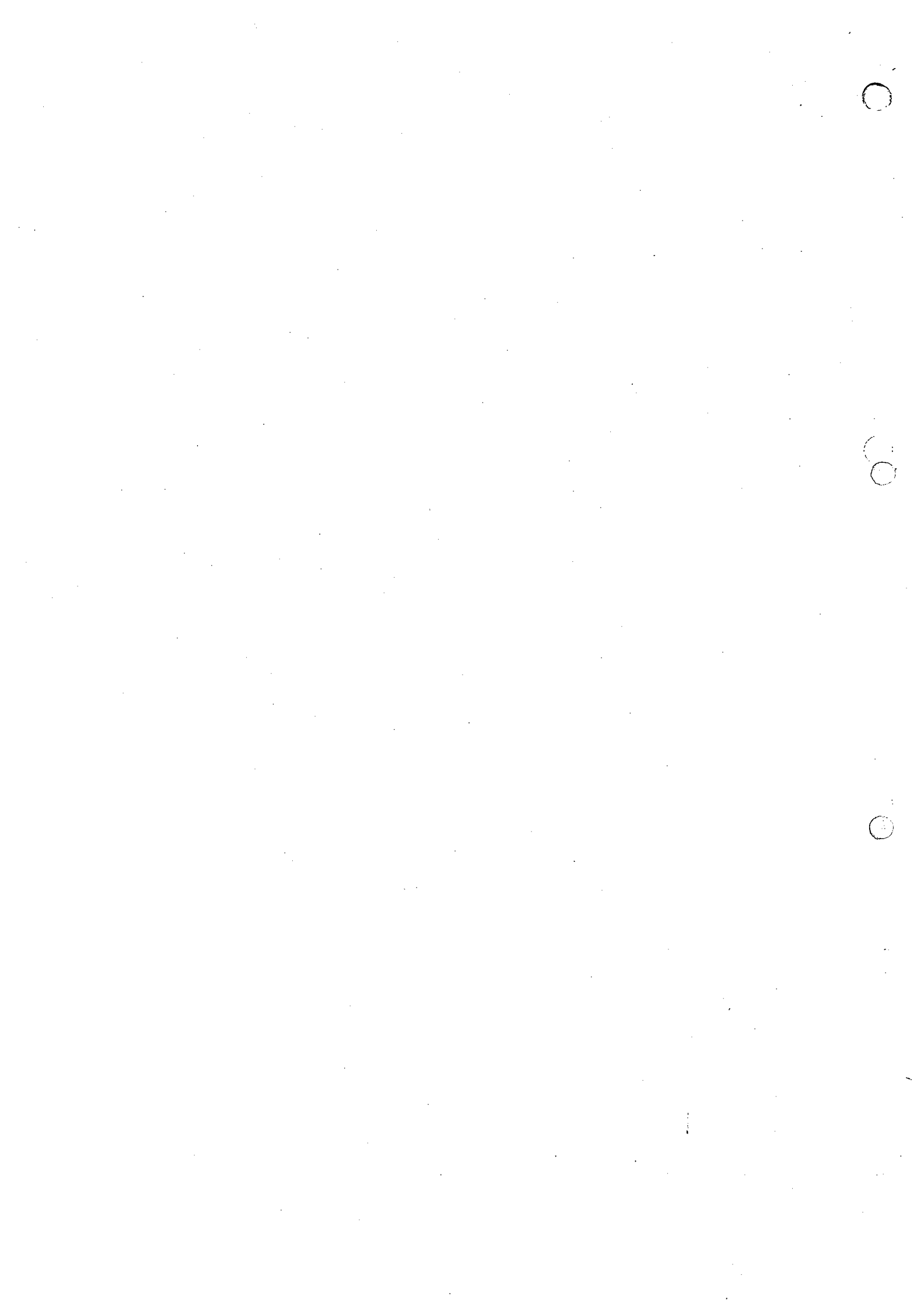


**CROWN, CORK AND
SEAL**



Crown Cork and Seal

Readings: P. Ghemawat, "Sustainable Advantage", HBR # 86507

Case Summary

Crown Cork & Seal has had an unusual success in competing in the metal container industry. The industry itself has been plagued by both technological change and by maturation of its market. This case allows you to examine both the strategy with which the company successfully competed against the giants, and the management style by which the company was run.

Questions

1. What are the most significant factors affecting competition in the metal container industry?
2. Have these factors changed over time?
3. What strategy does Crown Cork have for competing in this industry?
4. What advantages, if any, does a firm the size of Crown Cork have over American Can and Continental Can?
5. How would you explain the comparisons shown in Exhibit 3 in the case?
6. Identify and discuss the major problems facing Crown, Cork and Seal.
7. What recommendations would you make to John Connelly as of the end of the case?

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Crown Cork and Seal Company, Inc.

Karen D. Gordon and John P. Reed, research assistants, prepared this case under the direction of then Assistant Professor Richard Hamermesh as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

In 1977, Crown Cork and Seal Company was the fourth largest producer of metal cans and crowns¹ in the United States. Under John Connelly, chairman and CEO, Crown had raised itself up from near bankruptcy in 1957. After 20 years of consistent growth, the company had emerged as a major force in both the domestic and international metal container markets (see *Exhibit 1*).

During those 20 years, Crown Cork and Seal had concentrated its manufacturing efforts on tin-plated cans for holding beer, soft drinks, and aerosol products. By 1977, however, the ozone controversy and the trend toward legislative regulation of nonreturnable containers was threatening Crown's domestic business. Was it time for a change in Crown's formula for success or merely time for a reaffirmation of Connelly's basic strategic choices?

To explore these questions, this case looks at the metal container industry, Crown's strategy and position within that industry, and the nature of the problems facing the company during mid-1977.

The Metal Container Industry in 1977

The metal container industry included 100 firms and a vast number of product lines. This section describes the product segments in which Crown competed, examines the industry's competitive structure, and looks at three industrywide trends: (1) increasing self-manufacture, (2) new material introductions, and (3) the effect of the "packaging revolution" on the competitive atmosphere.

1. Crowns are flanged bottle caps, originally made with an insert of natural cork—hence the name Crown Cork and Seal.

The Products

Metal containers made up almost a third of all packaging products used in the U.S. in 1976. Metal containers included traditional steel and aluminum cans, foil containers, and metal drums and pails of all shapes and sizes. Of these, metal cans were the largest segment, reaching a value of \$7.1 billion in 1976. Cans were being used in more than three-fourths of all metal-container shipments.

Cans were composed of two basic raw materials: aluminum and tin-plated steel. Originally, they were formed by rolling a sheet of metal, soldering it, cutting it to the right size, and attaching two ends, thereby forming a three-piece, seamed can. In the late 1960s, a new process introduced by the aluminum industry made possible a two-piece can. The new can was formed by pushing a flat blank of metal into a deep cup, which eliminated the need for a separate bottom. The product makers adopted the term "drawn and ironed" from the molding procedure.

The aluminum companies that developed the process, Alcoa and Reynolds, had done so with the intention of turning the process over to can manufacturers and subsequently increasing raw material sales. However, when the manufac-

turers were reluctant to incur the large costs involved in line changeovers, the two aluminum companies began building their own two-piece lines and competing directly in the end market.

The new can had advantages in weight, labor, and materials costs and was recommended by the Food and Drug Administration, which was worried about lead from soldered three-piece cans migrating into the can's contents. Tin-plated can producers soon acknowledged the new process as the wave of the future. They quickly began to explore the possibilities for drawing and ironing steel sheets. By 1972 the technique was perfected, and investment dollars had begun to pour into line changeovers and new equipment purchases. *Exhibit 2* illustrates the rapid switch to the two-piece can in the beverage industry. In the beer segment alone, almost half of the total cans used in 1974 were made by the new process.

Growth

Between 1967 and 1976 the number of metal cans shipped from the manufacturers grew at an average of 3.4% annually. As shown in *Table A*, the greatest gains were in the beverage

Table A
Metal Can Shipments 1967-1976 (000 base boxes)

	1967	1972	1973	1974	1975	1976
<i>Total metal cans</i>	133,980	168,868	180,482	188,383	177,063	179,449
<i>By product</i>						
Food cans	67,283	64,773	68,770	73,104	68,127	64,984
Beverage cans	42,117	75,916	84,617	89,435	85,877	90,084
Soft drinks	14,580	31,660	35,631	36,499	33,284	39,488
Beer	27,537	44,256	48,986	52,936	52,593	50,596
Pet foods	5,797	6,694	7,121	7,083	6,057	6,121
General packaging cans	18,783	21,485	19,974	18,761	17,002	18,391
Motor oil	na	3,095	2,756	2,533	na	na
Paints	na	6,086	5,562	5,202	na	na
Aerosols	na	5,877	6,103	5,765	4,808	5,097
All other	na	6,427	5,553	5,261	na	na

Source: Standard and Poor's Industry Survey, *Containers, Basic Analysis*, March 24, 1977, p. C123; *Metal Can Shipments Report 1974*, p. 6.

Note: A base box contains 31,360 square inches.

segment, while shipments of motor oil, paints, and other general packaging cans actually declined. A 6% decline in total shipments in 1975 turned around as the economy picked up in all areas except basic food cans. For the future, soft drink and beer cans were expected to continue to be the growth leaders.

Industry Structure

In 1977 the U.S. metal can industry was dominated by four major manufacturers. Two giants, American Can and the Continental Can Division of the Continental Group, together made up 35% of all domestic production. National Can and Crown Cork and Seal were also major forces with market shares of 8.7% and 8.3%, respectively (see *Exhibit 3*).

Equipment. A typical three-piece can line cost \$750,000 to \$1 million. In addition, expensive seaming, end-making, and finishing equipment was required. Since each finishing line could handle the output of 3 or 4 can-forming lines, the minimum efficient plant required at least \$3.5 million in basic equipment. Most plants had 12 to 15 lines for the increased flexibility of handling more than one type of can at once. However, any more than 15 lines became unwieldy because of the need for duplication of setup crews, maintenance, and supervision.

