successfully moved a significant part of their communication budget and operations under one single advertising agency.

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CHAPTER

9

# Pricing High-Tech Products

Contents



Successful marketing companies know that pricing comes last when formulating the marketing mix of a product. The reason is very apparent: The price has to cover all the costs, including the product development and management costs, the distribution costs, and the communication costs in order to make a profit. Sometimes, a company may decide to price under cost for a given product on a given market for a given amount of time, but this is an exception, which cannot last forever.

Indeed, the impact of price is felt not only in sales volume and market share, but also financially as price determines a company's profitability. Indeed, according to the cost structure of a firm, a 1% price increase can improve profit margin by more than 50% [1]. For some companies in the computer business, for instance, where margins are very low, smart pricing is essential to survive [2]. Once you set the price for a product, it is extremely hard to change it [3], because customers never appreciate significant price fluctuations, as many "dot-com" firms have learned the hard way before collapsing. Once a price is made for a product, it is almost futile to increase it; on the other hand, a sudden price decrease may also have a negative impact on the product's perceived value leading to diminishing market share, volume, and profitability.

Price is also an important part of the marketing strategy, because a price strengthens a product's positioning in a market segment; that is, high-quality products usually call for high prices. Additionally, price is a basic element in the exchange between a company and its customers, even if it is not the only decision factor in the purchase of a high-tech product. On that matter, one has to consider that the prices of high-technology products are much higher than average prices of standard products: The price per kilogram of a satellite is 20,000 times higher than a kilogram of building material and 2,000 times higher than a kilogram of an automobile (see Figure 9.1).

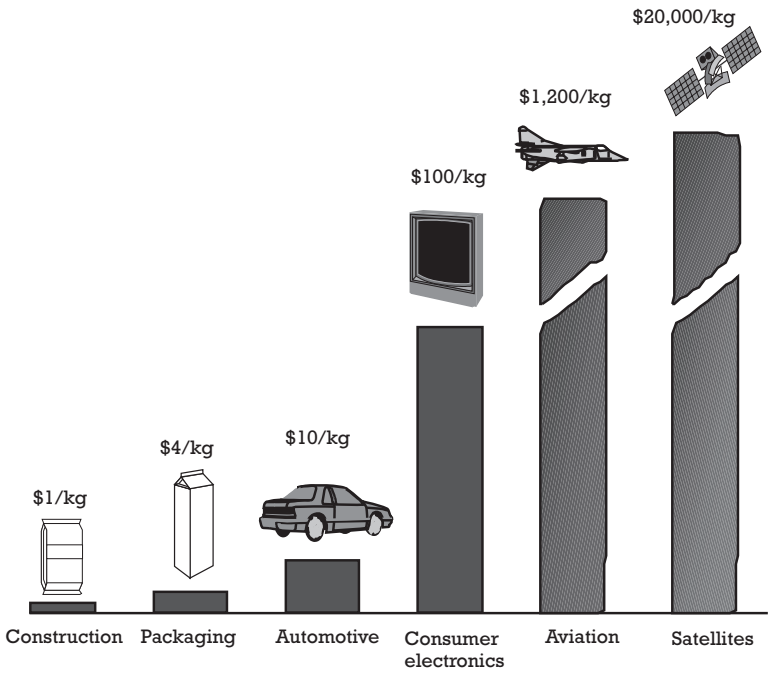


**Figure 9.1** Price comparisons of high-tech and standard products. (*From*: [4]. ©1991 French Ministry of Industry. Reprinted with permission.)

Consequently, price decisions are rarely made by just the marketing department [5] but at the top level of the company, at least for all the major products and innovations. According to a study performed in French high-tech firms, the final price decision in 50% of the cases is made by the chief executives, in 40% of the cases by a sales manager, in 30% of the cases by a multifunctional committee, and only in 20% of the cases by a marketing director [6].

In a world where products and competitive positions change very quickly, price managers must know how to adapt continuously the listed price of the product [7]. The price makers must first determine the pricing mix among the various pricing models; then they must figure out the various price limits in order to get the general framework of the pricing policy. Next they must select the most relevant pricing method according to the type of products they want to market, as well as other drivers such as the existing range of products and the anticipated reactions of the various players in the market. Finally, they have to manage the price dynamically.

The first step of the pricing strategy starts with the analysis of the various sources of revenues that a product can potentially generate. For instance, a computer or a satellite can be sold directly, but they can also be leased or charged on a per use basis, like IBM's new business model of "computer on demand."

In the case of some product such as software or some technologies, the customer doesn't buy the source product but pays for a license to use it. This

license can be charged by user, but also by site, and also by number and even by type of computer running the software. Its duration time may also vary. For instance, in 2002 Cadence, a leading firm marketing software for semiconductor design companies, introduced a "3-year" licensing scheme instead of the usual "99-year." Similarly, AutoDesk, a CAD software vendor, switched from a permanent license to a yearly subscription. Such a price policy change seeks to stimulate more repeated upgrades while diminishing the purchase price paid by the customers, though it has to be done repeatedly over the life time use of the software [8].

In the case of high-tech services such as the i-mode service offered by Japanese telecommunication operator NTT DoCoMo, for example, money can flow directly or from commissions. Direct revenues come from monthly subscriptions plus from the amount of e-mail and data downloaded from the 35 millions users; portal advertising and portal usage fees produce revenues, as well. Revenues also come indirectly from commissions on the m-commerce services available, as well as a commission (9% in 2003) on service revenues to content providers using the DoCoMo such as the hugely popular on-line games or sports information services. In 2003, DoCoMo's revenue mix was 13% from subscriptions, 10% from e-mail, 63% from Web access, and 13% from third-party content. The pricing strategy must balance the various pricing solutions for each of the sources of the revenue mix before setting the price for each of the components.

Price may be fixed but can also be variable in order to get a better balance between demand and supply, as is illustrated in Table 9.1. Variable, or dynamic, pricing has always been used for overstocks or commodity supplies. However, today, thanks to the Internet, it can also be more easily applied to high-tech consumer goods, such as electronics, as well as all categories of business goods through auctions or reverse auctions (see Section 9.2.4). Indeed, on the Internet prices can be changed on an hourly or daily basis at a very low cost compared to the weekly or monthly changes in the traditional brick-and-mortar channels. Furthermore, it is easier to analyze the nature of the sales, the consumer preferences and attitudes, or the demographic data of the visitors on a Web site. Finally, an increasing

**Table 9.1** The Various Pricing Models

| *Pricing Mode* | *Nature of Revenues* | |
|---|---|---|
| | Fixed | Variable |
| | One-off sale | Per use |
| Direct | Permanent license | Time-based license |
| | Leasing | Subscription |
| Indirect | Advertising (cost per thousand) | Advertising per click |
| | | Commission |
| | | Collection charge |

number of price-sensitive customers are using price-comparison Web sites before purchasing on the Net, pushing for more competition on price [9]. The combination of those different factors is pushing companies to set a dynamic pricing policy, which takes into account and adapts in real time to any variation of the supply or demand in the market.

Another key element to consider is the nature of the product to be priced. Indeed, the product can be innovative; it can also be evolutionary and market driven, as an upgrade or an improvement of an existing product; it can also be just a copycat of another product already in the market (also known as a "me-too" product). To begin with, one has to do an honest assessment of the product's status. Some high-tech firms tends to consider a product as revolutionary (for them, but not for the market) when it is just market-driven and even sometimes a rough imitation, because the company is late getting it to the market.

The pricing decision is significantly affected by the status of the product. For instance, a frequent error made by many high-tech companies is to underprice revolutionary products in order quickly to build market share and because it is difficult to evaluate their value for customers. Similarly, underpricing an upgrade product, which actually offers substantial added value, can ignite cannibalization or a price war. On the other side, overpricing a me-too product, which falsely differentiates from the competition, will translate into market failure.

## 9.1 Determining price limits

The price of a product always fluctuates between two points: the price ceiling and the bottom price (see Figure 9.2). The market segment being addressed determine the price ceiling; no customer will buy above this level, and this price ceiling will be translated into a zero market share. For instance, Vertu, a Nokia subsidiary, has priced at 24,000 Euros (more than $21,000) limited editions of a platinum handmade cell phone handset. Other cheaper gold models go for approximately 6,000 Euros apiece.

The bottom price is established by the cost structure of a product; below this price the company loses money on every product sold, which leads to a negative return as detailed in Section 9.2.7. With the specifications of high-tech products, a marketing manager must evaluate these two limits by analyzing the price elasticity of demand of the targeted market segments and by estimating the costs' learning curve.

### 9.1.1 Evaluating the price elasticity of demand

The price elasticity of demand in relation to price measures the variation of customer purchases according to an increase or decrease in price: If elasticity is high, demand for a product is influenced by its price. Understanding demand elasticity for a product allows firms to determine which products drive market penetration and thus require a low penetration price, and

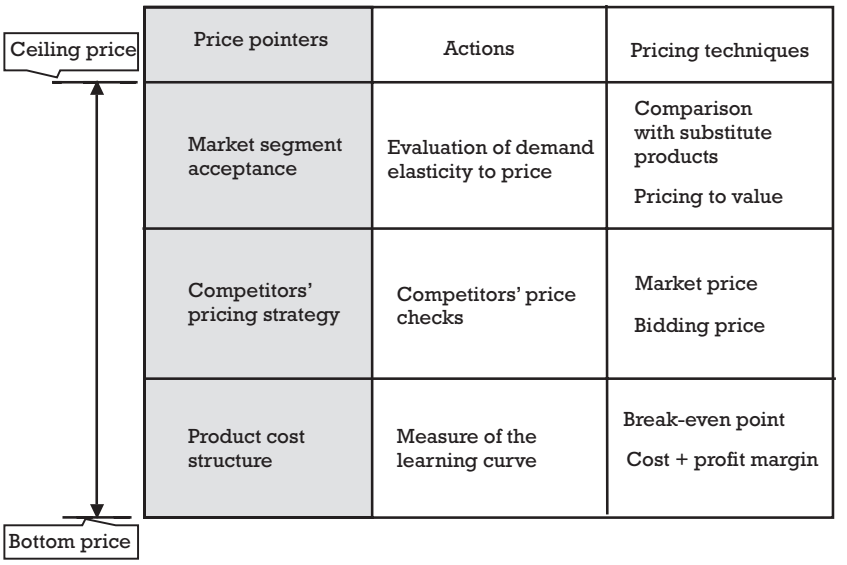


**Figure 9.2** From bottom price to ceiling price.

which solutions can be priced at a premium, like in the case of video cell phones or broadband subscription.

Usually, innovative high-tech products have low elasticity. This means that high variation in price, an increase as well as a decrease, does not significantly modify demand. These high-tech products have few substitutes, meaning that the costs to switch to another product are high. Additionally, at the first stage of the technology, buyers—either innovators or forerunners—are less sensitive to price than to additional performance; they often have deep pockets or are ready to spend a lot for a new innovative and outstanding product. For instance, with its new product range, Vertu is aiming at the 3% of millionaire households with assets of more than $2.5 million; those are customers who are ready to accept the price range mentioned above. At that stage, the competitors are not interested in lowering their price significantly whatsoever, because they are chasing the same categories of customers, not sensitive to price. Furthermore, the high price of these products is often perceived as a sign of quality and reinforces a customer's confidence in the company.

AOL successfully used the low elasticity for its product on the U.S. market. It started with a penetration pricing strategy at low price to establish the product in the market. Then AOL managed to raise the price without losing too many customers, because there were no direct competitors at that time and because the switching costs for the customers were high.

The price elasticity of demand increases for market-driven or less innovative high-tech products. The entry of competitors with similar but less expensive products or new products with a better price-performance ratio makes the buyer more sensitive to price. Ultimately, the product becomes standardized and its high price loses a part of its reassuring value. In this

case, a significant decrease in price would lead to a large increase in demand as can be seen now in the home electronics and personal computer markets. Such a pricing strategy is sometimes known as penetration pricing.

A foolproof method does not exist for determining the elasticity of a product. In the case of high-tech products, the task becomes even more difficult because of the short product life and fast rate at which these products change. In addition, it is impossible to use statistics of past demand usually because these numbers do not exist. Finally, test markets are very costly and quickly outdated, so a high-tech company often must rely on surveys of customers who used the prototypes or tested the new products in the hope that these customers are representative of the overall segment. This is not always the case, as experience shows that innovators and early adopters are less price-sensitive than other consumer categories. Often a company must take chances and perform an analysis to predict the buying behavior of target customers, while referring to available data for products that the new product will replace.

