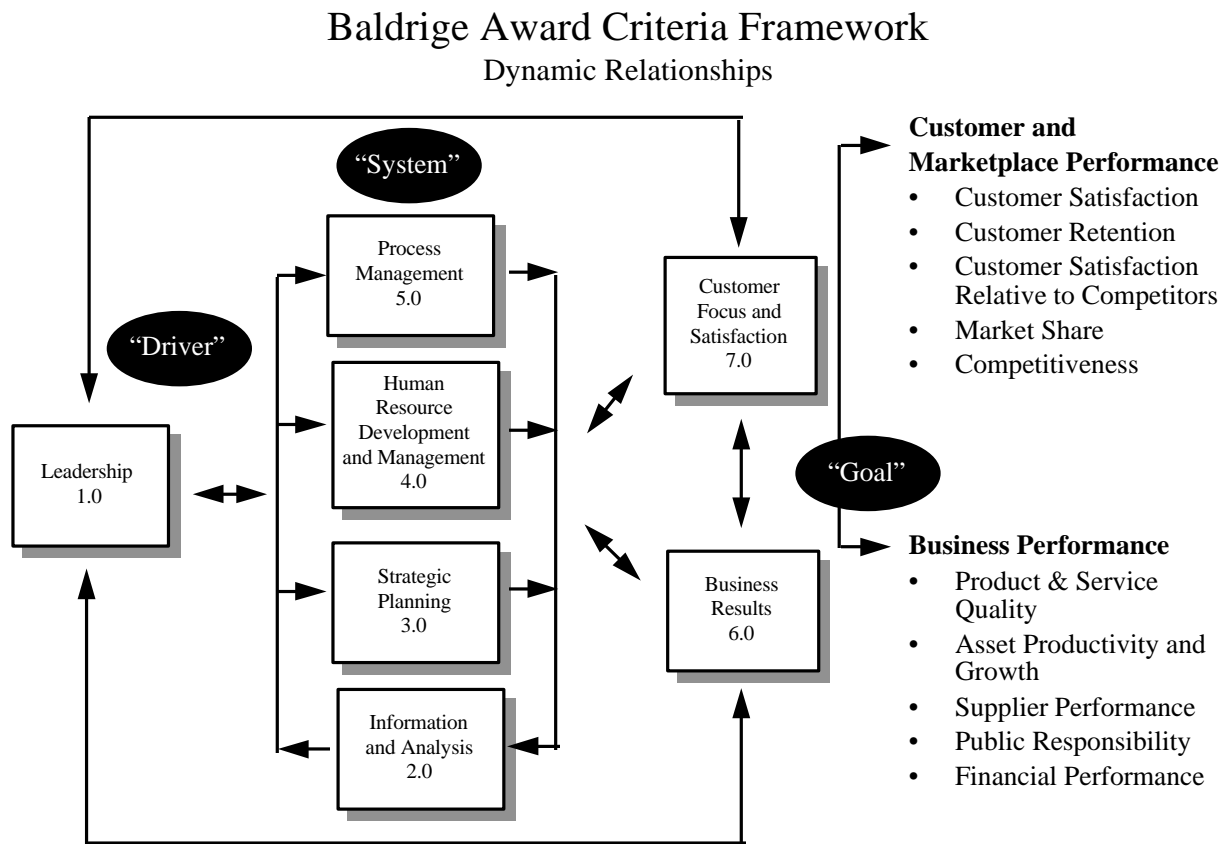


Xerox Corporation: Surviving the Competitive Crisis¹

On November 2, 1989, Xerox's Business Products and Systems organization, which accounted for about 75 percent of Xerox revenues, received the Malcolm Baldrige National Quality Award. This annual award recognized U.S. companies for business excellence. The award criteria cover seven categories including leadership, information and analysis, strategic planning, human resource development and management, process management, business results, and customer focus and satisfaction as shown in Figure 1. Chairman David T. Kearns and president Paul A. Allaire took an active role in preparing the application. As a result, they believed that the company was only about 20 percent of the way toward becoming the company it should be. The ultimate goal, Kearns said, was to be the best in every category. At the ceremony with President George Bush, Kearns expressed the need for continuing improvements, noting that quality was a race without a finish line. "As you get better, so does the competition."

Figure 1: Malcolm Baldrige Award Criteria



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In competing for the Baldrige award, members of the Xerox application committee identified more than 500 problems in the Business Products and System operations that needed to be corrected. Rigorous self-examinations resulted in the development of six principles:

1. A customer defines our business;
2. Our success depends upon the involvement and empowerment of trained and highly motivated people;
3. Line management must lead quality improvement;
4. Management develops, articulates and deploys clear direction and objectives;
5. Quality challenges are met and satisfied;
6. The business is managed and improved by using facts.