The new two-piece can lines were even more expensive. Equipment for the line itself cost approximately \$8.5 million, and the investment in peripheral equipment raised the per-line cost to \$10-\$15 million. Unlike three-piece lines, minimum efficient plant size was one line and installations ranged from one line to five lines.

Conversion to these two-piece lines virtually eliminated the market for new three-piece lines. No firms were installing new three-piece lines and the major manufacturers were selling complete, fully operational three-piece lines "as is" for \$175,000 to \$200,000. Many firms were shipping their old lines overseas to their foreign operations where growth potential was great. There were few entrenched firms, and canning technology was not well known or understood.

Pricing. The can industry was very competitive. The need for high capacity utilization and the desire to avoid costly line changeovers made long runs of standard items the most desirable business. As a result, most companies offered

volume discounts to encourage large orders. From 1968 to 1975, industrywide profit margins declined 44%, reflecting sluggish sales and increased price competition. This trend hurt the small company, which was less able to spread its fixed costs. Raising prices above industry-set norms, however, was dangerous. Continental tried this in the fall of 1963 with the announcement of a 2% price hike. Other manufacturers refused to follow its lead, and by mid-1964 Continental was back to industry price levels with a considerably reduced market share.

Distribution. Because of the product's bulk and weight, transportation was a major factor in a can maker's cost structure. (One estimate put transportation at 7.6% of the price of a metal can, with raw materials playing the largest part at 64% and labor following at 14.4%.) A manufacturer's choice of lighter raw materials and plant location could have a large impact on total costs. Most estimates put the radius of economical distribution for a plant at between 150 and 300 miles.

Suppliers and Customers

At one time the big U.S. steel companies were the sole suppliers of metallic raw material used by the metal container industry. Can companies, in turn, were the fourth largest consumers of steel products. During the 1960s and 1970s, aluminum—and to a lesser extent, fiber-foil and plastic—suppliers increasingly entered traditional tinplate markets.

On the customer side, over 80% of the metal can output was purchased by the major food and beer companies. Since the can constituted about 45% of the total costs of beverage companies, most had at least two sources of supply. Poor service and uncompetitive prices could be punished by cuts in order size. Because can plants were often set up to supply a particular customer, the loss of a large order from that customer could greatly cut into manufacturing efficiency and company profits. As one can executive caught in the margin squeeze commented, "Sometimes I think the only way out of this is to sell out to U.S. Steel or to buy General Foods."²

2. "Crown Cork and Seal Company and the Metal Container Industry," HBS Case Services No. 6-373-077, Harvard Business School.

Industry Trends

Three major trends had plagued the metal container manufacturers since the early 1960s: (1) the continuing threat of self-manufacture; (2) the increasing acceptance of other materials such as aluminum, fiber-foil, or plastic for standard tinfoil packaging needs; and (3) the "packaging revolution" leading to new uses and thus new characteristics for containers.

Self-Manufacture

In the years 1971 to 1977, there had been a growing trend toward self-manufacture by large can customers, particularly of the low-technology standard items. As shown in *Table B*, the proportion of "captive" production increased from 18.2% to 25.8% between 1970 and 1976. These increases seemed to come from companies gradually adding their own lines at specific canning locations rather than from full-scale changeovers. However, the temptation for major can users such as food and beer producers to begin making their own cans was high. As a result of such backward integration, Campbell Soup Company had actually become one of the largest producers of cans in the U.S. The introduction of the two-piece can was expected to dampen the trend toward self-manufacture, since the end users did not possess the technical skills to develop their own two-piece lines.

New Packaging Materials

Aluminum. The greatest threat to the traditional, tin-plated can was the growing popularity of the new, lighter-weight aluminum can. The major producers of this can were the large aluminum companies, led by Reynolds Metals and Aluminum Company of America (Alcoa). Some traditional tin-plated can producers, such as Continental and American, also produced a small proportion of aluminum cans.

From 1970 to 1976 aluminum usage for cans increased, moving up from 11.6% to 27.5% of the total metal can market. It was expected to reach a 29% share in 1977 (see *Table C*). In absolute numbers, steel use remained fairly level while aluminum use tripled in those years (see *Figure A*). Most of the inroads were made in the beer and soft drink markets, where aluminum held 65% and 31% shares respectively in 1976. Additional gains were expected, as aluminum was known to reduce the problems of flavoring, a major concern of both the brewing and soft drink industries.

Aluminum had several other important advantages over tinfoil. First, its lighter weight could help reduce transportation costs. In addition, aluminum was easier to lithograph, producing a better reproduction at a lower cost. Finally, aluminum was favored over steel as a recycling material, because the lighter aluminum could be transported to recycling sites more easily, and recycled aluminum was far more valuable.

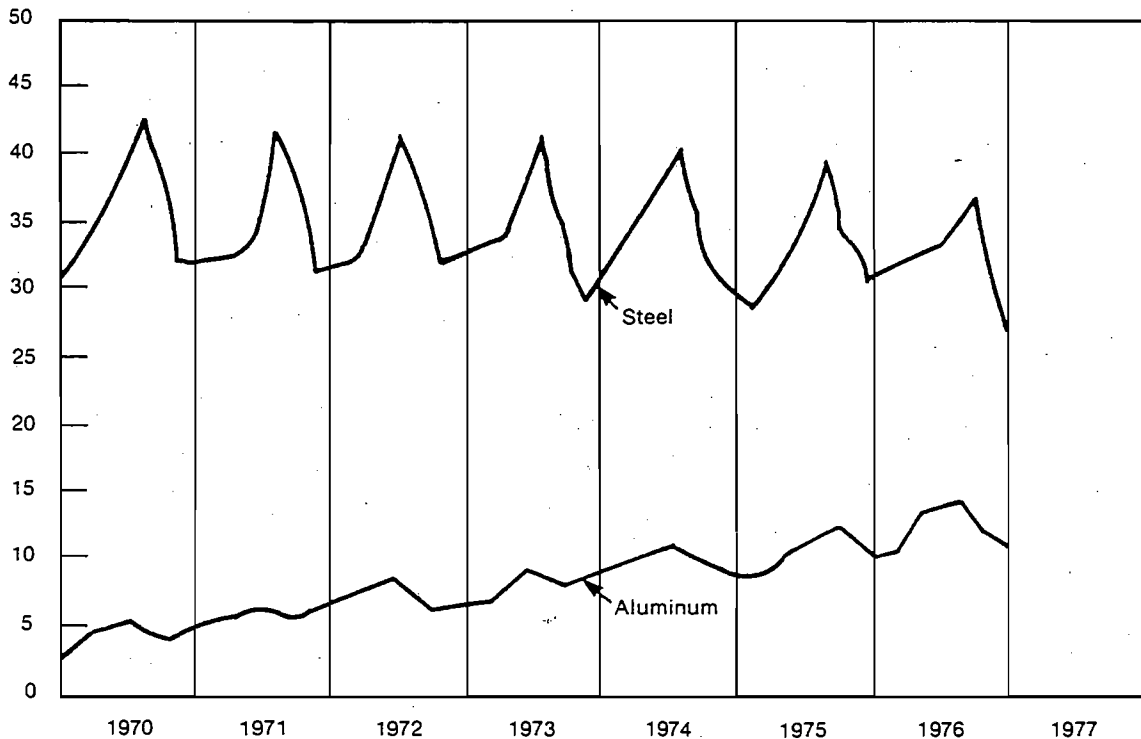
Table B
Metal Can Production by Market (%)

	1970	1971	1972	1973	1974	1975	1976
For sale	81.8	80.9	80.8	78.2	76.7	73.7	74.2
For own use	18.2	19.1	19.2	21.8	23.3	26.3	25.8

Table C
Metal Can Production by Material (%)

	1970	1971	1972	1973	1974	1975	1976
Steel	88.4	86.9	82.6	81.4	79.0	74.7	72.5
Aluminum	11.6	13.1	17.4	18.6	21.0	25.3	27.5

Figure A
Metal Can Shipments (million base boxes)



Source: Standard and Poor's Industry Survey, *Containers, Basic Analysis*, March 24, 1977, p. C123.

Aluminum's major disadvantage was its initial cost. In 1976 the stock to manufacture 1,000 12-ounce beverage cans cost \$17.13 using steel and \$20.81 using aluminum. Moreover, "in early 1977, steel producers raised the price of tinplate by only 4.8%, in contrast to an increase for aluminum can stock of about 9.7%. [They did this] in an effort to enhance the competitiveness of steel vis-à-vis aluminum."³ Some industry observers also expected the gap to widen as the auto companies increased their usage of aluminum and thus drove up aluminum prices. The two-piece tin-plated cans were also considerably stronger than their aluminum counterparts.

Other materials. Two other raw materials threatened tinplate as the primary product in making containers: the new paper-and-metal composite called fiber-foil and the growing varieties of plastics. Fiber-foil cans were jointly developed by the R. C. Can Company and Anacanda Aluminum in 1962 for the motor oil market. They caught on immediately, and by 1977

this composite material was the primary factor in the frozen juice concentrate container market as well. Plastics represented the fastest growing sector of the packaging industry and the principal force in packaging change. The plastic bottle offered an enticing variety of advantages over glass bottles, including weight savings, resistance to breakage, design versatility and thus lower shelf-space requirements. While can makers felt little initial effects from the introduction of plastics, they too could suffer if plastic bottles began to replace the cans being used as packaging for carbonated soft drinks.

The Packaging Revolution

Not only was the traditional package being reshaped and its materials reformulated, but by the 1970s containers also served a new purpose. Starting in the late 1950s the package itself became increasingly important in the marketing of the product it contained. The container was an advertising vehicle, and its features were expected to contribute to total product sales. This had serious implications for the metal can industry. Although the tin can was functional, aluminum was easier to lithograph and plastic

3. Standard and Poor's Industry Survey, *Containers, Basic Analysis*, March 24, 1977, p. C123.

enabled more versatile shapes and designs. Pressure for continuing innovation to enhance marketing meant that companies had to make greater R&D expenditures in order to explore new materials, different shapes, more convenient tops, and other imaginative ideas with potential consumer appeal.