Eventually, a high-tech product's elasticity can usually be measured by noticing shifts in price through sales figures. For instance, when the major U.S. chemical company DuPont, soon after introducing a new fiber called Kevlar, had to revise its price upward, customers protested but in the end accepted the increase. In another case, when a large French chemical company increased prices of all its molecules (mostly elastomers) by more than 30%, it managed to keep almost all its customers; only one segment changed suppliers.

Similarly, in the mainframe computer industry, whose customers are big private firms or governmental agencies, the recent trend of decrease in price has led to a volume extension. A new CMOS technology and the increasing use of standard components have allowed vendors like IBM, Amdahl, and Hitachi to decrease their prices since 1992. On average, a 25% decrease in unit price has translated into an increase of 10% in volume.

### 9.1.2 Estimating the costs' learning curve

Successful high-tech firms are constantly monitoring costs in order to keep these costs down. To show a profit that encourages future investments, a company must at least cover its variable costs that are linked to production volume and its fixed costs (salaries, rent, administration, R&D) that are necessary to manufacture its product. Identifying and controlling these costs can lead a company to measure its learning curve.

This learning curve effect corresponds to the company's improved know-how as its production increases during the growth stage of the life cycle: purchasing optimization, design simplification for manufacturing purposes, output increase for production facilities, improvement of sales force, selection of distributors, and increased performance of sales promotion campaigns. All these gains in productivity lead to a decrease in the average unit cost. This decrease in cost could be passed on to the price in order to react to a competitor's actions or to increase price-sensitive demand.

This strategy is characteristic of the electronics industry. Intel, Samsung, Infineon, and the other players use this strategy for pricing their memories and semiconductors. Sometimes they engage in price wars, like in 2001 when the market price of PC memory (DRAM) fell below the cost of production, forcing weaker players, such as Hynix, out of the industry (see also Section 9.1.3).

Microcomputer manufacturers have also chosen this strategy. In the cell phone business, Nokia has aggressively pursued a manufacturing cost control strategy to drive the price of mobile phones down in order to enlarge the market and reach "mainstream" and late majority customers, as well as to chase competitors with smaller volumes out of the game.

On the other side, the company can decide to pocket the productivity gains and increase its margin and profitability. This is the successful approach followed by Logitech, the PC accessories leading vendor. Logitech produces about 100 million units per year and because its products have a longer shelf life than with PCs, Logitech can drive manufacturing costs down. In the meantime, the retail price for its products tends to stay constant, allowing the company to keep the same price for a product such as a cordless optical mouse at the same level 18 months after its introduction. The difference between a fixed retail price and a diminishing cost of manufacturing goes directly to the bottom line.

The learning curve is valid for high-tech products because of the high level of R&D costs required by these products. Because the product life cycles are fairly short, these expenses must be written off very quickly (for example, in 1 year for computers, and in 2 years for robotics) and these R&D costs inflate the average unit cost at the beginning of the product's life, before decreasing very quickly. This unit cost variation is reflected in the changing unit price.

Figure 9.3 illustrates the cost experience curve for magnetic disk storage over 10 years. In recent years, the cost of a gigabyte of storage has fallen dramatically, from $165 in 1995 to $1.4 in 2003 and a projection of $0.2 in 2006. Today storage has become a mass product and the quantity of storage capacity is enormous. For instance, in 2003, Aetna, the U.S. leader of health and related benefits, had more than 174 terabytes (1,000 gigabytes) of data based on more than 4,100 direct-access storage devices and representing about 250,000 tape volumes; Boeing had about 150 terabytes of data over 150,000 desktops; in Europe, ATOS-Origin a high-tech service firm managed about 300,000 terabytes attached to 60 mainframes and more than 5,000 mid-range servers.

Every marketing manager must continuously follow the changes in the average unit cost and its position on the price experience curve according to the trend of the market price. A company that notices its costs decreasing much faster than market prices knows that it is benefiting from its experience and is gaining by profit margin and market share.

On the contrary, a company with costs that are increasing faster than the industry average will see its margins fade away. This company is losing its maneuvering autonomy as well as its market share. Usually, at this point,

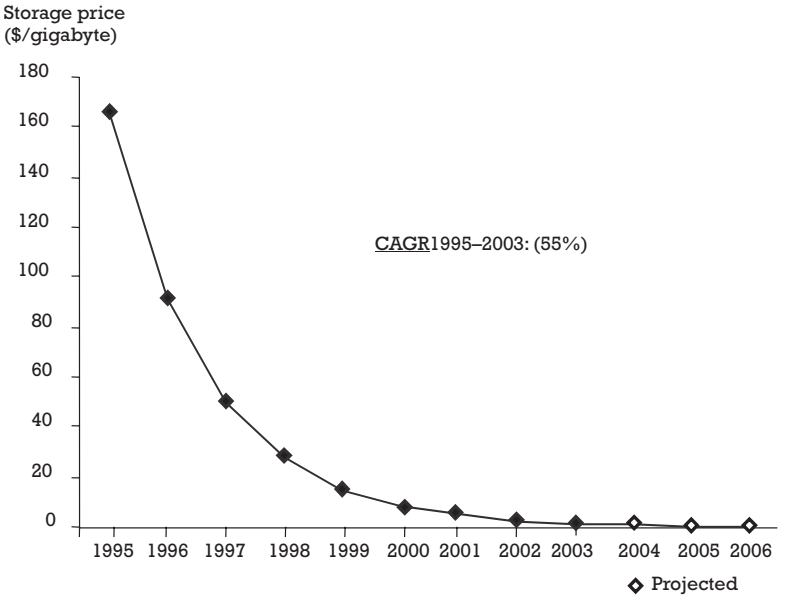


**Figure 9.3** Cost experience curve for magnetic disk storage. (*Source:* IBM Research, IDC, analysis by Eric Viardot.)

the company will complain of "dumping," "unfair competition," or "companies that are undercutting prices," without realizing that its inability to be more successful (attaining a higher performance level) is leading to its own failure.

Marketers must also avoid another hazard, which is to overstate the manufacturing potential when establishing the price. Indeed, if an aggressive pricing stirs market demand above production capacity, it directly impacts customer satisfaction (and brand image) because of excessive delays. Furthermore, it affects profitability, because firstly the company is not getting the full infusion of revenues at launch time, and secondly, available products could have been sold at higher prices. Apple went through this tough experience in 2003 when it started to ship its 17-inch PowerBook several weeks after the official availability date of February 2003. The previous year, it had had similar problems with the 15-inch flat panel iMac, which was introduced at Macworld Expo in January 2002, but was really available 3 months later in April 2002, leaving the company with a significant backlog of orders for the iMac at the end of its first financial quarter.

Such trouble does not occur for companies that have implemented a "built-to-order" manufacturing model, or a variable pricing scheme, which allows for quick rebalancing between demand and supply through price adjustment. Actually we should note that the learning curve analysis is adapted to products that can be mass produced, rather than to very customized manufacturing systems, even if R&D costs need to be written off in both situations.

### 9.1.3 Taking competitors into account

In the high-tech world more than in any other industry, the first company on the market sets the market price, particularly for a very innovative product. For a company that does not take the pole position, competitors will set the standards [10] and this company must position itself according to them.

Some very successful companies take advantage of being first on the market to get the maximum price possible and to skim the top off the market, a pricing strategy known as "skimming." Yun Jong Yong, CEO of Samsung Electronics, calls it the "sashimi theory." When prime fish is first caught, it is very expensive at a top-notch Japanese restaurant. If some of the fish is left over, it sells the next day for half the price at a second-tier restaurant. By the third day, it goes for one-fourth the price. Then it's dried fish. Samsung has successfully applied this theory in consumer electronics. It markets the most sophisticated products ahead of the competition and charges premium prices before the product is no longer fresh and competition is there.

However, smart pricing offers opportunities for new or late entrants to take over existing vendors. For example, in the phone business, new entrants are pricing their solutions to maximize the number of users switching from the incumbent. In Europe, like in the United States, most new entrants have started out offering a 15% to 20% discount, as did Vodafone and Bouygues Telecom in France, or Sprint and MCI in the American market. Experience shows that those discounts decrease to almost nothing over time once the average market price reaches a level where the relative market shares of the major players are stabilized.

Price contributes to the competitive positioning of a product on a given market segment and may be a competitive weapon by changing customers' perceptions of the competitors' products. Accordingly when facing a particular competitor, a company can set a higher price if its customers feel that its product provides a higher level of performance and if they have a better image of the product. Such is, for instance, the new pricing policy successfully initiated at Apple Computer by its new ex-CEO Steve Jobs. The high relative price of Apple's products compared to similar products in the same category reflects a positioning of quality and innovation. On that matter Apple's pricing strategy follows the successful track of BMW in the auto industry.

On the other hand, a company can start aggressively to decrease its prices if it has a lower cost structure or if it enjoys more flexibility with its distribution channels than its competitors. Dell in the PC industry and Linux in the software business are two good examples of organizations that have managed to boost market share, and margins, with a penetration pricing strategy. Their main rivals have a higher cost structure and cannot match their low costs.

However, companies have to be careful before deciding to enter into a price war. To unsophisticated marketers, the rationale for such a decision is clear-cut: Lower the prices and the sales will soar. Reality is far more

complex because a price war is generating feedback effects for two reasons. First, a decrease in price must be balanced by an increase in volume in order to cover the amount of fixed costs which are spread across all the units sold; if not, a price reduction will just reduce profits leading to less investment and ultimately to a price increase, which customers may not understand or accept.

Second, a competition to lower prices disturbs the competitors' market position and they usually react to the price move by adjusting their price or any other element of the market mix in order to maintain their market share. Such moves lead to equilibrium in the market: In some cases, some players may disappear, but in other cases, if all the players uphold their market share, the overall profitability of the market—and of all the product vendors—is what suffers.

Figure 9.4 illustrates the positive and negative feedback that a price cut decision may trigger. Company A cuts its price and consequently increases its market share and revenues, while lowering unit costs (because the increased volume covers its fixed costs) and ending up with better profitability. In the meantime, competitor B loses market share, volume and revenues and its unit costs increase leading to less profitability. To compensate for the loss of volume, company B may increase its unit price to keep the profit even; but such a move decreases, rather than increases, market share and puts the firm in a negative loop ending with no profit at all and the demise of the product or even the business. More or less this has been the

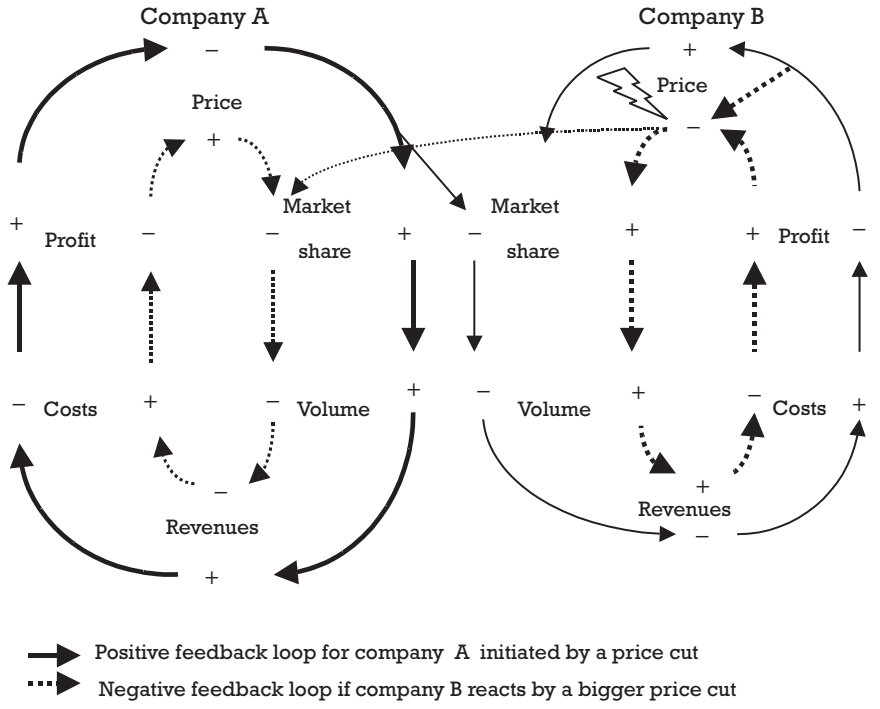


**Figure 9.4** Price cut decision feedbacks.

case of many PC makers, including IBM, facing the aggressive price cutting policy of Dell.