Increasingly, metal can companies would have to contend with the research and marketing strengths of such giant integrated companies as Du Pont, Dow Chemical, Weyerhaeuser, Reynolds, and Alcoa. In response to the integration of packaging by these major material suppliers, some metal can manufacturers began to invest in their own basic research. In 1963, American announced the start of construction on a research center where investigations in such areas as solid-state physics and electrochemistry might reveal potential sources of new products.⁴

The Competition

By the late 1960s all three of Crown Cork and Seal's major competitors had diversified into areas outside the metal container industry. However, in 1977 all three still remained major producers of metal cans (see *Exhibit 3*).

Continental Group

Because of the extent of its diversification, Continental changed its name in 1976, making Continental Can only one division of the large conglomerate. Although only 38% of the total company's sales were in cans, it still held the dominant market share (18.4%) of the U.S. metal can market. The remainder of Continental's domestic sales were in forest products (20%) and other plastic and paper packaging materials (9%).

In 1969 Continental began focusing its investment spending on foreign and diversified operations. In 1972, the company took a \$120 million after-tax extraordinary loss to cover the closing, realignment, and modernization of its domestic can-making facilities over a three-year period. Of the \$120 million loss, close to 70% resulted from fixed asset disposals, pension fund obligations, and severance pay. By 1976 almost one-third of the company's revenues

4. "Crown Cork and Seal Company and the Metal Container Industry," p. 14.

came from its overseas operations, which covered 133 foreign countries. Domestic investment went primarily to paper products and the plastic bottle lines. Very little was allocated for the changeover to new two-piece cans.

American Can

American also reduced its dependence on domestic can manufacture and, even more than Continental, emphasized unrelated product diversification. American competed in the entire packaging area—metal and composite containers, paper, plastic, and laminated products. In 1972, American "decided to shut down, consolidate, or sell operations that had either become obsolete or marginal [which] resulted in an after-tax extraordinary loss of \$106 million."⁵

By 1976, 20% of the company's sales came from consumer products such as household tissues, Dixie paper cups, and Butterick dress patterns. American's large chemical subsidiary brought in 15% of sales and another 15% came from international sales. Return on sales for the domestic container segment of American's business had remained stable at about 5% for the last five years. For this period American's average return on equity (7.1%) was the lowest of the four major can manufacturers, a result of relatively poor performance in its diversified areas (see *Exhibit 3*).

National Can

National's attempt to join the trend toward diversification achieved somewhat mixed results. Until 1967 National was almost solely a can producer. After that, through acquisitions the company moved into glass containers, food canning, pet foods, bottle closures, and plastic containers. However, instead of generating future growth opportunities, the expansion into food products proved a drag on company earnings. Pet foods and vegetable canning fared poorly in the 1974–1975 recession years, and the grocery division as a whole suffered a loss in 1976. As a result, National began a stronger overseas program to boost its earnings and investment.

Crown Cork and Seal

While its three major competitors turned to diversification, Crown Cork and Seal continued to manufacture primarily metal cans and clo-

5. Crown Cork and Seal, Annual Report, 1972, p. 3.

tures. In 1976 the company derived almost 65% of its sales from tin-plated cans; crowns accounted for 29% of total sales and 35% of profits. The remaining sales were in bottling and canning machinery. In fact, Crown was one of the largest manufacturers of filling equipment in the world. Foreign sales—of crowns primarily—accounted for an increasingly large percentage of total sales (*Exhibit 4*). In 1976, Crown's return on sales was almost twice that of its three larger competitors. Over the previous 10 years Crown's sales growth was second only to National Can, and Crown was first in profit growth. The following sections describe Crown's history and strategy.

Crown Cork and Seal Company

Company History

In August 1891 a foreman in a Baltimore machine shop hit upon an idea for a better bottle cap—a round piece of tin-coated steel with a flanged edge and an insert of natural cork. This crown-cork top became the main product of a highly successful small venture, the Crown Cork and Seal Company. When the patents ran out, however, competition became severe. The faltering Crown Cork was bought out in 1927 by a competitor, Charles McManus, who then shook the company back to life, bursting upon the "starchy" firm, as one old timer recalled, "like a heathen in the temple." *Fortune*, in 1962, described the turnaround:

Under the hunch-playing, paternalistic McManus touch, Crown prospered in the thirties, selling better than half the U.S. and world supply of bottle caps. Even in bleak 1935 the company earned better than 13% on sales of \$14 million.

Then overconfidence led to McManus' first big mistake. He extended Crown's realm into canmaking. Reasoning soundly that the beer can would catch on, he bought a small Philadelphia can company. But reasoning poorly, he plunged into building one of the world's largest can plants on Philadelphia's Erie Avenue. It grew to a million square feet and ran as many as fifty-two lines simultaneously. A nightmare of inefficiency, the plant suffered deepened losses because of the McManus mania for volume. He lured customers by assuming their debts to suppliers and sometimes even cutting

prices below costs. The Philadelphia blunder was to haunt Crown for many years.⁶

With all his projects and passion for leadership, McManus had no time or concern for building an organization that could run without him.

Neither of his two sons, Charles Jr. and Walter, was suited to command a one-man company, although both had been installed in vice presidents' offices. Crown's board was composed of company officers, some of whom were relatives of the boss. The combination of benevolent despotism and nepotism had prevented the rise of promising men in the middle ranks. When McManus died in 1946, the chairmanship and presidency passed to his private secretary, a lawyer named John J. Nagle.

In a fashion peculiar to Baltimore's family-dominated commerce, the inbred company acquired the settled air of a bank, only too willing to forget it lived by banging out bottle caps. In the muted, elegant offices on Eastern Avenue, relatives and hangers-on assumed that the remote machines would perpetually grind out handsome profits and dividends. In the postwar rush of business, the assumption seemed valid. The family left well enough alone, except to improve upon the late paternalist's largess. As a starter, Nagle's salary was raised from \$35,000 to \$100,000.

Officers arrived and departed in a fleet of chauffeured limousines. Some found novel ways to fill their days. A brother-in-law of the late McManus fell into the habit of making a day-long tour of the junior executives' offices, appearing at each doorway, whistling softly, and wordlessly moving on. After hours, the corporate good life continued. More than 400 dining and country club memberships were spread through the upper echelons. A would-be visitor to the St. Louis plant recalls being met at the airport, whisked to a country club for drinks, lunch, cocktails, and dinner, and then being returned to the airport with apologies and promises of a look at the plant "next time."⁷

Up to the early 1950s, Crown ran on a combination of McManus momentum and the last vestiges of pride of increasingly demoralized middle managers, who were both powerless to decide and unable to force decisions from above.

6. "The Unoriginal Ideas that Rebuilt Crown Cork," *Fortune*, October 1962, pp. 118-164.

7. *Ibid.*

Dividends were maintained at the expense of investment in new plant; what investment there was, was mostly uninspired. From a lordly 50% in 1940, Crown's share of U.S. bottle cap sales [in the early 1950s] slipped to under 33%. In 1952 the chaotic can division had such substantial losses that the company was finally moved to act. The board omitted a quarterly dividend. That brought the widow McManus, alarmed, to the president's office. President Nagle counseled her to be patient and leave matters to him.⁸

Matters soon grew worse. A disastrous attempt at expansion into plastics followed a ludicrous diversification into metal bird cages. Then in 1954 a reorganization, billed to solve all problems, was begun. The plan was modeled after Continental's decentralized line and staff. The additional personnel and expense were staggering and Crown's margins continued to dip. One observer noted, "The new suit of clothes, cut for a giant, hung on Crown like an outsized shroud." The end seemed near.

John Connelly Arrives

John Connelly was the son of a Philadelphia blacksmith who, after working his way up as a container salesman, formed his own company to produce paper boxes. His interest in Crown began when he was rebuffed by the post-McManus management, which "refused to take a chance" on a small supplier like Connelly. *Fortune* described Connelly's takeover:

By 1955, when Crown's distress had become evident to Connelly, he asked a Wall Street friend, Robert Drummond, what he thought could be done with the company. "I wrote him a three-page letter," Drummond recalls, "and John telephoned to say he'd thrown it into the wastebasket, which I doubted. He said, 'If you can't put it into one sentence you don't understand the situation.'" Drummond tried again and boiled it down to this formula: "If you can get sales to \$150 million and earn 4% net after taxes and all charges, meanwhile reducing the common to one million shares, you'll earn \$6 a share and the stock will be worth \$90."⁹

That was good enough for Connelly. He began buying stock and in November 1956 was

asked to be an outside director—a desperate move for the ailing company.

The stranger found the parlour stuffy. "Those first few meetings," says Connelly, "were like something out of *Executive Suite*. I'd ask a question. There would be dead silence. I'd make a motion to discuss something. Nobody would second it, and the motion would die." It dawned on Connelly that the insiders knew even less about Crown than he did.

He toured the plants—something no major executive had done in years. At one plant a foreman was his guide. His rich bass graced the company glee club, and he insisted on singing as they walked. Connelly finally told him to shut up and sit down. The warning system silenced, Connelly went on alone and found workers playing cards and sleeping. Some were building a bar for an executive.

At another plant he sat in on a meeting of a dozen managers and executives, ostensibly called to discuss the problem posed by customers' complaints about poor quality and delivery. The fault, it seemed, lay with the customers themselves—how unreasonable they were to dispute Crown's traditional tolerance of a "fair" number of defective crowns in every shipment; how carping they were to complain about delays arising from production foul-ups, union troubles, flat tires, and other acts of God. Connelly kept silent until a pause signaled the consensus, then he confessed himself utterly amazed. He hadn't quite known what to make of Crown, he said, but now he knew it was something truly unique in his business life—a company where the customer was always wrong. "This attitude," he told the startled executives, "is the worst thing I've ever seen. No one here seems to realize this company is in business to make money."¹⁰

The Crisis

In April 1957, Crown Cork and Seal was on the verge of bankruptcy. The 1956 loss was \$241,000 after preferred dividends, and 1957's promised to be worse. Bankers Trust Company had called from New York to announce the withdrawal of their \$2.5 million line of credit. It seemed that all that was left was to write the company's obituary when John Connelly took

8. Ibid.

9. Ibid.

10. Ibid.

over the presidency. His rescue plan was simple—as he called it, “just common sense.”

Connelly's first move was to pare down the organization. Paternalism ended in a blizzard of pink slips. The headquarters staff was cut from 160 to 80. Included in the departures were 11 vice presidents. The company returned to a simple functional organization and in 20 months Crown had eliminated 1,647 jobs or 24% of the payroll. As part of the company's reorganization, Connelly discarded divisional accounting practices; at the same time he eliminated the divisional line and staff concept. Except for one accountant maintained at each plant location, all accounting and cost control was performed at the corporate level; the corporate accounting staff occupied one-half the space used by the headquarters group. In addition, the central research and development facility was disbanded.

The second step was to make each plant manager totally responsible for plant profitability, including any allocated costs. (All company overhead, estimated at 5% of sales, was allocated to the plant level.) Previously, plant managers had been responsible only for controllable expenses at the plant level. Under the new system, the plant manager was responsible even for the profits on each product manufactured in the plant. Although the plant manager's compensation was not tied directly to profit performance, one senior executive pointed out that the manager was “certainly rewarded on the basis of that figure.”

The next step was to slow production to a halt and liquidate \$7 million in inventory. By mid-July Crown paid off the banks. Planning for the future, Connelly developed control systems. He introduced sales forecasting, dovetailed with new production and inventory controls. This move took control away from the plant managers, who were no longer able to avoid layoffs by dumping excess products into inventory.

By the end of 1957 Crown had, in one observer's words, “climbed out of the coffin and was sprinting.” Between 1956 and 1961 sales increased from \$115 million to \$176 million, and profits soared. After 1961 the company showed a 15.45% increase in sales and 14% in profits on the average every year. However, Connelly was not satisfied simply with short-term reorganizations of the existing company. By 1960, Crown Cork and Seal had adopted a strategy

that it would follow for at least the next 15 years.

Crown's Strategy

Products and Markets

Recognizing Crown's position as a smaller producer in an industry dominated by giants,¹¹ Connelly sought to develop a product line built around Crown's traditional strengths in metal forming and fabrication. He chose to return to the area he knew best—tin-plated cans and crowns—and to concentrate on specialized uses and international markets.

A dramatic illustration of Connelly's commitment to this strategy occurred in the early 1960s. In 1960 Crown held over 50% of the market for motor oil cans. In 1962 R. C. Can and Anaconda Aluminum jointly developed fiber-foil cans for motor oil, which were approximately 20% lighter and 15% cheaper than the metal cans then in use. Crown's management decided not to continue to compete in this market and soon lost its entire market share.

In the early 1960s Connelly singled out two specific applications in the domestic market: beverage cans, and the growing aerosol market. These applications were called “hard to hold,” because the cans required special characteristics either to contain the product under pressure or to avoid affecting taste. The cans had to be filled in high-speed lines. In the mid-1960s, growth in demand for soft drink and beer cans was more than triple that for traditional food cans.

Crown had an early advantage in aerosols. In 1938 McManus had tooled up for a strong-walled, seamless beer can, which was rejected by brewers as too expensive. In 1946 it was dusted off and equipped with a valve to make the industry's first aerosol container. However, little emphasis was put on the line until Connelly spotted high growth potential in the mid-1960s.

In addition to the specialized product line, Connelly's strategy was based on two geographic thrusts: expand to national distribution in the U.S. and invest heavily abroad. The domestic expansion was linked to Crown's manufacturing reorganization; plants were spread

11. In 1956 Crown's sales were \$115 million compared with \$772 million for American and \$1 billion for Continental.

out across the country to reduce transportation costs and to be nearer customers. Crown was unusual in that it set up no plants to service a single customer. Instead, Crown concentrated on providing products for a number of customers near their plants. Also, Crown developed its lines totally for the production of tin-plated cans, not for aluminum. In international markets Crown invested heavily in undeveloped nations, first with crowns and then with cans as packaged foods became more widely accepted.

Manufacturing

When Connelly took over in 1957, Crown had perhaps the most outmoded and inefficient production facilities in the industry. In the post-McManus regime, dividends had taken precedence over new investment, and old machinery combined with the cumbersome Philadelphia plant had given Crown very high production and transportation costs. Soon after he gained control, Connelly took drastic action, closing down the Philadelphia facility and investing heavily in new and geographically dispersed plants. From 1958 to 1963, the company spent almost \$82 million on relocation and new facilities. By 1976, Crown had 26 domestic plant locations versus 9 in 1955. The plants were small (usually under 10 lines versus 50 in the old Philadelphia complex) and were located close to the customer rather than the raw material source.

Crown emphasized flexibility and quick response to customer needs. One officer claimed that the key to the can industry was "the fact that nobody stores cans" and when customers need them, "they want them in a hurry and on time. . . . Fast answers get customers."¹² To deal with rush orders and special requests, Crown made a heavy investment in additional lines, which were maintained in set-up condition.

Marketing/Service

Crown's sales force, although smaller than American's or Continental's, kept close ties with customers and emphasized Crown's ability to provide technical assistance and specific problem solving at the customer's plant. This was backed by quick manufacturing responses and Connelly's policy that, from the top down,

12. "Crown Cork and Seal Company and the Metal Container Industry," p. 28.

the customer was always right. As *Fortune* described it:

At Crown, all customers' gripes go to John Connelly, who is still the company's best salesman. A visitor recalls being in his office when a complaint came through from the manager of a Florida citrus-packing plant. Connelly assured him the problem would be taken care of immediately, then casually remarked that he planned to be in Florida the next day. Would the plant manager join him for dinner? He would indeed. As Crown's president put the telephone down, his visitor said that he hadn't realized Connelly was planning to go to Florida. "Neither did I," confessed Connelly, "until I began talking."¹³

Research and Development

Crown's R&D focused on enhancing the existing product line. According to Connelly, "We are not truly pioneers. Our philosophy is not to spend a great deal of money for basic research. However, we do have tremendous skills in die forming and metal fabrication, and we can move to adapt to the customer's needs faster than anyone else in the industry."¹⁴ Research teams worked closely with the sales force, often on specific customer requests. For example, a study of the most efficient plant layout for a food packer or the redesign of a dust cap for the aerosol packager were not unusual projects.

Crown tried to stay away from basic research and "all the frills of an R&D section of high-class, ivory-towered scientists." Explained John Luviano, the company's new president:

There is a tremendous asset inherent in being second, especially in the face of the everchanging state of flux you find in this industry. You try to let others take the risks and make the mistakes as the big discoveries often flop initially due to something unforeseen in the original analysis. But somebody else, learning from the innovator's heartaches, prospers by the refinement.¹⁵

This sequence was precisely what happened with the two-piece drawn and ironed can. The

13. "The Unoriginal Ideas . . .," p. 164.

14. "Crown Cork and Seal Company and the Metal Container Industry," p. 30.

15. *Ibid.*, p. 29. Mr. Luviano became president in 1976, while Connelly remained chairman and chief operating officer.

original concept was developed in the aluminum industry by Reynolds and Alcoa in the late 1960s. Realizing the can's potential, Crown, in connection with a major steel producer, refined the concept for use with tinplate. Because of Crown's small plant manufacturing structure and Connelly's willingness to move fast, Crown was able to beat its competitors into two-piece can production. Almost \$120 million in new equipment was invested from 1972 through 1975, and by 1976 Crown had 22 two-piece lines in production—far more than any competitor.¹⁶

Crown was also credited with some important innovations. The company initiated the use of plastic as a substitute for cork as a crown liner, and in 1962 it introduced the first beverage-filling machine that could handle both bottles and cans.

Financing the Company

After Connelly took over, he used the first receipts from the inventory liquidation to get out from under the short-term bank obligations. He then steadily reduced the debt-equity ratio, from 42% in 1956 to 18.2% in 1976. In 1970 the last of the preferred stock was bought back, eliminating preferred dividends as a cash drain. From 1970 on, the emphasis was on repurchasing the common stock (see *Exhibit 1*). Each year Connelly set ambitious earnings goals and most years he achieved them, reaching \$2.84 per share in 1976. That year marked a critical time for Connelly's financial ambitions. As he said in the 1976 annual report:

A long time ago we made a prediction that some day our sales would exceed \$1 billion and profits of \$60.00 per share. Since then the stock has been split 20-for-1 so this means \$3.00 per share. These two goals are still our ambition and will remain until both have been accomplished. I am sure that one, and I hope both, will be attained this year [1977].

International Expansion

Another aspect of Crown's efforts was its continuing emphasis on international growth, particularly in developing nations (*Figure B*, next page). With sales of \$343 million and 60 foreign plant locations, Crown was, by 1977, the largest producer of metal cans and crowns overseas.

In the early 1960s, when Crown began to expand internationally, the strategy was unique. In many cases the company received 10-year tax shelters as initial investment incentives. At that time Connelly commented:

Right now we are premature but this has been necessary in order for Crown to become established in these areas. . . . If we can get 20% to 40% of all new geographic areas we enter, we have a great growth potential in contrast to American and Continental. . . . In 20 years I hope whoever is running this company will look back and comment on the vision of an early decision to introduce canmaking in underdeveloped countries.¹⁷

John Connelly's Contribution to Success

Many claimed that John Connelly himself was the driving force behind Crown's dramatic turnaround and that it was his ambition and determination that kept the company on the road to success. Connelly has been described as a strong-willed individual whose energetic leadership convinced and inspired his organization to meet his goals.