However, if competitor B can manage to underprice firm A, it can create a feedback loop in its favor, while beating company A at its own game, if the firm is not able to retaliate and to reduce its price further. In all cases, when many companies are reacting to a price cut with another price cut, they are engaging in a negative cycle, which will stabilize in the end. But market stabilization may cost the industry a few players, and certainly overall profitability of the product category will take a hit. The semiconductor industry entered this situation during the high-tech slump of the beginning of this decade; while some firms tried to make more volume and took on a price war, the whole industry ended up with a significant drop in profit.

In any case, a marketing manager must know and understand competitor prices. To stay on top of product pricing, he or she can inquire about price reports with distributors, obtain competitor rates, ask the sales force to catch up with competitor prices, and seek customer input.

## 9.2 Setting the price of high-tech products

Only after estimating demand, evaluating costs, and identifying competitor prices can the marketing manager set the price of his or her product. Several methods of determining prices of high-tech products are possible. Asked about setting prices, marketing managers of high-tech products usually give priority to pricing based upon the company's offer using cost + profit margin or break-even point methods (see Figure 9.5, which is based upon interviews I have conducted).

If necessary, these marketing managers take into account competitors (using market price method), particularly in the case of a bidding process, which is very common in military or government markets (using the bidding price method). Few of these marketing managers establish a pricing method based upon customer demand (with the perceived value or comparison with substitute products methods).

All the six different pricing techniques will now be detailed.

### 9.2.1 Cost + profit margin

This simple method, which is frequently used in the high-tech field, consists of adding a profit margin percentage to a total cost. This method is simple—almost simplistic—and is usually justified by the fact that it is easier to estimate changing costs than a changing customer demand of a particular segment. However, many high-tech firms tend to forget some costs that should be assigned to products such as the R&D expenses for unfinished projects in a product category or the share of the goodwill related to acquisition that is associated directly with new products.

Yet, because it is completely independent from the market, this technique will never lead to an optimal profit. For instance, a typical mistake is

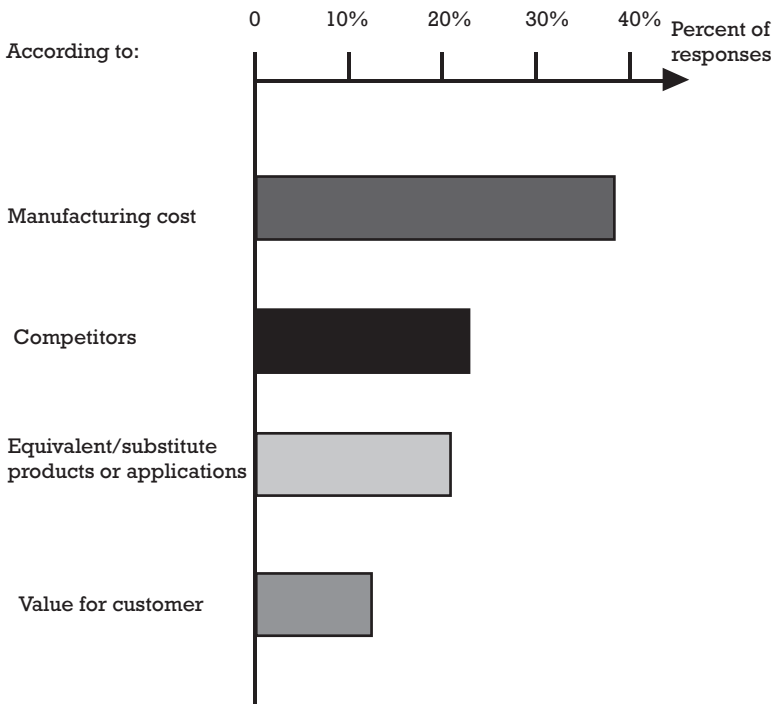


**Figure 9.5** Different pricing tactics. Tabulation of responses to the question: How do you determine the price of a new product?

to make market forecasts too rosy, leading to wrong estimates of costs, and especially fixed cost amortization.

### 9.2.2 Rate of return and break-even point

This financial price approach seeks to determine the price that can earn a sufficient middle—to long-term return on the investment. The unit price is calculated as follows: $p$ = unit cost + [(rate of return × investment) / quantity sold], and the break-even point is the level at which sales figures cover related fixed and variable costs. For example, as shown in Figure 9.6, a company invests $200,000 in new product and expects a 15% profit. If the unit cost is $45 and the sales objective for year one equals 6,000 units, then the unit price will be $45 + [(15% × $200,000)/6] = $50 for a total value of $300,000. Furthermore, if fixed costs total $100,000 and variable costs (per unit) are $25, then the break-even point equals 4,000 units. Should the break-even point not be reached, a new price would have to be calculated with a lower level of sales.

An interesting case is when a company enjoys a technological monopoly for a revolutionary, innovative product. In that case licensing agreements may generate less profit than doing business on one's own because it increases the number of suppliers in the final market. Consequently, prices

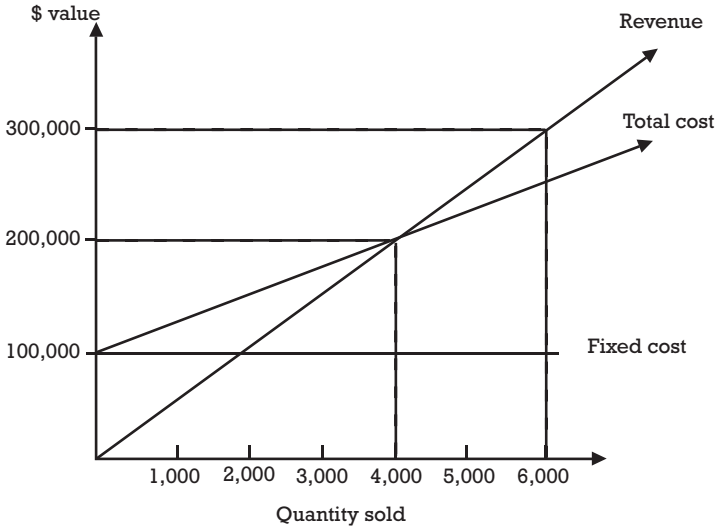


**Figure 9.6** Profitability, price, and break-even point.

may drop below the rate that would exist in a monopoly situation, since royalty rates are usually a fixed percentage of sales revenues. This may explain why Intel gradually stopped licensing its microprocessor technology: Intel licensed 12 firms to produce its 8086 microprocessor, four to produce its 80286 microprocessor, one (IBM) to produce its 80386 microprocessor, and none to produce its 80486 and Pentium microprocessors.

Again, this method does not take into account customer demand or reactions. For instance, a high price may lead to a low break-even point, but it is possible that no products will be purchased at such a price level.

### 9.2.3 Market price

When competing products already exist on the market, they must be taken into account. Setting a price according to the price of a main competitor is a better approximation of the market than the preceding techniques because this price reflects demand. Furthermore, a price can be used to reinforce the product's positioning in relation to its competition.

It is fairly easy to measure competitor prices for standard and not very differentiated products, but this method cannot be easily applied to highly innovative products or to very specific, customized systems. The only way is to conduct customer interviews or to rely on the sales force or any other source of information detailed in Table 4.2 of Chapter 4. Market prices are more transparent on the Internet where comparison are easier to make with price comparison Web sites, or auction platforms such as eBay, or reverse auction sites such as that of Priceline [11]. On the other side, prices on the Internet are updated almost constantly to keep up with the changing demand and offerings.

### 9.2.4 Bidding price

Bidding processes are traditionally used for military and government contracts but also for some private industry contracts in many high-tech industries including aerospace, automotive, computer, and communications. In a bidding process, competition is open and usually the supplier with the lowest price for the contract is selected. The bidding price is set according to the available information about competitor bids and the customer's opinion of the product's advantages. Because a higher profit but fewer possibilities to achieve this profit are directly associated with a higher price, an expected profit graph can be drawn according to the bidding price. However, when the marketing manager is given a "must win" direction from management, he or she may have to ignore cost and profit: in such a case the concern is to be lower than the lowest competitor [12].

Bidding price scenarios are on the rise because of the development of electronic marketplaces, which are using the Internet as a way to have more suppliers competing on price through "reverse auctions"; unlike on-line auctions, in reverse auctions sellers bid instead of buyers, and quotations decrease rather than increase.

Reverse auctions presents some clear opportunities for suppliers, most specifically the hope of new business, the access to new markets, reduced inventory cycle time, better inventory management, and a direct benchmark of competitors [13]. But there are also some serious threats, the most important one being that purchasers make their decision on price only. Another threat is that the buyer uses the auction not to purchase but just to get some information on the market before starting actual purchasing negotiations with a limited set of its usual suppliers. A last risk is to be caught in the emotion of the auction where there is a fixed time limit and you end up bidding an excessively low price [14].

### 9.2.5 Comparison with substitute products

When an innovative product appears on the market and does not yet have a competitor, this product may be evaluated in relation to the products for which it could substitute. For instance, when launching a new biotechnology product, a pharmaceutical laboratory positioned its product's price according to the price of a traditional cancer treatment because, for patients, the new product was an improvement over long and costly classical treatments. On the other hand, if a company implements this incremental pricing technique, using an existing product as the basis, it may undervalue the real value of a revolutionary high-tech product for the market. Consequently the most successful high-tech companies tend to favor the value pricing method.

### 9.2.6 Value perceived by customers

This last pricing technique is based on a simple assumption: When a product responds to customer needs, these customers know the product's value,

taking into account the different advantages. Consequently, they know the price that they are prepared to pay for it.

A first and basic approach is the willingness to pay (WTP) method where customers directly communicate the price of the product according to the value it represents to them. Researchers ask, "What would you be willing to pay for this?" Another unsophisticated approach is the "buy-response" question where customers are shown the product then invited to answer the question, "Would you buy it?" The questions may be asked separately for different prices in order to figure out price sensitivity using Monadic tests where the respondent is presented with one product.

Another mode is the price sensitivity meter (PSM) introduced by Dutch economist Peter van Westendorp and based on the idea that there is a relationship between price and quality and that consumers are ready to pay more for a higher quality product. Potential consumers are asked five questions:

- At what price would you consider this item to represent a good value?
- At what price would you say this item is getting expensive, but you would still consider it?
- At what price would you consider this item too expensive and you would not consider it?
- At what price would you consider this item to be a bargain?
- At what price would you consider this item to be so inexpensive that you would doubt its quality and would not consider it?

Other approaches such as trade-off methods like conjoint analysis (CA) and discrete choice modeling (DCM), allow measuring the price response not just for one product, but also for several competing products [15]. Customers can be asked to voice their opinion on the value of product features by comparing them with those of other products. The product's perceived value can then be calculated and its price can be established accordingly. Table 9.2 is an example that involves three products. For each characteristic the buyer can give a total of 100 points divided among the three products, weighing each characteristic.

Sometimes price perceptions are directly correlated with the amount of information available and the motivation for shopping. This has been shown most specifically for the price evaluation of products on the Internet. Motivated consumers—typically "early adopters"—give more value to products at a high price level when the information load is excessive. They also appraise better value at the low price level when they do not have so much information, though their perception may be modified if they use efficient Web screening engines [16]. On the other hand, less motivated persons (from the "early" or "late majority"), perceive a high price level higher in value and quality than a low price level [17].

Another way to understand the value of a product is to estimate the overall economic gains of this new product (saving time, manufacturing,

**Table 9.2** Sample Product Characteristics Comparison

| *Characteristic* | *1* | *2* | *3* | *Percentage of Importance* |
|---|---|---|---|---|
| Product performance | 30 | 25 | 45 | 45% |
| Product quality | 32 | 28 | 40 | 25% |
| Enhancement capacity | 41 | 25 | 34 | 13% |
| Ease of use | 18 | 49 | 33 | 11% |
| Ease of maintenance | 24 | 23 | 53 | 6% |
| Weighted value | 30.2 | 28.3 | 53 | |

labor, maintenance costs, and usability). Then by quantifying the potential value of these economic gains, marketers can assess the total value of the product for a targeted segment of customers. This method is often called "economic value."

Such an approach is widely used by MIS managers to evaluate the total cost of ownership (TCO) [18] when they have to consider the total value of equipment. TCO only considers the price of the product, but also all the associated costs during the product's lifetime. These are visible "hard" costs such as the cost for implementation, upgrades, maintenance, and disposal; they are also less tangible "soft" costs such as management, support, training, and downtime.

Using such an approach may change the perspective of a prospective buyer about price. For instance, Gartner group estimates that the yearly TCO of a $450 Palm handheld is $2,690 per year. This needs to be put in perspective with the TCO of an average laptop estimated at $9,700 per year by Research in motion (RIM) in 2002.

Cutting the TCO is one of the main rationales for companies to buy online. According to a McKinsey survey, just 30% of purchasing managers considered low price as the key benefit of purchasing on the Internet while the majority are more interested in reducing the search cost and the transaction cost, through less paperwork for example. This is important to consider when pricing B2B products on the Web [19].

The importance of TCO in pricing was underscored during the fight between Microsoft and Linux. While Linux is almost free, Microsoft argued that its TCO is higher than Windows in the long run, mostly because of staffing, training, and maintenance. In 2002, a widely publicized study by the Robert Frances Group came with opposite results, showing that over 3 years the cost of running Linux is roughly 40% of that of Microsoft Windows, and only 14% of that of Sun Microsystems's Solaris. In any case, such an approach in pricing allows marketers to redefine what constitutes the value of a product.

While the WTP model works well for consumer goods, economic value is more adapted to industrial markets, because in B2B value and WTP are rarely equivalent, for different reasons. The most notable one is that the purchasing process is complex; the buyers usually are not the users and need to formalize a process for determining the value of the product to the organization [20]. Consequently, in B2B, the most successful firms do not try to precisely determine the price sensitivity of customers to a change in a given product attribute; they look for the main value drivers that are central for customers.

Finally, marketers should keep in mind that the product's value might change during a downturn where supply is ample and competitors more aggressive. Service quality or technological performance may become more important than lead time or availability [21].

### 9.2.7 Pricing below costs

In some cases, pricing below current costs can make sense for a company that anticipates significant cost reduction from scale economies and experience effects, once the product generates enough volume. The short-run loss must be balanced against the potential gains. To do so, it must meet two prerequisites. The first is to carry important short-run losses whose amount must be compared with the drawback of not having the technology as a standard. The second is to have a manufacturing capacity strong enough to satisfy demand so that supply shortages will not drive the market price back up again. In the case of software this is made easier because the product can be easily duplicated on large scale and at very minimal cost. Various companies, such as Matsushita, AOL, and Microsoft, have effectively used that type of pricing strategy to build significant market share with new and innovative products.

In the same way, Dolby licensed its high-fidelity sound technology to numerous firms with a very low licensing fee. Though it reaped only a few cents for every audio player that included its technology, Dolby has built such a large volume that it manages to make a satisfactory profit while preventing any push by competitors to develop a superior technology with so little unit margin.

On the down side, consumer electronics firms like Toshiba and Matsushita made this bet on the nascent digital videodisk market in 1997 and failed to achieve the sales they anticipated. Similarly, in 2003 Hutchinson had to reduce its forecast for recruiting 1 million new users in the United Kingdom for its new 3G services, though it had lowered its price significantly compared to its 2G services. One of the reasons of the slow take-off of the 3G market was not Hutchinson's responsibility, but the poor quality of the phone handsets and especially the battery's short life.

The ultimate pricing below cost strategy is obviously when a company is giving its product away for free. It can be a very efficient way to create market share. For instance, in 2003 free software Apache managed to get more than 60% of the Web server operating systems against Microsoft IIS, which requires license fees and is not gratis.

Similarly, KaZaA Media Desktop the most popular free download peer-to-peer file sharing network quickly has managed to reach millions of users performing more than 85 million downloads a day. Song- and movie-swapping are free for the users. Once the notoriety is there, successful high-tech services companies manage to cover the costs of operation and make a profit through different sources, such as banner and pop-up advertising, selling content, selling coupons and offers to other related Web sites, and selling other products and services. Another well-known free service vendor Yahoo has managed to achieve profitability by selling more services. In the past Yahoo drew 90% of its revenues from on-line advertising; in 2002, services represented more than 30% of revenues and were representing 50% by 2004.

## 9.3 Adapting a price policy to different types of high-tech products

When asked about determining prices for high-tech products, marketing managers emphasized the difficulty encountered in making decisions vis-à-vis customers; instead, they prefer to refer to their company's offer. Their answers also showed the underutilization of price as a key marketing variable. A price, when determined according to the expectations and needs of customers in a segment, reinforces positioning and allows a company to earn more substantial profits by remaining closer to the market.

In reality, three types of situations can be distinguished depending upon whether high-tech products are standardized or differentiated and whether these products are pushed by the company's innovation (supply-driven) or pulled by the market's demand (market-driven). Each situation calls for a different approach, as represented in Table 9.3.

1. Whether basic or differentiated, when products are pushed by a firm because they are innovative, we recommend pricing them according to the value they bring to customers. As a matter of fact, being the first on the market gives room and flexibility to set up the price and extract the maximum premium from customers.
2. However, as soon as products achieve success and are pulled by demand, new competitors enter the market. Pricing must therefore be adjusted to competitors while maintained above costs. In the case

**Table 9.3** Price Policies and Product Types

| *Type of Product/ Marketing* | *Standard Product* | *Differentiated Product* |
|---|---|---|
| Supply | 1. Customers' value | 1. Customers' value |
| Demand | 2. Competitors/ costs | 3. Competitors/ customers' value |

of standards products or commodities where there is little room for differentiation, the key to achieving success is constantly to lower the product unit cost through economies of scale by aggressively managing the production and distribution costs—such as the famous Dell model in the PC business or Nokia model in the phone handset activity.

3. For differentiated product, when demand "pulls" the sales, the company must obviously adapt its prices to the market but the room is more open for pricing. If the company manages to adapt to its customers' demand, it can price the differentiation according to its value for the customer and not according to its costs. For instance, major integrators like IBM Global Services, EDS, or Accenture offer customized software to customers who demand complex programs that are perfectly adapted to their needs. They do not have a standard list price. They determine the price of these products depending upon the customer's financial abilities and the cost of available resources to assure the best possible performance within the scope of the customer's budget. Ultimately, the price depends upon the complexity of the product demanded by the customer as well as the supplier and competition's aggressiveness in sales.

Differentiation is very often the key to better pricing. For example, in memory chips, the archetypal commodity, Samsung has managed to price 15% above the industry average. How? Because 60% of its memory devices are customized for products like Nokia's cell phones, Dell servers, or Microsoft Xbox game consoles. Interestingly, the Internet is offering new opportunities for differentiation through the customization of standard services or even products [22], which may be adapted to the needs and wants that customers are expressing on-line when ordering.

Overall, high-tech companies still have room for improvement when setting prices based upon the value for their customers; this is part of learning about marketing. These companies can benefit considerably from the experience of companies that market more traditional products.

## 9.4 Integrating the other determinants of price

Every price decision about a product must take into account the prices within the product range, when applicable, as well as the overall price policy of the company and the reactions of other market participants.

### 9.4.1 Pricing according to the product range

The high rate of new high-tech product releases often leads to large product ranges that are frequently updated. So, for every new product belonging to a range, a correct understanding and forecasting of customers' perceptions is a necessity, as far as pricing is concerned, to balance two risks.

Usually, new products are targeted to the segment with the highest willingness to pay in order to recover from the big fixed development costs. Then lower-priced versions are sold at much lower prices, because of a modest incremental cost [23].

However, except for new entrants that have no history in the business whatsoever, the pricing of a new product (even a revolutionary one) must take into account the context of the company's existing product mix.

On one hand, if a new product is introduced at a price that is too high compared to the product range, the risk exists that sales will not take off because customers continue to prefer an older model with a more attractive price-performance ratio. On the other hand, price is the determining element in curbing or accelerating cannibalization of existing products. Indeed, a new product that is introduced with a very low price compared to the rest of the products in a range can "ruin" these other products, leaving large quantities of unsold goods, or can generate a demand that the company might not be able to satisfy immediately. If the company enjoys a technological monopoly, one solution is not to offer a special pricing for customers who have already bought an earlier version of the product [24].

Furthermore, a decrease in price for an already existing product can accelerate its phaseout and prepare its replacement. Actually, few customers are ready to purchase an older generation of the product, at a reduced price when they anticipate that a significant new version is about to be launched [25]. Consequently, a price reduction of a mature high-tech product, which can be only 1 or 2 years old like some consumer electronics products, will not increase volume but will completely kill margins. In high technology where dynamics are a requirement for survival, this type of price policy is often necessary but not always without difficulties.

### 9.4.2 Pricing complementary products and tie-in offers

High-tech products are rarely sold as stand-alone commodities, either in B2B or B2C. Because they are complex products, very often they required a full array of services as well as add-ons or extensions to keep up with the constant evolution of the technology.

When considering the pricing of complementary products, some companies tend to favour the "razor and blade strategy," modeled on Gillette pricing strategy where the main product is priced cheaply, according to costs, while add-ons are sold at value price to captive customers (see also Section 7.3.5). For example, HP has successfully applied this model for developing its printer business and its digital camera business.

Another important pricing practice is to bundle [26]—or tie-in—a new product with other complementary products, because the package is more attractive to the targeted customers. Typical examples are an Internet browser included in the operating system, or a camera included in a cellular phone, or DVDs offered with a DVD player. Usually tie-ins consist of a special pricing offer, which makes it cheaper to buy the products and services as a package than separately. This marketing technique is very helpful to open

new markets and increase market share, as illustrated by the success of Microsoft, Samsung, and LG Electronics.

### 9.4.3 Pricing according to the reactions from other competitive forces in the market

The sales force, distributors, and dealers should be consulted prior to making final decisions on the pricing of a high-tech product, because they can react negatively when faced with a product that they consider to be too expensive. Finally, a government can have a restricting role on pricing, for example, when setting up monopoly regulation and antitrust policies and, furthermore, through price controls. This is the case in most countries for the biochemical industry where every new drug requires government approval not only for its content but also for its price quotation.

## 9.5 Managing price

Price setting is just the starting point of the pricing policy. Then marketers have to manage their price aggressively by driving customers' expectations to bring them along to pay for the value they get from the product.

Pricing is a skill that all the most successful high-tech firms have managed to build on, especially during the recent economic slowdown, when overall prices were going downward [27] but also now that the economy is expanding. Fine pricing allows a company to secure margin improvements in targeted segments while deterring uncalled-for industry price erosion; it also means positioning the company to exploit as rapidly as possible the upsurge that finally comes. Winning firms know to:

- Differentiate prices according to market segment attractiveness.
- Adapt the price and the content of the marketed product (i.e., features, add-ons, extended services) to the customers' needs, which usually vary during a recession.
- Introduce radically new and innovative price models to better fit with customers' expectations and to put competitors off-balance.
- Stick with a strict pricing policy, and not surrender to the pressures for discounts and exceptions to pricing terms and conditions; badly needed margins are more important than money losing sales volumes.
- Identify and manage all the component of a price, most specifically discounts, rebates, and allowances, to escape uncontrolled price reduction.

## 9.6 Summary

Pricing comes last when creating the marketing mix of a product. Price is an essential component of the marketing strategy and determines a company's

profitability. Consequently, price decisions are rarely made by just the marketing department [28] but at the top level of the company.

The price makers must first determine the pricing mix weighing the various pricing models (one-off sale, price per use, permanent license, time-based license, leasing, and subscription, advertising—cost per thousand or per click, commission, collection charge).

For high-technology products, prices are on the average much higher than prices of standard products, and high-technology products often succeed each other at a higher rate than standard products.

To determine a product's price, a marketing manager must know the ceiling price, above which customers will no longer buy and the floor price below which his or her company will lose money. Besides these two limits, the marketing manager must also observe competitor prices.

The marketing manager has at his or her disposal different pricing techniques that depend upon the company's offer (cost + profit margin and break-even point), the competitor's offer (market price and bidding price), and customer demand (comparison with substitute products or perceived value by the customer). Logically speaking, prices should be set according to customer demand, but marketing managers still overemphasize the company's offer. Pricing techniques must also be adapted to the particular type of high-tech products: standard or differentiated, product-driven or market-driven. Finally, each price decision must take into account prices within the product range as well as the company's usual price policy and government regulation.

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CHAPTER

# 10

## Contents



# The Position of Marketing Within High-Tech Companies

All the high-tech firms that have managed to overcome the technological slump that began in mid-2001 were able to offer the right solution at the right time to the right customers. They had a market-oriented approach, and focused on customer needs and not on the appeal of a technology. For instance, in the middle of the slump, Cisco Systems went through a major reorganization toward a more centralized marketing organization under single leadership, while aligning its technology groups with its main groups of customers (see the case study in Section 10.1 for more details). This customer orientation was intended to replace a more product oriented organization and proved extremely helpful for Cisco to withstand the economical gloom of the high-tech industry at the beginning of 2000 and following.