Yet Connelly was no easy man to please. He demanded from his employees the same dedication and energy that he himself threw into his work. As one observer wrote in 1962:

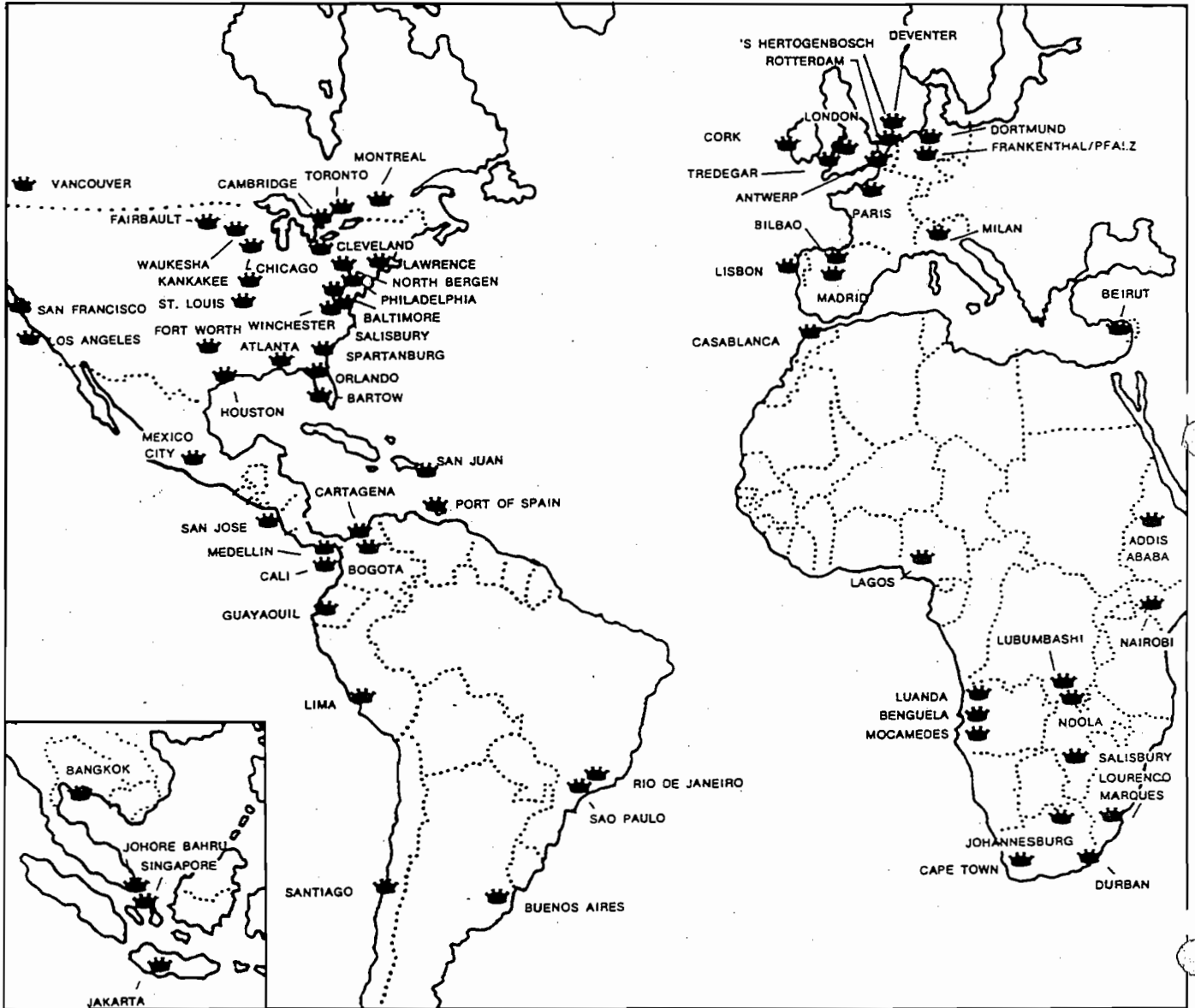
At fifty-seven Connelly is a trim, dark-haired doer. The seven-day, eighty-hour weeks of the frenetic early days are only slightly reduced now. The Saturday morning meeting is standard operating procedure. Crown's executives travel and confer only at night and on weekends. William D. Wallace, vice president for operations, travels 100,000 miles a year, often in the company plane. But Connelly sets the pace. An associate recalls driving to his home in the predawn blackness to pick him up for a flight to a distant plant. The Connelly house was dark, but he spotted a figure sitting on the curb under a street light, engrossed in a looseleaf book. Connelly's greeting, as he jumped into the car: "I want to talk to you about last month's variances."¹⁸

16. In 1976, there were 47 two-piece tinplate and 130 two-piece aluminum lines in the U.S.

17. "Crown Cork and Seal Company and the Metal Container Industry," p. 33.

18. "The Unoriginal Ideas . . .," p. 163.

Figure B
Crown Cork and Seal's Facilities



Source: Crown Cork and Seal Company, Inc., 1972 Annual Report.

In 1977, at age 72, Connelly still firmly held the reins of his company.¹⁹ "He'll never retire. He'll die with his boots on,"²⁰ noted one company official. Despite comments such as these, Connelly had raised John Luviano—age 54 and a 25-year veteran at Crown—to the presidency of the company.

Outlook for the Future

In 1977, observers of Crown Cork and Seal had a favorite question: how long can this spectacular performance last? Until then, Crown's sales and profit growth had continued despite recession, devaluation, and stiff competition from the giants of the industry. However, in 1977 the ozone scare and the potential legislation on nonreturnable containers threatened the company's beverage and aerosol business.

The Ozone Controversy

In 1973 two University of California chemists advanced the initial theory that fluorocarbons—gases used in refrigerators, air conditioners, and as a propellant in aerosols—were damaging the earth's ozone shield. (Ozone forms an atmospheric layer that prevents much of the sun's ultraviolet radiation from reaching the earth's surface.) Their theory was that the fluorocarbons floated up into the stratosphere where they broke up, releasing chlorine atoms. These atoms then reacted with the ozone molecules, causing their destruction. The problem was compounded because after the reaction the chlorine atom was free to attack other ozone molecules, causing accelerated break-up of the ozone layer. Proponents of the theory asserted that "fluorocarbons have already depleted ozone by 1% and will eventually deplete it by 7% to 13%, perhaps within 50 to 80 years, if the use of fluorocarbons continues at recent levels."²¹

Proponents of the theory argued that there was real danger in allowing the destruction of the ozone shield. As this shield was depleted and more radiation passed through, they predicted, the number of cases of skin cancer would rise alarmingly. Dr. Sherwood Rowland,

one of the original proponents of the theory, explained:

If aerosol use were to grow at 10% annually (half the growth rate of the 1960s), stratospheric ozone content would fall by 10% by 1994. Scientists figure this would mean a 20% increase in ultraviolet radiation reaching the earth and cause by itself at least 60,000 new cases of skin cancer annually in the United States, roughly a 20% increase.²²

They also cited the possibility of crop damage, genetic mutation, and climatic change.

Although many studies were in progress, by the end of 1976 the theory had not yet been conclusively proven. There were still some major questions about the types and amounts of reactions that would take place in the stratosphere. Nonetheless, most tests supported the basic thesis that fluorocarbons were in some way damaging the ozone layer.

After the ozone theory was publicized, the reaction against aerosols was severe. Aerosols provided about 60% of the fluorocarbons released into the air annually. In 1974 aerosol production declined almost 7% in reaction to the recession and the fluorocarbon problem. Only 2.6 billion aerosol containers were used, down from 2.9 billion in 1973. Action began immediately—on the scientific front to test the ozone theory and on the legislative front to restrict the use of fluorocarbons.

Soon a bitter battle broke out between industry spokespeople and those advocating an immediate ban: One industry spokesperson, who requested anonymity, said, "All the scientific theories against fluorocarbons are just that—theories, not facts. What we need is more research before there are any more bans or bad-mouthing. We don't want another false scare."²³ A member of the Natural Resource Defense Council looked harshly upon the aerosol industry's position. "It's like Watergate," he said. "They want to see a smoking gun. We'll have to wait 25 years for that, and by then irreparable damage will have been done."²⁴

Despite industry protests and with the support of some additional studies, state legislators began to introduce antifuorocarbon bills. Georgia led the way in June 1975 by passing a bill

19. Connelly reportedly owned or controlled about 18% of Crown's outstanding common stock.

20. *Financial World*, November 26, 1975, p. 12.

21. *Wall Street Journal*, December 3, 1975, p. 27.

22. *Ibid.*

23. *New York Times*, June 22, 1975, p. F3.

24. *Ibid.*

banning fluorocarbon aerosols effective March 1, 1977. Successful industry lobbying kept other actions to a minimum until May 1977, when federal agencies proposed a nationwide ban. Calling fluorocarbons an "unacceptable risk to individual health and to the earth's atmosphere,"²⁵ the commissioner of the Food and Drug Administration outlined a three-step phaseout of fluorocarbon manufacture and use. The first step in the ban would be a halt to all manufacture of chlorofluorocarbon propellants for nonessential uses. This ban would take effect October 15, 1978. In the second step, one December 15, 1978, all companies would have to stop using existing supplies of the chemicals in making nonessential aerosol products. The third step would be a halt to all interstate shipment of nonessential products containing the propellant gases. This part of the ban would go into effect April 15, 1979.²⁶

The future for aerosols. Opinions differed widely as to the extent of the problems the ozone issue would cause the industry. By 1977, the latest estimates were that the fluorocarbon ban would cost container manufacturers over \$132 million in lost sales from 1977 to 1980. This was much less than most of the original estimates due to the success of efforts in the previous two years in finding fluorocarbon substitutes. Most of the solutions involved finding substitute propellants or changing the aerosol valve.

A propellant is the pressurized gas used to hold the suspended molecules of aerosol products as they are sprayed out. Until the early 1970s the most common propellant material was fluorocarbon, which was used in about half of the aerosol cans sold. By 1977 the possibility of substituting hydrocarbons was being explored for many applications. However, although they were less expensive, hydrocarbons were known to be more flammable and thus more dangerous to mix with the many personal-care products that include alcohol as an ingredient. Other proposed alternatives included using carbon dioxide or special pressurized cans that did not release propellants at all.

In May 1977 the new Aquasol valve promised to be one of the most promising ways of eliminating fluorocarbons. Developed by Robert

Abplanalp, the inventor of the original aerosol valve, the Aquasol used a dual-duct system (rather than the traditional one-duct) that kept the product separate from the propellant. Abplanalp claimed that fillers could get twice as much product into a can with the new valve because the product did not have to be mixed with the propellant. Also, hydrocarbons could be used more safely for many applications.

Industry recovery. By 1977 recovery in the aerosol market had already begun, with shipments for 1976 up 6%. It seemed likely that this trend would continue because of the strong appeal aerosols had for the consumer. In a 1974 study over 59% of the population had heard of the ozone problem, yet about 25% said they would be "very disturbed to do without" aerosol products. Industry optimism was moderated, however, by the growing popularity of pump sprays and other nonaerosol products, and by the tendency of the consumer not to differentiate between fluorocarbons and aerosols using other propellants.