Similarly, when SAP, the leading German ERP software giant, decided to transform the company from an engineering-driven technology enterprise to a market-focused firm solutions provider in 1999, it established a new central marketing organization, with a new vice president, marketing guru Martin Homlish, in a new headquarters in New York City.

Subsequently, the marketing organization plays a vital role in implementing such a go-to-market approach. It is not only a matter of allocating significant budget and resources to the marketing department. They are necessary but not enough to succeed. In order to market its solution efficiently, successful high-tech firms first thoughtfully define the place of their marketing structure within the whole organization of the company. Then they design the internal organization of their marketing structure with the utmost attention and care. Finally, they try to optimize the cooperation of all departments for complete customer satisfaction.

## 10.1 The position of the marketing structure in a high-tech firm

The marketing philosophy can be translated three different ways for high-tech companies. The first is strategic marketing at the executive level where top management selects the areas in which the company will and will not compete (countries, market segments, technologies). The second translation is operational marketing where the marketing manager determines how (with which resources) the company will compete (these are the components of the marketing mix: product range, price, promotion, sales network, and distribution). The third is sales support marketing, either integrated or closely related to the sales force, which helps the sales force meet its goals. This support can help the sales force deal with competitor traps and hostile environments using resources such as sales promotions and sales presentations.

When putting the marketing philosophy into action, the marketing department has a different place in each organization depending upon the importance given to marketing by the company. However, research shows that marketing's position in an organization changes with a company's development phases (see Figure 10.1).

At the first step, the large majority of technology-driven companies assign the marketing responsibility to the sales manager. This is the case of numerous start-up firms that were created as a result of one successful

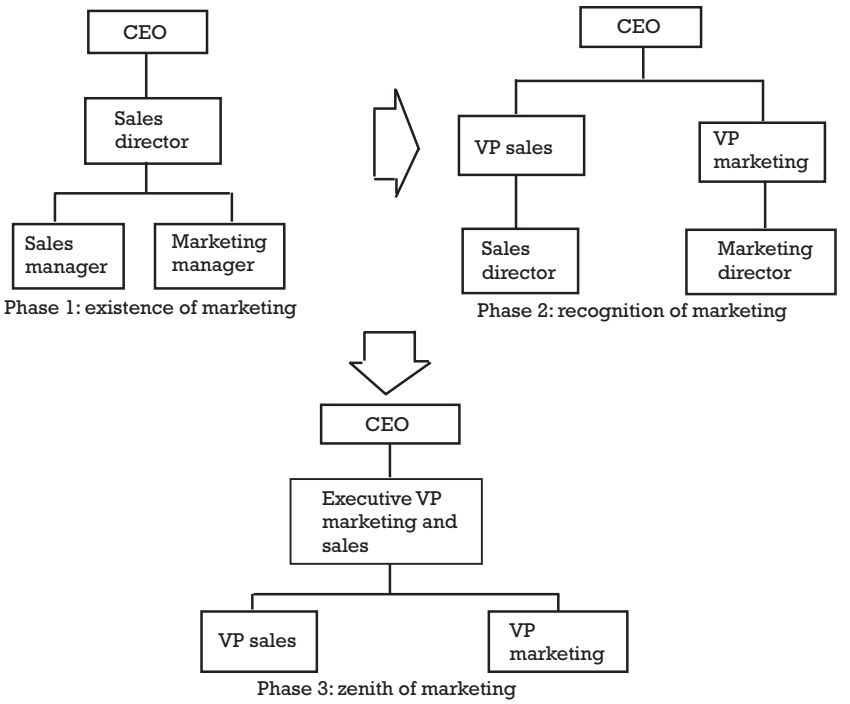


**Figure 10.1** Development stages of a marketing department in a high-technology company.

innovative product, which often must quickly capitalize on its technological breakthrough by increasing sales. The first goal of the new marketing department is to support the sales force with promotional tools such as leaflets, direct marketing, and attendance at trade shows. Company growth leads to the launching of new products and the development of advertising, promotion, and customer service activities.

Such an organization is not restricted to small firms. Even large technology-driven firms follow this model when there is a strong demand for a given technology. For instance, most of the European high-tech service companies have been practicing this very basic type of marketing for years by simply exploiting business opportunities rather than actively executing a strategic plan. However, recently the technological crash forced the most advanced service companies—such as Cap Gemini Ernst and Young, Atos, or T-Systems—to become better organized in order better to understand their markets.

In most cases, high-tech companies with a marketing department give its director the same status as a sales manager but under the responsibility of a sales director. However, this situation presents functional difficulties and will require continuous coordination efforts, as will be explained later. Some companies regard sales (and rightly so) as only one aspect of marketing a product. These companies hold their marketing manager responsible for sales and put him or her in charge of all customer relations. Marketers get really frustrated and very often leave the organization or accept that they have no actual clout from a strategic marketing perspective.

When the need for better knowledge and anticipation of the market becomes imperative, market-driven high-tech firms go one step further. They set up a different marketing structure, under the responsibility of a vice president of marketing, independent from the person in charge of sales. Obviously, this new type of structure is inherently conflict-ridden. The sales department essentially has a short-term orientation; it must achieve its sales quota and obtain orders that translate into income for the company. This pressure on sales is even more pronounced, because markets change very quickly in high technology. Faced with a decrease in sales, companies are tempted to react immediately by lowering prices, increasing the sales force, or introducing sales promotions.

On the other hand, the marketing organization can have a wider view or horizon. Faced with a decrease in orders, it will question, for example, target markets, the importance of its products, and the appropriateness of the distribution channels, and will reconsider the overall marketing strategy in order to respond better to customer expectations. These opposite points of view often generate a "struggle" between sales and marketing. Sales will accuse marketing of its ivory tower position at headquarters and its failure to understand anything about customer needs, while marketing will blame sales for its marketing myopia and its inability to step back from the field.

Another traditional conflict between sales and marketing in the high-technology industry concerns the use of research and development

laboratories. In some companies, the sales force has immediate access to researchers from whom they can request customer presentations of new prototypes, for example.

However, a research and development department may often be too candid. A laboratory specialist, who is not familiar with competitors or manufacturing constraints, can easily be talked into giving sensitive or overly optimistic information regarding a new product release.

In reality, the interval between the development of a prototype and the industrial product launch is often fairly long. If this information leaks to other customers or even to the press, the impact could be disastrous. This unintended slip-up will disrupt the marketing department's carefully prepared new product announcements and advertising plans.

Usually, the division head or company's managing director settles conflicts between sales and marketing, but if the number of these conflicts increases or if they become more serious, it will become necessary to acknowledge that marketing plays a strategic role in the company's future and that sales fall under the marketing department's responsibility. In that case, a corporate VP of marketing and sales who manages both organizations is in the unique position to arbitrate any conflicts between the two organizations. Most of the successful high-tech firms have adopted this structure today.

Research shows that this type of organization limits the number of unexpected fluctuations by stressing the necessary symbiosis between the marketing organization and the sales force, for all marketing and sales support operations. This is the ultimate development stage of the marketing department.

## 10.2 The internal organization of the marketing structure

As discussed in previous chapters, the marketing organization must reflect the company's phase of business and market development. However, the organization of a marketing department also depends upon the size of the company's markets and its number of products. In some companies, the number of people working in the marketing department can be counted on one hand, but for large multinational companies personnel in marketing can exceed 10,000 worldwide.

Contrary to a popular image, size is not always a limitation to marketing radical innovations and especially for large incumbent companies. Actually, it has been shown that large incumbent firms are more likely to introduce radical innovations more successfully than small and nonincumbent firms. Being an incumbent is not always a curse as companies such as IBM, Microsoft, Oracle, and SAP have demonstrated convincingly in the recent past. However, in order to escape inertia and conservatism, they must break down organizational filters to open the organization to the external world and especially the market. They must also break organizational routines that

**Case Study: Cisco Systems**

In August 2001, Cisco Systems announced a new organizational structure. It moved from the company's existing "line of business" structure to centralized engineering and marketing organizations. Instead of five autonomous business units, the engineering organization was built around 11 new technology groups (namely Access, Aggregation, IP Core Routing, Ethernet Access, Internet Switching and Services, IOS Technologies Division, Network Management Services, Optical, Storage, Voice, Wireless), while marketing was to concentrate on communicating Cisco's unique technology differentiation.

Cisco Systems also announced several executive changes related to the new organizational structure. The new chief development officer was Mario Mazzola, an 8-year Cisco veteran and former senior vice president of Cisco's new business ventures group. The new marketing organization was managed by James Richardson, formerly senior vice president of the enterprise line of business, who was made chief marketing officer and was reporting to Cisco's president and CEO, John Chambers.

Cisco Systems had been through two major reorganizations in recent years. In 1995, it had created five distinct business units that reflected its major networking product groups, and had named a vice president/general manager to head each group. Each of the five business units—Workgroup, ATM High End, Access, Core, and IBM Internetworking—had its own marketing and engineering organization.

Then in 1997, Cisco Systems reorganized around lines of business to address two major new market opportunities: the service provider migration to IP services and the adoption of IP products by small and medium-sized businesses. Marketing was still within the business units. This organization paid off immensely. Cisco grew from $6.4 billion in 1997 to $22.3 billion in 2001.

However, Cisco Systems made the decision to reorganize again in 2001. As John Chambers articulated, "At the heart of this change are our customer requirements and our clear market transition opportunity. Our line of business structure has served us very well in the past, when customer segments and product requirements were very distinct. Today, the differences have blurred between these customer segments and Cisco is in a unique position to provide the industry's broadest family of products united under a consistent architecture designed to help our customers improve productivity and profitability."

Question 1: How would you characterize the evolution of the position of the marketing organization at Cisco among the various reorganizations?

Question 2: What are the pros and the cons of a centralized marketing organization?

are more often geared to develop incremental innovation based on an existing technology than radical product innovation [1].

The marketing structure must fit into the overall organization of the company while taking into account its management philosophy. A decentralized company will position the marketing structure close to the sales force, whereas a centralized company will prefer its marketing structure to be set up at headquarters; both cases can exist in high-tech companies.

Small and large high-tech companies have to decide whether to have a market-oriented or product-oriented, internal organization. In the high-tech industry, most frequently, companies organize their sales force by market (geographically and by customer type) and assign product managers for the most important products.

Some companies have organized their sales force and marketing by product. This approach is justified by the need to be familiar with products in order to sell them, especially if these products represent a major innovation. However, using a product-oriented approach could mean running the fairly large risk of losing touch with reality (market need).

IBM has experienced this type of problem. During the 1960s and 1970s, IBM structured its sales force by computer type; the main reason was the launch of a new, revolutionary model, the 360 system, which required special training for the sales force. In 1975, IBM had two organizations, one that sold mainframes and another that sold small business computers, peripherals, and typewriters.

Sales representatives from both groups quickly started competing against each other for a number of customers. As a result, customers became confused: Should they buy one large IBM computer or several smaller IBM systems? Because the sales force gave no clear answers, these customers often bought from other suppliers. In 1983, IBM finally decided to organize its sales force by customer type and separated large companies from the rest of the market and, in 1986, defined several geographic zones [2]. Since then, the organization has undergone several modifications, but it remains market-oriented and is no longer product-oriented. Its organization, entitled "Go to Market," is even more customer-focused around 12 vertical "industries," such as communication, distribution, education, finance, and government. Each industry executive is responsible for revenue, profit, and customer satisfaction.

More recently, in 2002, Nokia made a similar structural move. Instead of nine product business units, it set up four groups: two groups for consumer markets, Mobile Phones and Multimedia, and two groups for the business markets, Networks and Enterprise Solutions (see also Section 5.2). Mobile Phones offers a global range of mobile phones while Multimedia proposes mobile multimedia content (e.g., images, games, music). Networks offers network technology and related services based on major wireless standards, whereas Enterprise Solutions provides terminals and seamless mobile connectivity solutions. In addition to those four groups are corporate-wide sales, marketing, logistics, manufacturing, and technology units, as well as a corporate strategy, development, and research unit.

Large companies that sell a large number of products often employ product managers. Their role is to develop a product strategy (for which they are responsible), including a marketing plan and annual sales objectives. These product managers must keep the sales force and distributors excited about the product, organize advertising, and follow customer expectations to anticipate problems and capitalize on opportunities. They must also plan for product changes, together with other departments of the company, to respond more effectively to the needs of different markets.

Some companies, mostly in consumer goods and services, have brand managers who are responsible for a single brand. Besides the product manager and the brand manager, the marketing manager is in charge of managing the marketing activities that serve a particular group of customers; for instance, a company that serves the industrial market and consumer market may have one marketing manager for each of these two markets.

High-tech product managers, like their colleagues in more traditional companies, do not have any linear authority on other departments. They have all the accountability and none of the power. They must convince these departments because they can never "force" their ideas. Therefore, they must have a solid technical education and field experience (with customers) in order to have significant credibility with researchers, manufacturing engineers, and the sales force. They must also have a strong political sense to motivate the various organizations they are depending on. Anecdotally, one software product manager jokingly observed that to succeed it helps to have the reflexes of a juggler (to help keep multiple balls in the air), the nose of a basset hound (to help sniff out the political winds), and the skin of rhinoceros (to help deflect the poison darts that will be coming your way [3]).

The marketing structure also performs sales support functions (for example, brochures and product documentation); communication (trade shows, media relations, advertising); and market studies, when necessary. In order to achieve all those activities, the marketers have to rely increasingly on information technologies (IT) for the following reasons.

First, IT helps the marketer to collect, screen, and analyze all the marketing-related information available before its introduction in the decision-making process. Of particular interest are the new data mining application software programs like Clementine from SPSS, Oracle 9i Data Mining from Oracle or Intelligent Miner from IBM. These application software programs, coupled with large customers databases, allow the marketer to identify market segments easily and quickly using various techniques like clustering, classification, association, and sequential buying patterns identification. Second, IT is also being used to enhance the support operation. Finally, IT may increase the value of service to customers.

Finally, successful high-tech firms, especially the large ones, have a knack for nurturing the emergence of product "champions" who will help to push radical innovation-as well as incremental improvement-through the bureaucratic layers of a firm [4]. Being passionate and persuasive, champions keep projects alive and they influence others to divert resources to the advocated project.

A famous product champion at IBM was Malcolm Haines, a 25-year veteran at IBM, who was in charge of the operating system OS400 running on the IBM middle range AS400 family of computers. Dubbed the OS/400 platform's "Minister of Propaganda," Haines had managed to win respect from the tough AS/400 customer base, through aggressive and creative advertising campaigns, using graffiti messages on the walls of London or giant blimps in the sky of Los Angeles. But he was also internally credited with leading the design of OS/400's advanced architecture. Within IBM, Haines was a passionate advocate of AS400 always pushing its product family against other IBM platforms.

Recent research shows that champions arise from all levels in the marketing organization. Interestingly, champions do not emerge in marketing alone, but also in the R&D department, as well as in the production and operations or even at the general managers' level [5].

## 10.3 The necessity for interdepartmental cooperation

High-tech firms with a winning record of performance even through down cycles have integrated the marketing organization into the rest of the company. Because its responsibility is to market products that fit customers' needs at the right time and with the right level of quality, the marketing organization has to work first with all the other departments, not only with R&D, but also with the manufacturing and the services departments.

### 10.3.1 Collaboration with research and development

In the high-tech sector one of the first basic recipes for success is to foster the collaboration between the R&D and the marketing organization [6]. But experience shows that this is easier said than done. Cultural differences are merely one of the main reasons for the difficulty, as listed in Table 10.1. Rifts between the two organizations can be found not only in large firms, where

**Table 10.1** Some Cultural Differences Between Marketing and Research and Development Professionals

| *Dimension* | *Marketing* | *R&D* |
|---|---|---|
| Education | Business | Engineering, sciences |
| Training | General problem solving | Testing hypothesis |
| Time orientation | Short | Long |
| Professional orientation | Market and profit | Science and progress |
| Language | Product benefits and positioning | Product specification and performance |

*Source:* [7].

the departments may be separated geographically, but even in smaller firms where departments are actually closer.

Indeed, marketing professionals usually have a business background, even if it is good also to have a technical background in the high-technology industry. They are trained to combine data and intuition in order to answer general problems and to make profit-oriented business decisions, generally within a short time frame. They talk of markets, product benefits, and perceptual positioning for customers.

Conversely, research and development professionals generally have an engineering or sciences background. They are trained to generate and then test hypotheses in order to resolve technical problems and to promote scientific development on a long-term basis. They talk of product specifications and performance.

All these differences are frequently intensified by structure [8] and by geography since research and development departments are located on an outside campus, while marketers are close to markets or at headquarters. This leads to less interpersonal activity and strengthens separate worlds of thought.

Numerous product failures can be chalked up to a disastrous lack of cooperation between the marketing and research and development departments. For instance, it is said that Novell folded up its third-party software development center in 1997 at the same moment Microsoft was launching Windows NT and enticing the software development community to develop applications in Windows instead of using the popular Novell NetWare Loadable Modules (NLMs). This decision was almost fatal to Novell [9].

Another famous case is Xerox whose research lab, the famous Xerox PARC, invented more or less all the technologies for the personal computer, the laser printer and the Ethernet, among others. But Xerox, and most specifically its strategic marketing structure failed to build a business on those inventions, mostly missing the PC market [10] though the firm managed to make some money out of the Laser Printer business [11]. Also Ken Olsen was quoted as attributing his downfall at DEC in 1992, the company he founded, to a lack of communication between R&D and marketing [12].

Indeed, the rivalry between those two structures can derail the most promising future of a new high-tech product, as R&D's people tend to use less of the information from the marketing department, or even ignore it [13]. However the integration of R&D and marketing is extremely important especially to enforce the effectiveness of new product development [14].

On one hand, R&D needs marketing's market vision and guidance for the general direction of research. On the other hand, marketing needs R&D to invent products that correspond to the customer needs identified by marketing. Successful high-technology companies do not emphasize this necessary cooperation between their R&D and marketing organizations by chance. They know that on their own these two departments are meaningless, but together they can perform miracles. Actually, without consistent market-oriented programs, research will go round in circles.

However, this organizational link is often easier to discuss than to create. The initiative must come from upper management, which must affirm the priority of cooperation and, as a result, must make available the necessary resources to make it happen.

Under the stern leadership of founder Larry Ellis, Oracle was one of the first successful firms to break down the barriers between R&D and marketing using the same software engineering product "Case" that served as a common language for product developers and marketing managers. Using "Case," developers generated the software program and marketing generated the product documentation on the same basis, making it easier for customers to use. These days, this type of approach has become the norm in the software industry [15].

Moreover, for the most part, the time period preceding a new product announcement is filled with frequent communication between the R&D and marketing departments. Figure 10.2 summarizes the main movements related to the materialization of a new product.

At the onset, marketing gives the new product functional requirements that correspond to customer demand. Marketing will also indicate the desired time period for introducing this product to the market and possibly a budget for product development costs and maximum manufacturing costs.

Based upon these indications, the R&D service—in connection with the manufacturing department—will develop the necessary technical specifications based upon technologies that exist within the company and those available on the market. However, dreams and realities can lie far apart. Researchers can invent technical wonders, but they will come up against a certain number of physical constraints due to limitations in today's knowledge, as well as financial limits.

The technical answer is approved by the marketing service if it believes that the proposed solution correctly corresponds to market expectations, even if the product differs from what was originally imagined. At this stage, all innovations that come directly from researchers are usually screened. Brilliant ideas (new products, new applications) must always be compared to customer expectations.

Taking into account these different elements, the company decides whether to continue with this product. If the project is accepted, the development service will build one or more prototypes to verify the consistency and feasibility of the technical selections. The characteristics of this prototype help marketing in performing a value analysis of this product using a certain number of representative customers and prospects.

If the value analysis appears positive, the development department will start working with the manufacturing department on the manufacturing of a prototype, which several customers are then asked to test. The marketing department will analyze customer reactions in order to measure the new product's rate of acceptance and to detect a possible need for (additional) modifications. If the product is favorably received during testing, the marketing department will also prepare sales projections (revenue) and

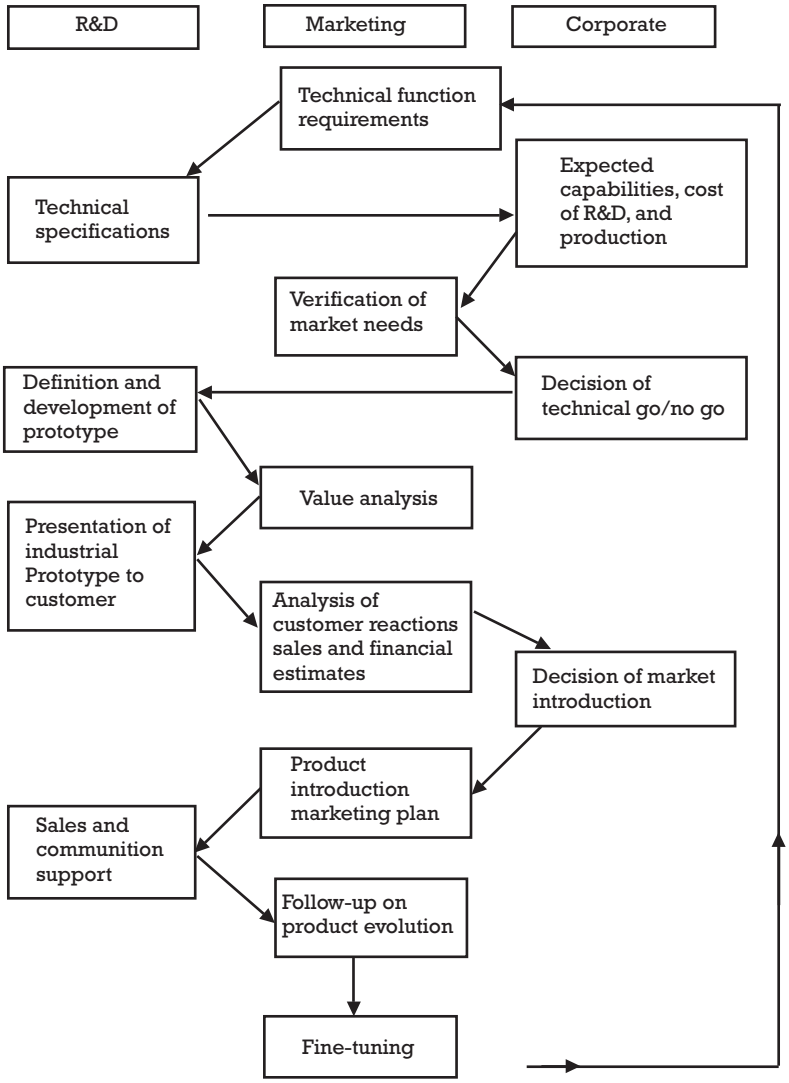


**Figure 10.2** Links between R&D and marketing during a product's life.

financial estimates (profit) that will justify the investments necessary for launching a new product.

At this stage, upper management must decide whether or not to put the product on the market. If it agrees to do so, the marketing department will finalize its marketing plan and prepare all necessary product-launching activities. Similarly, the manufacturing department will set up, in cooperation with product development engineers, a manufacturing process and assembly for the new product.

After the product has been marketed, the R&D department will appear again because it often plays an important role in communication; its researchers participate in conferences and write about the new products for professional journals. In certain cases, particularly for products in industrial

markets, these researchers contribute to the sales effort by performing product demonstrations to convince customers that the product does what they said it would.

Finally, marketing will continuously keep track of the product. User reactions will lead to possible new improvements and will be translated into functional specifications before being passed on to the R&D department. The product has now come full circle, and a new cooperative cycle begins.

This cooperation process varies from company to company. In some companies, the marketing department has the authority and necessary power to work with the research and development department. In other companies, this initiative comes from research's engineers who consult the marketing department to verify that they are on the right track and that their ideas truly correspond to a market need.

Some companies have adopted an extremely formal communication process between the two departments like the quality function deployment that was developed in Japan but is now widely used in western countries. Quality function deployment requires marketing and research and development to build a "house of quality" by clarifying and quantifying their assumptions and then translating them to one another through a relationship matrix. Such a process prevents misunderstandings and requires each group to explain their own thought world. Exchanging specifications and verification procedures requires formal documentation to ensure the consideration of all steps.

However, U.S. and Japanese companies have distinct ways of integrating their departments. For instance, Japanese firms often have less integration when conducting market survey and product launching. However, Japanese culture's emphasis on community mitigates against one or the other department acting completely autonomously, which makes this departmental differentiation easier to implement than in U.S. firms that have a more individualist culture [16].