Regulating Nonreturnable Containers

Crown's future was also threatened by moves to legislate restrictions on the use of nonreturnable containers. By 1976 Oregon, Vermont, and South Dakota already regulated the use of disposable containers. Laws requiring mandatory deposits for most beverage containers were approved in November 1976 by voter referendums in Maine and Michigan, while they were turned down by narrow margins in Massachusetts and Colorado. The existing laws required a 5-cent deposit on all bottles and cans, refundable when the empties were brought back for recycling or reuse. Nationally, the Environmental Protection Agency banned throwaways from federal property—parks, federal buildings, and military posts—starting in October 1977.

The main problem was litter. Although it was estimated that only 1% of the American population were litterers, the extent of the damage was staggering. Unfortunately, disposable cans contributed significantly to the problem. While containers made up only 8% of the solid waste in the United States, they made up 54% to 70% of highway litter by volume. A second issue was the potential savings of raw materials and energy that could be obtained from reusing containers.

25. *New York Times*, May 12, 1977, p. 1.

26. *Ibid.*

Economic impact. Part of the controversy involved the potential economic impact of legislative bans on nonreturnables. Industry sources agreed that the laws would bring an increase in beer and soft drink prices and eliminate thousands of jobs. The environmentalists countered that consumers paid 30% to 40% more for beverages in throwaway containers. "Any increased cost due to retooling would be offset by savings in the use of returnable bottles or recycled cans," claimed a spokesperson for the Michigan United Conservation Clubs. He added that "any jobs lost in the canning or bottling industries would be offset by additional jobs in transportation and handling."²⁷

Prospects for the future. Despite a powerful industry lobby, the fight against nonreturnables gained momentum. In July 1977 legislation was being considered by the Congressional Committee on Energy and Natural Resources to require deposits on throwaways nationwide. Although the Senate had once rejected a ban on pull tops, some states, including Massachusetts, had passed such bills effective in 1978. Returnable bottles, which could be used by more than one manufacturer, were being encouraged under the new laws, but it seemed unlikely that cans would be totally banned. Instead, various schemes for deposits and recycling were emphasized. Proposals were made that metal cans be collected, crushed, melted,

and reused to make new cans. Under the new system it was uncertain who would pay the extra transportation costs and whether lower raw material prices to the can maker would result. Unfortunately for tinsplate users like Crown, the new system favored aluminum cans because of the higher value of the reclaimed metal and the recycling network that already existed for aluminum products.

Crown's Future Growth

Crown's usual optimistic forecasts continued into 1977. The 1976 annual report all but ignored the aerosol and bottle bill issues. The strategy stayed the same: no major basic R&D efforts, but quick attention to meeting customer needs and leadership in new applications that involved the traditional metal can. Thus, despite current problems in its markets, some industry observers saw no reason why the company's good record wouldn't continue:

Even with Connelly's eventual retirement, his Number 2 man seems certain to keep Crown on its upward profits growth trend. While others—like National Can—have ventured into uncharted and at times unprofitable waters, Crown has prospered by doing what it knows best. Under that strategy, prosperity is likely to continue reigning for Crown.²⁸

27. *New York Times*, October 30, 1976, p. F1.

28. *Financial World*, November 26, 1975, p. 12.

Exhibit 1
Financial Statements, 1956-1976 (\$ thousands except where indicated otherwise)

	1976	1975	1974	1973	1972	1971	1966	1961	1956
Net sales	\$909,937	\$825,007	\$766,158	\$571,762	\$488,880	\$448,446	\$279,830	\$176,992	115,098
Cost of products sold									
(excluding depreciation)	757,866	683,691	628,865	459,183	387,768	350,867	217,236	139,071	95,803
Selling & admin. expense	31,910	30,102	28,649	23,409	20,883	21,090	18,355	15,311	13,506
% of net sales	3.5%	3.6%	3.7%	4.1%	4.3%	4.7%	6.6%	8.7%	11.7%
Interest expense	3,885	7,374	6,973	4,407	4,222	5,121	4,551	1,252	1,150
Depreciation expense	26,486	25,402	25,525	20,930	18,654	16,981	9,381	4,627	2,577
Taxes on income	43,500	34,925	33,298	26,725	24,900	24,560	12,680	7,625	105
Net income	\$ 46,183	\$ 41,611	\$ 39,663	\$ 34,288	\$ 31,193	\$ 28,474	\$ 16,749	6,653	277
% of net sales	5.1%	5.0%	5.2%	6.0%	6.4%	6.3%	6.0%	3.8%	.2%
Earnings per common share	\$2.84	\$2.43	\$2.20	\$1.81	\$1.58	\$1.41	\$.80	\$.28	\$ (.01)
Plant and equipment									
Expenditures	\$ 21,568	\$ 47,047	\$ 52,517	\$ 40,392	\$ 28,261	\$ 33,099	\$ 32,729	\$ 11,819	\$ 1,931
Accumulated investment	398,377	401,657	371,297	335,047	316,266	313,214	223,153	107,258	65,196
Accumulated depreciation	149,306	143,406	129,924	116,191	105,377	101,314	68,359	45,004	31,167
Current asset/liability ratio	1.8	1.6	1.4	1.6	1.7	1.6	1.5	2.7	3.2
Long-term debt	\$ 25,886	\$ 29,679	\$ 34,413	\$ 37,922	\$ 31,234	\$ 41,680	\$ 57,890	\$ 17,654	\$ 21,400
Short-term debt	2,984	30,419	45,043	28,504	17,221	31,381	44,784	5,190	6,500
Shareholders' investment	316,684	292,681	262,650	243,916	230,366	211,847	110,841	77,540	50,299
Number of									
Preferred shares	0	0	0	0	0	0	79,370	139,540	275,000
Common shares, average	16,235,040	17,137,030	18,000,792	18,894,105	19,726,799	20,211,810	20,606,835	21,594,720	24,155,800

Source: Crown Cork and Seal Company, Inc., 1976 Annual Report, pp. 4, 5.

Exhibit 2
Beverage Can Shipments (billion cans)

	1972	1973	Change 1972-1973	1974	Change 1973-1974
<i>Soft Drink Cans</i>					
Total	15,596	17,552	+12.5%	17,980	+ 2.4%
Three-piece	14,217	15,779	+11.0%	15,589	- 1.2%
% of total	91.2	89.9		86.7	
Two-piece	1,379	1,773	+28.6%	2,391	+34.9%
% of total	8.8	10.1		13.3	
<i>Beer Cans</i>					
Total	21,801	24,131	+10.7%	26,077	+ 8.1%
Three-piece	14,746	14,363	- 2.6%	13,237	- 7.8%
% of total	67.6	59.5		50.8	
Two-piece	7,055	9,768	+38.5%	12,840	+31.4%
% of total	32.4	40.5		49.2	

Source: *Metal Cans Shipments Report 1974*, Can Manufacturers Institute, p. 6.

Exhibit 3
Comparison of 1976 Performance of Major Metal Can Manufacturers (\$ millions)

	Continental Group	American Can	National Can	Crown Cork and Seal
<i>Total Company Performance</i>				
Sales	\$3,458	\$3,143	\$917	\$910
Net income	\$118.3	\$100.9	\$20.7	\$46.2
Sales growth, 1967-76	147%	107%	317%	202%
Profit growth, 1967-76	51%	33%	160%	145%
Return on equity, 5-year average	10.3%	7.1%	11.9%	15.8%
Debt ratio	34%	35%	46%	23%
<i>Metal Can Segments (domestic)</i>				
Sales	\$1,307.8	\$1,177.6	\$616.0	\$575.0
Pre-tax income	\$73.0	\$64.9	\$36.4	\$49.0
as a % of sales	5.6%	5.4%	5.0%	8.5%
Market share	18.4%	16.6%	8.7%	8.3%
Number of can plants	70	48	41	26
<i>International (sales of all products)</i>				
Sales	\$1,147.2	\$475.1	na	\$343.0
Net income (before taxes)	\$63.4	\$41.5	small loss	\$39.4

Source: *Wall Street Transcript*, November 3, 1975, pp. 41, 864, and company 10-K reports.

Exhibit 4
Estimated Breakdown of Crown Cork and Seal's Sales and Pretax Income

	(\$ millions)			(percentages)		
	1974	1975	1976 ^a	1974	1975	1976 ^a
A. Sales						
<i>Domestic</i>						
<i>Cans</i>						
Beer	180	209	232	23.5	24.7	24.6
Soft drinks	120	128	140	15.7	15.2	14.8
Food	55	65	70	7.2	7.7	7.4
Other (mainly aerosols)	100	91	101	13.0	10.7	10.7
Total cans	<u>455</u>	<u>493</u>	<u>543</u>	<u>59.4</u>	<u>58.3</u>	<u>57.5</u>
Crowns	25	29	32	3.3	3.4	3.4
Machinery	20	24	27	2.6	2.8	2.8
Total domestic	<u>500</u>	<u>546</u>	<u>602</u>	<u>65.3</u>	<u>64.5</u>	<u>63.7</u>
<i>International</i>						
Cans	46	57	73	6.0	6.7	7.7
Crowns	200	220	242	26.1	30.0	25.6
Machinery	20	24	28	2.6	2.8	3.0
Total international	<u>266</u>	<u>301</u>	<u>343</u>	<u>34.7</u>	<u>35.5</u>	<u>36.3</u>
Total, domestic and international	<u>766</u>	<u>847</u>	<u>945</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
B. Pretax Income						
<i>Domestic</i>						
Cans	41.0	43.0	46.0	53.9	52.2	50.9
Crowns	2.0	2.0	3.0	2.6	2.4	3.3
Machinery	1.5	2.0	2.0	2.0	2.4	2.2
Total domestic	<u>44.5</u>	<u>47.0</u>	<u>51.0</u>	<u>58.5</u>	<u>57.0</u>	<u>56.4</u>
<i>International</i>						
Cans	4.0	6.0	8.0	5.3	7.3	8.9
Crowns	25.6	26.4	28.4	33.6	32.1	31.4
Machinery	2.0	3.0	3.0	2.6	3.6	3.3
Total international	<u>31.6</u>	<u>35.4</u>	<u>39.4</u>	<u>41.5</u>	<u>43.0</u>	<u>43.6</u>
Total, domestic and international	<u>76.1</u>	<u>82.4</u>	<u>90.4</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
C. Pretax Margins						
<i>Domestic</i>						
Cans				9.0	8.7	8.5
Crowns				8.0	6.9	9.4
Machinery				7.5	8.3	7.4
Total domestic				<u>8.9</u>	<u>8.6</u>	<u>8.5</u>
<i>International</i>						
Cans				8.6	12.5	11.0
Crowns				13.0	12.3	11.6
Machinery				10.0	12.5	10.7
Total international				<u>11.9</u>	<u>11.8</u>	<u>11.5</u>
Total, domestic and international				<u>9.9</u>	<u>9.7</u>	<u>9.6</u>

Source: Wall Street Transcript, November 3, 1975, p. 41, 865.

a. 1976 figures are estimated and thus do not match actual numbers on other exhibits.