Other companies prefer informal relations and encourage any form of communication. An electronics company even reorganized its office space so that product development engineers and marketing managers can work together more easily.

Ultimately, some firms try to integrate the two departments in various organizational structures such as permanent coordinating groups, matrix organizations, and project teams (which are less confusing and more efficient than a matrix structure). The goal is to stimulate cross-functional information; to improve the decision-making process, including conflict resolution; to decrease project uncertainties; and to shorten the time spent on new product development. Experience teaches that short project duration is more effective than long-term or permanent structure, because the former improves integration without significantly diminishing the functional expertise of each team member.

The distance and isolation of these two departments could spell danger for high-technology companies. Traditionally, research laboratories are separated from the rest of a company so that researchers can be in a more

innovative environment [17], devote their time to scholarly thoughts and be close to a university or other research centers. However, companies should not forget that technology in itself is worthless without customers [18].

In order to break down this ivory tower and prevent a company from getting lost in techno-mania, marketing people and researchers should work together. They should be grouped together by project managers or be joined in a task force.

### 10.3.2 Collaboration with manufacturing and customer service

The manufacturing-marketing interaction [19] has been a key success factor for many thriving high-tech firms. One of the main reasons is the extreme importance to optimize the time-to-market for high-tech products.

As seen in Chapter 9, the first company in a market can usually demand a higher price, as its risk premium, and therefore earn a higher profit margin. On the other hand, companies that trail behind competitors and enter a market where prices have started to drop often end up in financial disaster.

One researcher has calculated that introducing a laser printer 6 months late could lower cumulative profits by 30% (based upon a 20% annual market growth, a 12% annual price decrease, and a 5-year product life cycle) [20]. On the other hand, a product development program that runs 30% over budget will only reduce cumulative profits by 2.3%. A vice president at Hewlett-Packard noted: "If we overspend by 50% on our engineering budget, but deliver on time, it impacts 10% on revenue. But, if we are late, it can impact up to 30% on revenues."

The entire company should be ready to make a product launch a success-and this should be double-checked. Manufacturing problems can considerably contribute to a restrained product launch, even more so because new technologies involve more and more complex manufacturing constraints. In the manufacturing of DRAM computer memory chips, the number of process steps has doubled in the last years while it require temperatures above 1,000°C; and manufacturing is getting increasingly more complex with the new generation of embedded DRAM. Similarly, in the beginning of the 1980s, the manufacturing of photocopiers simply consisted of assembling the light source and a toner system with a mechanical system to move a piece of paper. Nowadays, copiers resemble computers and contain control hardware and software, panel displays, and organic photoreceptors. The same trend is affecting the technology in cell phone handsets, which are no longer simple phones but include flash memories, cameras, an image sensor, LCD display (supporting more than 260,000 colors), navigation wheel, and many other components.

This greater operational sophistication obviously requires a fundamental adaptation of the manufacturing department (including purchasing) and the customer service department. From the beginning, all departments in a company must work together even if their degree of involvement varies along the process. The manufacturing department must be included from

the beginning of the prototyping phase in order to pinpoint possible difficulties in mass production and suggest improvements in product design. This cooperation can lead to precious timesavings when compared with competitors who discover manufacturing problems only after a product launch has been carried out. In any case, it is also a guarantee of a better manufacturing quality.

Besides, in many high-technology businesses where product life cycles are short and demand is unpredictable, delivery performance is critical. When the delivery process is slow, it is usually because of a long lead time, which distorts sales forecasts. When the manufacturing department does not respond quickly enough, the sales department overstates the customer's commitment or the size of its orders to build in a safety margin. Consequently, production schedules and inventories do not match real demand and late changes have to be made to orders in the factory, adding more lead-time to the process.

The solutions are not only an improvement of the sales forecast, planning meetings or the use of computer-integrated production planning. Efficient high-tech companies have also included the manufacturing viewpoint in their product development policies and strategic plans [21]. In addition, they have deployed task forces or permanent multifunction teams organized by segment of customers and products to effectively manage the order-to-payment process. The ultimate step is having a just-in-time production system like the one utilized by Dell, which builds most of its products on receipt of a customer order.

This ability of manufacturing to respond quickly to changing customer requirements has been labeled as "Agile manufacturing" [22]. It demands a system that can produce effectively a large variety of products and that can be reconfigured swiftly to cope with any change in the product design. It is not based on technology alone but on the strategic capacity to take into account the market change through vision, strategy, and organization [23]. Consequently, communication between the manufacturing organization and the marketing structure is of primary importance to develop better relationships between the two departments [24] in order constantly to balance the adjustment between market demand and the firm's supply [25]. Communication also helps to reduce the differences between departments' perceptions of goals, which are often creating interdepartmental conflicts [26].

Furthermore, research engineers are usually preoccupied with technical product performance and marketing managers are often unaware of the fact that a product tends to malfunction and the amount of time necessary for repair, but these are the major reasons why users of high-technology product are dissatisfied. Therefore, installation and maintenance departments can also provide useful advice at the original steps of the development of a product. Because these departments have a good knowledge of problems due to their amount of customer contact, they will support simplicity and consistency during prototype development.

For Nintendo, the Japanese manufacturer of the most popular video games, customer service is a true marketing resource. More than 120

teenagers, called "game advisors," are available to give advice on the best way to play "Donkey Kong" or "Ninja Turtles." Weekly telephone calls number 50,000; these calls are analyzed to study the expectations of a very versatile group of young customers. Using this strategy, Nintendo came out with the most varied and most liked product range in an industry with more than 250 different games.

Finally, not only must products be launched very quickly, but also, at the same time, they must have a very high quality. Accordingly, one new driving force to a better cooperation between the marketing department and the other departments (such as R&D, manufacturing, and customer service) is the ISO 9000 certification. This standard provides a framework for telling clients the way a firm tests products, keeps records, fixes defects, and trains employees. According to the International Organization for Standardization—the body that governs ISO—it had issued 510,616 ISO 9000 certificates worldwide by December 2001 [27]. While the ISO is defining the standards, it does not itself issues certificates of conformity. Different certification bodies in each country independently check whether a company conforms to the accepted standards. Those organizations, such as ANSI in the United States, AFNOR in France or JISC in Japan, are using assessors who conduct audits, determine nonconformities to standards, and approve corrective actions, before making the accreditation.

The ISO certification process is an effective way to improve business performance. Among the ISO-certified companies, 62% have increased sales, 54% have increased market share, 57% have decreased the cost of quality, 37% have increased export growth and 20% have increased employee retention.

ISO 9000 is a European standard of quality management that has been adopted by more than 120 countries, including the United States, Canada, Japan, and all the members of the European Union. Philips Electronics, General Electric, British Telecom, to name a few, and all the other large high-tech firms are certified and request suppliers to adopt ISO 9000.

ISO 9000 has become an internationally recognized system, understandable to sellers and customers (much more than the American Malcolm Baldridge award). By putting the emphasis on quality and forcing companies to pass the certificate exam, ISO 9000 has driven many firms to reconsider seriously the whole process of communication between the various departments involved in the design, production, and marketing of new products.

An interesting example is the case of Amadeus, a leading global distribution system (GDS) and technology provider for the travel and tourism industry. Amadeus mostly competes with Sabre and Galileo. Amadeus created its Quality Management department in 1997 and in 1998 Amadeus was the first GDS to receive ISO 9002 certification, which covers best practices in product and service quality delivery. The benefits quickly impacted customers, as reflected in a 15% to 20% improvement of customer ratings in customer satisfaction surveys.

In 2001 Amadeus was the first GDS, and one of the first companies in the world, to receive ISO 9001:2000 standard. Because, ISO 9001:2000

deals with the management practice and organizational requirements of managing successfully for quality, Amadeus used ISO 9001:2000 as the foundation of a company-wide quality initiative, encompassing every division and department. The goal of achieving ISO 9001:2000 recognition was to improve further the company's ability to develop and deliver its products (i.e., GDS products, IT services as well as e-commerce and e-business solutions) better, faster, and more efficiently, in accordance with customer requirements.

Today, quality is no longer an element of marketing differentiation because it is now a given for the customers. Currently no customer would accept a major quality problem from a high-tech branded product. However, the quality challenge is still important for the small and medium size high-tech firms.

### 10.3.3 Organizing cooperation among departments

In order to minimize or escape the time- and money-wasting conflicts between departments, it is the responsibility of top management to provide clear goals to each department and to align them as much as possible. Cross-functional involvement is also a key success factor to prevent most of the conflicts [28]. Consequently, the most successful high-tech firms have managed to redesign the company's structure and organization focusing on key processes more than departments.

To ensure true team work between all departments, the issue is to move from a linear sequence, where everyone works in his or her own field of expertise and transmits the results of his or her work to the next department, to an integrated structure, where everyone works together to propose quality solutions that respond to customer needs, as is shown in Figure 10.3.

In the model for traditional organizations in Figure 10.3, R&D generates new products and develops prototypes. Manufacturing purchases the required resources and produces the items that are then sold by marketing and installed and repaired by maintenance. In a high-tech organization, which is founded on customers, departments communicate with each other continuously during the entire product life cycle. Marketing is the preferred interface with the customer, which allows this type of organization to come up with new ideas for product improvement. A "just-in-time" and flexible production is needed but should guarantee high-quality and satisfying customer service.

In order for this type of cooperation to succeed, successful companies use a combination of variables taking into account the local culture [29]. Those variables include physical proximity, information and communication technology such as Intranet, the same remuneration and career opportunities for marketing and R&D, job rotation and cross-functional teams [30].

Indeed, many successful high-tech firms are developing new products using integrated teams that consist of members from each department [31] in a process that is sometimes called concurrent engineering. Concurrent engineering can be defined as the simultaneous performance of product

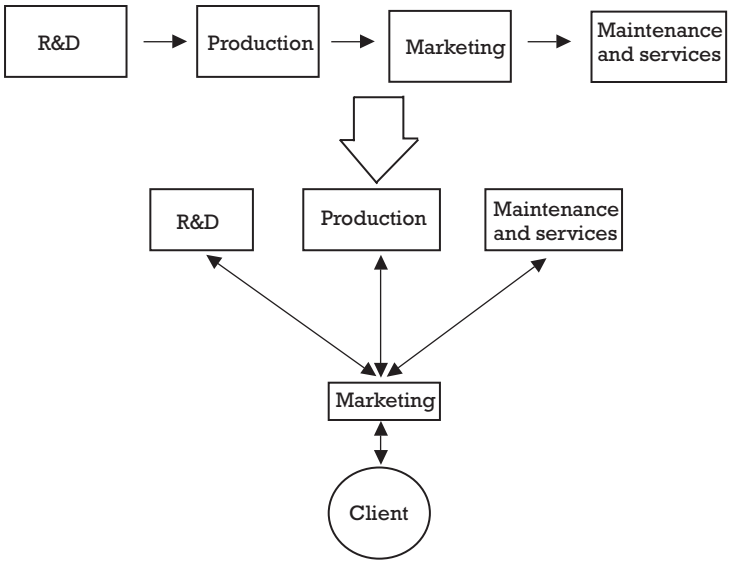


**Figure 10.3** From a traditional organization to a multifunctional organization.

design and process design. This allows engineers and managers of different disciplines to work together simultaneously in developing product and process design [32]. Some teams even integrate outside suppliers and customers who become involved at a very early stage in the extended supply chain, outlining a virtual enterprise [33]. Such integration is made even easier and cheaper with the emergence of new communication tools based on Internet standard protocols [34]. Western Digital was one of the first companies to implement this type of structure successfully to develop disk storage controllers for computers.

More recently Xerox relied on the same structure, dubbed Extended Enterprise, moving several design and development activities of digital copier/printers to its suppliers while concentrating on its R&D's strength in systems engineering. There were only 24 engineers on the development team instead of the usual 150 engineers in the traditional development structure.

Key benefits of this new approach were significant cost savings as well as better time to market. Development costs for digital products were down by 30% compared to those for equivalent analog models. Time to market was cut by half from more then 4 years to just 2 years.

Indeed, successful high-tech companies also consider time as a major strategic variable to get the upper hand on their competitors. Today leading PC vendors are developing new products in 10 months when they needed more than double that time 2 years ago. To achieve such a dramatic result, they reconsidered their product development technology, as for instance, Compaq's design of application-specific integrated circuits (ASICS). Using electronic simulation software to eliminate the flaws in the conception of the circuits before making silicon prototypes, Compaq managed to cut

development time by more than half by limiting the number of iterations between the computer maker and its chip suppliers.

Multifunctional project teams do not become successful overnight. By definition, these teams go against a company's traditional linear functional organization and can clash with an established company hierarchy. So, upper management's support is necessary to assure the success of project development teams. Executives must understand the importance of knowing how to manage innovation and to supervise both innovation and changes in the business environment with all departments in the company in a simultaneous and coordinated manner. This change is necessary if a company wants to respond to customer expectations more effectively and efficiently, and to surpass competitors in profitability. Upper management must also plan for project team evaluation and motivation systems related to the assigned objectives such as improvements on market introduction intervals.

For instance, when the General Electric Aircraft Engine Business Group found that its jet engine customers were not happy with the service component of what they offered. Thus the group initiated a CRM project (see also Chapter 3, Section 3.3) based on a thorough understanding of customers' genuine expectations. It showed that what customers expected most was to improve their productivity. After the results came back, the group made some major changes in its organization. First, it included new metrics based on customer requirements to traditional functional metrics. Second, it reorganized the sales, marketing, and product support groups around customer-facing processes rather than functions. Third, it assigned a corporate vice president to each of the top 50 customers, giving customers direct access to the top management of the Business Group. Fourth, the group put leaders of their six-sigma quality program on site with customers to provide training and work closely on engine-service projects and parts inventory management. Finally, the group incorporated customer-service metrics and rewards into the employee evaluation criteria. Throughout the process, all employees were kept informed of new developments. This new organization worked very effectively and today, the group routinely gets high satisfaction ratings from customers [35].

At any rate, the marketing department also plays a fundamental role in the acceptance of this multifunctional approach. As customer representatives responsible for customer interests, the marketing department is in the best position to serve as intermediary and team coordinator, of which the main objective always is to serve customer needs. Without waiting for upper management's impetus, the marketing department must take the initiative to organize this necessary cooperation between all departments in order to assure the success of its commercialization policy.

## 10.4 Summary

The marketing organization plays a vital role in implementing a marketing strategy and in deploying marketing operations effectively. Successful

high-tech firms first deliberately define the place of their marketing structure within the whole organization of the company.

The position of the marketing department in a company changes along with the company's growth stages. In the beginning, marketing starts off as a support of the sales force. When company growth leads to new products, marketing becomes independent from the sales department. This change can cause conflicts since these two departments have neither the same time horizon nor the same views on relations with the research and development department. Leading companies include sales within the responsibility of the marketing organization.

Leading high-tech firms also design the internal organization of their marketing structure with the utmost attention and care. More specifically, within the marketing structure, these companies tend to organize the sales force by market instead of by product, very often with a centralized marketing organization reporting directly to the CEO. Yet they have product managers for the most important products. They also significantly invest in technology so that the marketers can get the most of all the marketing related information.

Finally winning high-tech companies try to optimize the cooperation of the marketing structure with all the other departments. They push for strong and direct teamwork with the research and development department at all stages of product development, from prototyping to customer service. However, they also expand the collaboration to the manufacturing and customer service departments so as to shorten the time between conception and product introduction, and to increase product quality.

This collaboration is one of the key success factors of the most profitable high-technology companies, and upper management must back it wholeheartedly. However, the marketing department plays an important role in its application because, as a representative of customers, it is in the best position to nurture multifunctional cooperation.

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**Appendix A**

# Key Success Factors of a Marketing Department in a High-Tech Company

When asked for the key abilities that a marketing department must manage in order to be highly successful, experienced marketing managers of major high-tech firms gave the following answers (see Figure A.1, which was based on interviews that I conducted):

1. Knowledge of customers and assessments of their future needs are the first priorities, which perfectly corresponds to the marketing department's objectives: the analysis of market needs. This first priority justifies marketing's existence and its credibility within the company.
2. Close coordination with the sales department is a necessity. The sales force is the only informational source readily available in ever-changing markets. The sales force is in contact with customers whose impressions, opinions, and attitudes can be relayed to the marketing department. Finally, sales representatives participate in the execution of the marketing plan and are essential in the strategy's success. Marketing helps the sales force by supplying information on and training for new products. All these efforts must then be communicated to customers. For the two departments to work together efficiently, there should be no waste or loss of energy between them.
3. Awareness of the company's abilities is essential for the development of a realistic marketing strategy. Proposing new products is useless if the company does not have the necessary technical and financial abilities to materialize new products. Targeting a large number of markets with a sales force that is limited in size is also

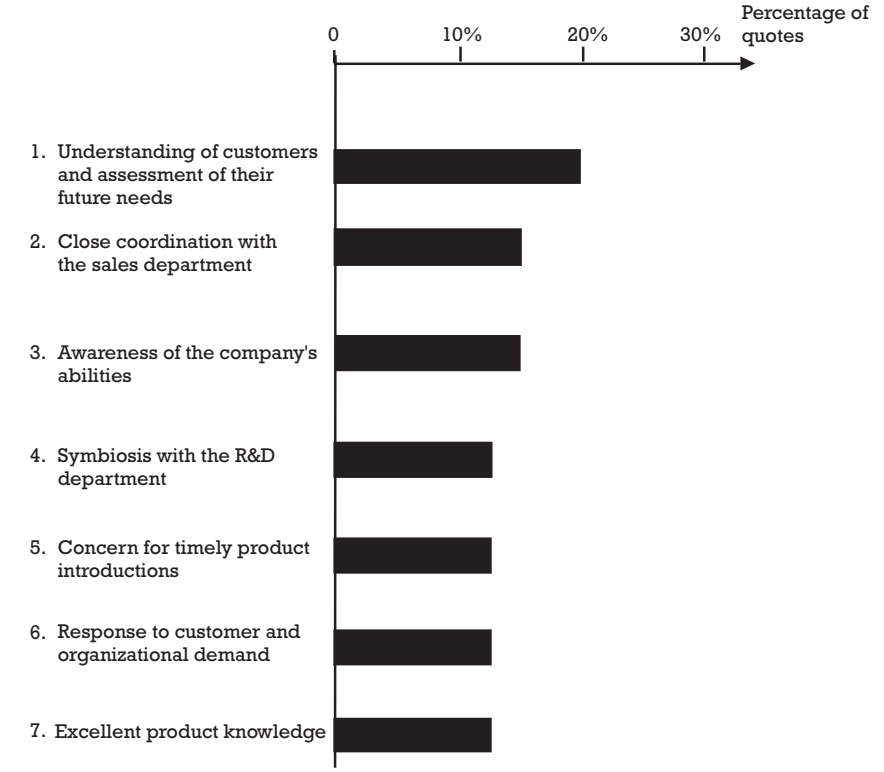


**Figure A.1** Success factors of a marketing department in a high-tech company.

futile. Many examples of failed marketing strategies exist; these are failures due to a lack of needed resources.

4. Symbiosis with the research and development department is a necessity in the high-tech industry. Reasons for this symbiosis were explained in Chapter 10; marketing managers confirm that this cooperation must be part of the marketing team's day-to-day activities.
5. Concern for timely product introductions is imperative in an aggressive competitive environment with shortened product life cycles. The rules of the game are constantly changing; the first company in a market often comes away as the winner. In addition, a delay in a product's introduction usually has serious financial consequences that can increase the pressure on the marketing department to market products at the right place and time.
6. Response to customer and organizational demand is characteristic of the highly competitive and ever-changing high-tech industry. The marketing department must answer all questions quickly; if not, it will risk losing its credibility.

7. Excellent knowledge of the product is also necessary in order to establish credibility with the sales force, customers, and research and development, and manufacturing departments. In the high-technology industry, technology plays an important role, but it must be dedicated to meeting customer needs.

To bridge the gap between products and markets, the marketing department must understand in order both to translate customer demands into technical features and vice versa.

## Appendix B

# The Marketing Plan

Because the high-tech business is highly volatile due to the breathtaking evolution of technology, the number of competitors and their moves, and market needs and attitudes, a marketing plan is very important for any marketing manager who wants to make a success of product management. A marketing plan is a systematic process that involves evaluating marketing opportunities and resources, determining marketing objectives, and developing a plan for implementation and control. The marketing plan outlines the company's strategy to create, satisfy, and keep customers [1].

The strategic marketing plan, for 3 years or more, translates how managers perceive their marketing advantage, what objectives they want to achieve, their strategies to achieve them, the resources required, and the expected results. The operational marketing plan is the detailed scheduling and budgeting of the actions necessary for the achievement of the first year of the strategic marketing plan. According to McDonald [2], the two principal benefits of a marketing plan are greater profitability (than nonplanning companies over time) and improved productivity. These benefits stem from:

- Systematic identification of emerging opportunities and threats;
- Specification of sustainable competitive advantage;
- Improved communication between executives; Involvement of all levels of management in the process;
- More appropriate allocation of scarce resources;
- Consistency of approach throughout the organization;
- More market-focused orientation throughout the organization.

The items that should appear in a strategic marketing plan are:

1. Executive summary.

2. Objectives:
   - Company mission;
   - Financial objectives;
   - Marketing objectives.
3. Marketing analysis:
   - Markets/ products overview;
   - Marketing macroenvironment trends;
   - Competition situation;
   - Distribution situation.
4. SWOT analysis:
   - Strength and weaknesses of current marketing strategies;
   - Opportunities and threats;
   - Issues to be addressed.
5. Marketing strategies:
   - Segments;
   - Competitive advantage (by segment);
   - Positioning (by segment);
   - Major decisions about all the elements of the marketing mix;
   - Cooperation needed with the other departments.
6. Marketing action programs:
   - Marketing mixes by segment: product, price, promotion, and place;
   - Tasks and responsibilities.
7. Budget.
8. Controls and contingency plans.

The executive summary is a concise overview of the report for quick management skimming. It includes overall strategies, main conclusions, and key points of the marketing action programs. A table of contents must follow the executive summary.

Objectives give perspective to the report. They refer to the organization's mission statement, including the definition of the business and the contribution of the unit as well as its distinctive competence. The financial objectives are those expected from the business unit: return on investment, net profit, and cash flow.

Those financial objectives are translated into marketing objectives. A marketing objective is a statement of what is to be accomplished through marketing activities, in terms of gains in market share, sales volume, profitability per unit, degree of product introduction, and innovation. It must be stated in a measurable form ("increase market share by 10%") with a given

time frame ("within the next 15 months") and internally consistent ("following the launching of our new product X").

The marketing analysis is the foundation of the marketing programs. The market/product overview helps the unfamiliar reader understand the marketing plan. It provides the necessary background about the market segments that are served as well as a brief summary of the past performance and history of the products on each of those segments.

Marketing analysis also includes a description and an evaluation of the major key macroenvironment trends, most specifically technological, economic, political, and legal. The competition situation introduces the major competitors described in terms of their size, goals, products, marketing strategies, and any other relevant characteristic. Initially, the distribution situation presents facts and data on the products split by channel the changing importance of each channel, in terms of volume and bargaining power (that is, the prices and trade conditions that are necessary to motivate them).

The SWOT analysis provides the rationale for the marketing strategy. On one hand, it identifies the strengths and weaknesses of current marketing strategies; on the other hand, it reviews the opportunities and threats of outside factors that can affect the future of the business. The results of the SWOT analysis define the main issues to be addressed in the plan. The marketing strategies section presents a broad overview of the plan. It defines the targeted market segments and outlines the competitive advantage of the product on these segments as well as its positioning. It introduces strategic decisions about all the elements of the marketing mix, that is, the product strategy, the pricing strategy, the communication strategy, and the distribution strategy as well as the required needs of marketing research. Finally, it mentions the main avenues of cooperation with the other departments of the firm that are required to reach each of the targeted segments.

The marketing action program details precisely all the elements of the marketing mix and defines what is to be done, when, by whom, and how much it will cost. It lists all the activities that are required to implement the marketing plan and to achieve the marketing objectives. It is of key importance to check that all the tasks have been addressed and the responsibilities for action clearly identified.

The action plan translates into a supporting budget that looks like a profit-and-loss projected statement. On the revenue side are the forecasted sales volumes in unit and the average price; entries on the expense side include the cost of production, the cost of physical distribution, and all the costs of marketing: product development, advertising, distribution channel training and development, sales force training and compensation, and marketing research.

Finally, the controls section details the manner in which the performance of the plan will be measured, as well as the schedule by which to monitor its progress by comparing results versus objectives. More specifically for

the field of high-tech products, where the environment and markets change at breakneck speed, contingency plans that are designed for implementation in case of some specific adverse event, like a delay in new product launching because of technical problems or the earliest entry on the market of a new competitor, may be outlined.

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