Pankaj Ghemawat

Sustainable advantage

"If a man...make a better mouse-trap than his neighbour, tho' he build his house in the woods, the world will make a beaten path to his door." Attributed to one of Emerson's lectures in the nineteenth century, these words seem to have anticipated the exhortations of the twentieth: manage for uniqueness, develop a distinctive competence, create competitive advantage.

*"For outstanding performance,
a company has to beat the competition.
The trouble is the
competition has heard
the same message."*

But that's not all Emerson had to say about investment in better mousetraps; he also remarked, "Invention breeds invention." What will restrain rivals from imitating or even improving on an invention? That question preoccupies the real mouse-trap industry as it staggers from imported copies of its innovative glueboards and repeating traps.

That question is also central to competitive strategy. Strategists insist that for outstanding performance, a company has to beat out the competition. The trouble is that the competition has heard the same message. Deadlocks ensue. Look at the cross-industry findings about three competitive hot spots:

1 **Product innovation.** Competitors secure detailed information on 70% of all new products within a year of their development. Patenting usually fails

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to deter imitation. On average, imitation costs a third less than innovation and is a third quicker.¹

2 **Production.** New processes are even harder to protect than new products. Incremental improvements to old processes are vulnerable too—if consultants are to be believed, 60% to 90% of all "learning" ultimately diffuses to competitors. Production often blurs competitive advantage: recent studies show that unionized workers pocket two-thirds of the potential profits in U.S. manufacturing.²

3 **Marketing.** Nonprice instruments are usually ascribed more potency than price changes, partly because they are harder to match. Rivals often react to a particular move, however, by adjusting their entire marketing mix. Such reactions tend to be intense; limited data on advertising suggest that the moves and countermoves frequently cancel out.³

In principle, threats like these have always been part of doing business. In practice, they have multiplied with the intensification of domestic and international competition. How should a business cope with such competitive pressure? For guidance, we can turn from cross-industry findings to cases.

Keeping the edge

This study of sustainable success grew out of a sample of 100 businesses that far outperformed their industries in the recent past. Not all of them promise to be as successful in the coming decade. The vulnerable ones have a lesson to impart.

Analog Devices, which focuses on specialized applications for analog semiconductors, has invested countercyclically to cash in on business upturns. The results: 80% faster growth and 50% higher profitability than the rest of the semiconductor industry. But existing competitors seem set to copy Analog's investment policy, and new ones—notably the Japanese—are invading its profitable niches.

Nike's leadership in athletic shoes was built on cheap Far Eastern labor and massive investments in product development and marketing. Over the last five years, Nike averaged thrice the profitability and four times the growth of the rest of the U.S. shoe industry. But competitors are busy cloning its strategy. Reebok International, for one, sources 95% of its shoes from South Korea, spends heavily on product styling, and has won endorsements from rock stars as well as athletes. Reebok's sales and profits expanded fivefold in 1985, while Nike's actually declined.

Piedmont Aviation's hubs at Baltimore, Charlotte, and Dayton tie together dozens of small and mid-sized cities. Since the major airlines had neglected these routes, Piedmont grew three times as fast as the rest of the industry and was six times as profitable. But others are now muscling in: People Express has started to encroach, and American Airlines' planned hub at Raleigh will hurt Piedmont's operations out of Baltimore and Charlotte.

Analog Devices, Nike, and Piedmont are very different from one another, yet they face the same threat: copying by competitors. Their competitive advantages are insecure, or contestable, because each can be duplicated. These examples also show that some success stories do revolve around contestable advantages: all of a company's competitors may be stupid some of the time. But can you count on your competitors being stupid *all* of the time? The historical record suggests otherwise. That is why sustainable advantages—advantages anchored in industry economics—command attention.

The literature on strategy is crammed with accounts of why a sustainable competitive advantage is A Good Thing To Have. But all those accounts beg two key questions: Which advantages tend to be sustainable, and why?

Sustainable advantages fall into three categories: size in the targeted market, superior access to resources or customers, and restrictions on competitors' options. Note that these advantages are nonexclusive. They can, and often do, interact. The more of them, the better.

Benefits of size

Size advantages exist because markets are finite. If a business can commit to being large, competitors may resign themselves to remaining smaller. What holds them back is the fear that if they matched the leader's size, supply might exceed demand by enough to make the market unprofitable for everyone.

Commitment to being large means making durable, irreversible investments. To exploit commitment opportunities, a business must be able to pre-



"My big mistake was sticking to my last."

empt its competitors. Caveat preemptor: first-movers have to be especially wary of environmental changes that can erode the value of their early investments.

Size is an advantage only if, net net, there are compelling economies to being large. Such economies have three possible bases: scale, experience, and scope.

Scale economies usually summon up a vision of a global factory running flat out. But it is important to remember that scale can work on a national, regional, or even local level, and that its effects need not be confined to manufacturing.

Wal-Mart, the discount merchandiser, illustrates the power of local and regional scale economies. Historically, it focused on small Sunbelt towns that its competitors had neglected. Most of these towns could not support two discounters, so once Wal-Mart made a long-lived, largely unrecoverable investment to service such a town, it gained a local monopoly. The company reinforced this advantage by wrapping its stores in concentric rings around regional distribution centers. By the time competitors realized that this policy cut distribution costs in half, Wal-Mart had preempted enough store sites to render competing regional warehouses unviable. Now you know why Sam Walton is one of the richest men in America.

The Wal-Mart story also shows the limits to scale economies. K mart and other discounters are beginning to enter some of Wal-Mart's larger locations. The problem, ironically, is market growth: because of the boom in the Sunbelt, some of these towns

can now accommodate two discounters. And even the warehousing advantages look insecure in the regions into which Wal-Mart is expanding; it probably won't be able to blanket these areas with stores before competitors move in.

Experience effects are based on size over time, rather than size at a particular point in time. If you think about it, experience is a kind of irreversible, market-specific investment. While it is usually cited in the context of the experience curve—the inverse relation between cumulative production and average cost—its ambit is actually much broader. For example, experience has been shown to increase the operating reliability of processing plants, the success rate of product introductions, and the marketability of high-tech products.

Experience effects—especially experience curves—have come under heavy fire recently because they were oversold in the 1970s. Yet some companies *have* parlayed them into competitive success. Take Lincoln Electric's experience in the electric welding industry. Ever since John Lincoln developed the portable arc welder in 1895, Lincoln Electric has outraced its competition down the experience curve. In its ninth decade it still commands a 7% to 15% cost advantage over its four largest rivals.

Lincoln is an object lesson about when and how to exploit experience effects. As the product pioneer it had a first-mover advantage, and that lead has proved durable because of the incrementalism of technological change. Lincoln has also kept its experience proprietary by integrating backward, customizing its production machinery, and holding annual worker turnover under 3%. Finally, it has continued to invest in experience by sharing cost reductions with customers. Competitors complain publicly that they have trouble matching Lincoln's prices, let alone undercutting them.

Scope economies are derived from activities in interrelated markets. If they are strong, a sustainable advantage in one market can be used to build sustainability in another. The term scope economies isn't just a newfangled name for synergy; it actually defines the conditions under which synergy works. To achieve economies of scope, a company must be able to share resources across markets, while making sure that the cost of those resources remains largely fixed. Only then can economies be effected by spreading assets over a greater number of markets.

Cincinnati Milacron, the largest U.S. machine tool manufacturer, shows how companies can capitalize on scope economies. For the last two decades it has led the U.S. machine tool industry in both R&D and the size of its sales and service networks—activities that account for a third of the value added by the

industry. In the 1980s it has pushed hard into robotics, with good reason. Its cumulative R&D experience gives the company such a big lead in the machine tool segment that no domestic challenger can rationally commit to matching its R&D, sales-force, or service expenditures. Furthermore, the technologies and customers for its computerized, numerically controlled machine tools overlap with those for robotics. And the company's R&D, sales, and service activities are all very volume sensitive, which slashes the incremental costs of moving into robotics. These factors make it a formidable contender in the industry.

A company pursuing a sustainable scope advantage cannot afford to run its businesses as isolated units. Activities have to be coordinated and allowances must be made for contributions from one business to the success of another. This makes scope economies especially hard to implement.

Access advantages

Preferred access to resources or customers can award a business a sustainable advantage that is independent of size. The advantage persists because competitors are held back by an investment asymmetry: they would suffer a penalty if they tried to imitate the leader.

Access will lead to a sustainable advantage if two conditions are met: it must be secured under better terms than competitors will be able to get later, and the advantage has to be enforceable over the long run. Enforceability can come from ownership, binding contracts, or self-enforcing mechanisms such as switching costs. Without enforceability, the terms of access shift in line with overall market conditions, wiping out any competitive differences.

Enforceability can be a two-edged sword, however. The risk of pursuing sustainable access advantages is that they may saddle a business with worse terms than those available to its rivals.

Know-how. Superior access to information may reflect the benefits of scale or experience. Boeing, for instance, has acquired superior know-how about commercial jet aircraft through billions of dollars of cumulative investments in R&D. More often, though, sustainability hinges on hidden know-how—what your rivals don't see. For example, IBM's size and the complexity of its operating environment make it hard for competitors to figure out exactly what makes it tick. If the cost of surmounting that kind of informational barrier exceeds the payoffs, rivals may not even attempt imitation.

Consider Du Pont's preemption of all the capacity expansion in the U.S. titanium dioxide in-

Research method

I have drawn many of my examples from research reports prepared by MBA students for the Industry and Competitive Analysis (ICA) course at the Harvard Business School. Constraints of space preclude individual citations; I should, however, emphasize the collective contribution of ICA students to this article.

In fall 1984 and 1985, we asked our students to analyze companies identified as outstanding performers in their industries. The purpose was threefold: to understand the sources of competitive advantage on which these companies relied, to determine why the advantages had proved sustainable, and to assess their future security.

Our students submitted reports on well over 150 companies. Some, obviously, dealt with companies that had been canonized publicly; many others, however, were unfamiliar to the ICA teaching group.

Even more important, the quality of the reports surpassed our expectations. Taken together, they suggest answers to some of the most fundamental questions about strategy formulation. To give these reports the broader circulation they deserve, Douglas Anderson, Michael Porter, and I are editing 20 of them for publication. The compendium will be available in 1987.

dustry in the 1970s. Thanks to a production process based on low-cost feedstock, Du Pont enjoyed a 20% cost advantage over competitors' processes. Mastering the cheaper feedstock technology was a black art—it could be accomplished only by investing \$50 million to \$100 million and several years of testing time in an efficiently scaled plant. The cost and risk of this alternative kept Du Pont's competitors from trying to imitate its demonstrably superior technology.

An obvious but important point: know-how must be kept secret if it is to yield an advantage. Many high-tech and service companies have been devastated by the defection of key personnel in whom their know-how is vested. The Boston Consulting Group, for instance, has suffered more than a dozen spin-offs, eroding its competitive advantage in management consulting and its client base. Other sources of leaks include suppliers, customers, reverse engineering, and even patent documents.

Inputs. Tying up inputs will lead to a sustainable advantage only if the commodity's supply is bounded and the company has the right to use it on favorable terms. Boundedness here is interpreted broadly: it may imply either a strictly limited supply of the input or a supply that is elastic but of varying quality.

In both cases, the supply of the preferred input is limited; as a result, tying it up can be very profitable.

This description covers a wide range of phenomena. Courtaulds' 10% to 15% cost advantage over its competitors in the viscose industry can be traced to its backward integration into dissolving pulp, which accounts for a third of the finished product's cost. Courtaulds gets its pulp from a well-located subsidiary for half what its competitors pay. James River Corporation has averaged a 24% ROE by buying obsolete commodity paper machines at fire-sale prices and converting them to specialty products, a stratagem that has held its assets-to-sales ratio to two-thirds the industry average. In diamonds, the Central Selling Organization (controlled by De Beers) has built up its marketing muscle by tying up contracts to market 80% of the western hemisphere's supply.

Companies can also secure preferred access through their reputations or established relationships. In the record industry, for example, CBS has attracted promising artists because of its reputation for being able to take them to the top—at least partially a self-fulfilling prophecy.

Access advantages are vulnerable to shifts in input availability or prices. Courtaulds' cost advantage in dissolving pulp will wither as infrastructural development opens up more tropical and subtropical forests. And James River's competitors, particularly Hammermill, have begun to bid up the prices of the second-hand paper machines that it traditionally bought for a song. This constrains James River's growth, even though its cheap asset base will prop up profitability for years to come.

Markets. In many ways, preferred access to markets is the mirror image of preferred access to inputs. But access to markets relies less on vertical integration or contracts and more on self-enforcing mechanisms such as reputation, relationships, switching costs, and product complementarities.

That is not to say that vertical integration and contracts are entirely missing from the picture. Tele-Communications' strategy in cable television systems shows otherwise. While competitors outbid each other in their scramble to secure big franchises, Tele-Communications concentrated on acquiring small, contiguous systems in areas that were poorly served because they were hard to get to or far from large population centers. Tele-Communications' current network faces no serious threats from substitutes or competitors, limits its exposure to the whims of any one regulatory authority, and allows the company to spread the costs of its microwave common-carrier network over several communities.

Still, self-enforcing mechanisms for market access crop up far more frequently. Let us look at just two examples. Tandem, which pioneered expan-

sible, fault-tolerant computers for processing transactions, has gained preferred access to demand for upgrades and replacements because changeovers from one system to another are very costly. And Borden's brand of processed lemon juice, ReaLemon, attained a 50% premium over identical competing brands because as the pioneer, it benefited from consumer risk-aversion: lemon juice doesn't cost very much and you don't buy it very often, so why take a chance with an untried brand?

You have probably already figured out that market access advantages are very sensitive to customer preferences. Even slight, apparently innocuous shifts in preferences can weaken an entrenched brand, dispel accumulated switching costs, or undercut long-standing relationships.

Exercising options

Sometimes the sustainability of an advantage cannot be pinned on either size or access. Instead, competitors' options may differ fundamentally from yours, hamstringing their ability to imitate your company's strategy. Rivals may be frozen into their current positions for several reasons:

Public policy. Government intervention always affects the workings of markets; that is its avowed purpose. Sometimes its actions percolate so far as to affect competitive positions within an industry. The examples are familiar: patents (try to) protect innovators from imitators, antitrust laws prevent large businesses from being as aggressive as smaller competitors, some companies get handouts while others do not. The lesson, strategically, is that a company that is on the right side of public policy can exploit its position to build sustainability against companies that are not.

Heileman Brewing exemplifies both the leverage from this source of sustainability and its limits. The shakeout in the U.S. brewing industry during the 1970s endangered many small, regional brewers. Antitrust laws prevented the national brewers—Anheuser-Busch, Miller, and Schlitz—from acquiring them. Heileman, then one of the larger regional brewers, faced no such constraints. It grew throughout the decade by buying out numerous smaller brewers lock, stock, and barrel. These cheap assets fed right through to the bottom line: with an average ROE of 29% over the last five years, Heileman is still ahead of its competitors. But the bloom on this particular strategy is fading. By 1982, Heileman's market share had tripled, and the Justice Department blocked its proposed acquisitions of Schlitz and Pabst. Other takeovers by Heileman are improbable.

Remember that what the government gives, the government can take away. Treat an advantage based on public policy as sustainable only if you are sure you will continue to be on the right side. If not, try a different route.

Defense. A business can also sustain an advantage if its competitors are restricted by past investments. If imitation threatens the cash flow from those investments, disadvantaged competitors may rationally stay put and defend them, thereby giving the innovator an opportunity to take the lead.

Examples of defensiveness are legion. Bic used its 19-cent Crystal to wrest leadership from Gillette in the U.S. pen market in the 1950s, when Bic's aggression went unmatched because Gillette did not want to decimate the sales of its more expensive Paper Mate line. In plain-paper copying, a number of competitors successfully attacked Xerox in the 1970s. Recognizing that its multibillion-dollar rental base was becoming obsolete, Xerox milked it by dragging its feet on price cuts and product innovation—even though these lags caused its share of new placements to fall from nearly 100% in 1972 to 14% by 1976.

Time often erodes defensiveness, however, as it depreciates the value of past investments. In 1970, Gillette introduced a low-priced line of Write Bros. pens to arrest Bic's advance. And since 1977, Xerox has restored its share of new copier placements to the 40% to 50% range by matching competitors' prices and product features.

“All of your competitors may be stupid some of the time—but can you count on them being stupid all of the time?”

Response lags. The final restriction on rivals' options comes from response lags. One business can be every bit as efficient as another in terms of potential size or access without being equally prepared to make a specific move. In that event, the nimbler of the two can count on a lag in its competitor's response, or a period of sustainability.

The longer the response lag the better, as existing advantages stretch out and opportunities to create new ones multiply. Lag times vary enormously, of course, but I can make some broad generalizations. Responses to most pricing moves come in weeks if not days, while responses to nonprice competition and to R&D usually take a few years. And it may take a de-

cadé or more to match a competitor's scope economies or superior organization.⁴

Kodak vividly illustrates how you can sustain a lead by exploiting competitors' response lags. In the late 1950s, Du Pont and Bell & Howell formed a joint venture to challenge Kodak's dominance of the color film market. They found product development exasperating, however, because each time they improved their film, Kodak seemed, as if by magic, to make its film even better. When the Du Pont-Bell & Howell film was finally ready, Kodak administered the coup de grace by introducing the vastly superior Kodachrome II slide film. The competing entry never reached the market.

Guidelines for strategy

I have outlined a set of factors that affect the sustainability of competitive advantages. How should these factors—and the broad notion of sustainability—be integrated into strategy formulation? Here are several points to remember:

1 Managers cannot afford to ignore contestable advantages. For one thing, even moves that offer ephemeral advantages may be worth making, if only to avoid a competitive *disadvantage*. For another, some contestable advantages may survive uncontested: disadvantaged competitors may be tied up trying to meet their profit targets, constrained by their corporate strategies, or just ineptly managed.

2 The distinction between contestable and sustainable advantages is a matter of degree. Sustainability is greatest when based on several kinds of advantages rather than one, when the advantage is large, and when few environmental threats to it exist.

3 Not all industries offer equal opportunities to sustain an advantage. First-mover advantages tend to be most potent in industries characterized by durable, irreversible, market-specific assets, either tangible or intangible. Industries that evolve gradually offer more room to sustain advantages than those that are regularly rocked by drastic changes in technology or demand. And sustainability is more accessible in industries with more than one dominant strategy because competitors may not have the same options you do.

4 To create a sustainable advantage, you must either be blessed with competitors that have a restricted menu of options or be able to preempt them. Propitious times to preempt occur when an industry is undergoing wrenching changes in technology, demand patterns, or input availability. Scan the environment

actively. If you notice any changes, see whether they play to your particular strengths:

Ultimately, the search for sustainability involves a series of decisions about the degree to which you are willing to commit your business to a particular way of doing things. You have to pick the relative emphasis you are going to place on two things: commitment to competing a particular way and retaining the flexibility to compete effectively in other ways.

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Editor's note: Additional references are available from the author.