For 1990, the company intensified its quality efforts in the U.S. and abroad. The company's priorities remained the same: to increase customer satisfaction, improve employee motivation, improve market share and increase return on assets (ROA). Customer satisfaction was considered paramount for industry leadership. The goals were 15% for ROA in 1990 with increased market share in Xerox's core business.

Background

The Xerox Corporation with headquarters in Stamford, Connecticut was founded in 1906 in Rochester, New York as the Haloid Company, a manufacturer of photographic paper. In 1947, the Haloid Company obtained the license to Chester Carlson's basic xerographic patents from the Battelle Development Corporation of Columbus, Ohio. Through the remainder of the 1940's and the 1950's it perfected and marketed the first xerographic copying machines. With the introduction of the plain-paper copier in 1959, Xerox invented a new industry and launched itself on a decade of spectacular growth. In 1961, the company name was changed to the Xerox Corporation and was listed on the New York stock exchange. The Xerox Corporation expanded operations and grew from \$176 million in 1963 to \$4 billion in sales by 1975. From the mid-1960s to the mid-1970, Xerox revenues grew at an average annual rate of about 23 percent per year and profits increased at an average rate of about 20 percent. Between the mid-1970s and 1980, revenue and profit growth slipped to an average annual rate of about 16 and 14 percent, respectively. From 1981 to 1983, revenues flattened and net income fell 17 percent below 1980 levels. ROA fell from 19 percent in 1980 to 8.4 percent in 1983. In concern for its maturing technology and growing competition, Xerox management began to diversify into new businesses. By the 1980s, insurance and financial services sectors accounted for a quarter of Xerox's total revenues.

The Competitive Challenge

The Xerox name was synonymous with office copying. Protected by patents, Xerox had a rapidly growing market to itself. As a result, Xerox lost sight of the customer, providing an opening for competitors to attack the company's dominant share of the market. By the late 1970s, market share began to plummet as competition attacked from all sides. Japanese firms like Canon, Ricoh, and Sharp attacked the low-end of the market, followed by IBM in the middle, and Kodak

at the high-end. With over two dozen competitors, by 1980 Xerox's market share fell to 50%. In machines that produced up to 8,000 copies per month at speeds of up to 30 copies a minute, Xerox market share fell from 12.2% in 1981 to 8.6% in 1984. Return on assets also fell from 19 percent in 1980 to 8.4 percent in 1983.

Having ignored low-end competition, Xerox faced a battle for survival. Japanese firms sold high-quality, low-priced copiers through office products dealers and retailers, and supplied OEM products to American copier-marketing companies. With a growing product base, competitors moved "up market" into mid-volume machines. According to Mark Shimelonis, Xerox vice president of quality:

At first we denied the competitive problem. Then we thought it was currency translations that made the difference. Or maybe Japanese government support. But in the end, we realized that the Japanese simply managed better than we did. And we set out to match them and exceed them in every way we could.

Establishing Competitive Benchmarks

Xerox began studying other companies to see how they ran similar operations. Critical areas like design, production, inventory management, supplier relations, and staff functions were analyzed. In administrative areas, Xerox chose non-competitive companies, like Procter & Gamble in marketing and L.L. Bean in distribution, that were the best in their fields. Fuji Xerox, a 50/50 joint venture in Japan, evaluated Japanese competitors and discovered annual productivity improvements of 18% compared to 8% for Xerox. According to Shimelonis:

We found that, compared with Japanese manufacturers, we had nine times as many production suppliers, our product lead times were twice as long, and it took five times as long to set up a production line for manufacturing. We also learned we had 10 times as many parts rejected and seven times as many manufacturing defects as our competitors in the copier industry.

Competitor's total costs to produce a comparable product were found to equal Xerox's direct labor costs. Japanese firms priced their models at Xerox's production costs. Reverse-engineering revealed that Xerox's manufacturing techniques were no longer competitive in price or quality.

Xerox management responded with a competitive benchmarking strategy that required each functional area to compare itself to the best counterpart outside Xerox. These measurements set the benchmarks for operating performance. Formalized in 1984, Xerox increased its benchmarks from 14 to 237 performance measurements. After benchmarking LL Bean, Xerox redesigned its warehouses to shorten the distance an order filler had to travel to reach materials and arranged parts according to frequency of purchase. Japan's just-in-time manufacturing techniques were instituted to provide for parts delivery as needed for assembly, thereby eliminating inventories and warehousing requirements. In manufacturing, the number of suppliers were trimmed from 5,000 to the best 500. Suppliers were required to attend seminars in statistical quality-control and quality-improvement methods.

The Quality Improvement Strategy

Beginning in 1980, Xerox agreed with the Amalgamated Clothing and Textile Workers Union, the union representing its manufacturing work force, to explore a joint management-labor problem-solving process. They established Quality of Work Life (QWL) teams to investigate and solve work-related difficulties. After some initial hesitation, job satisfaction for the industrial staff improved and shop-floor problems were solved more easily. The problem-solving process and employee involvement process was then introduced to design engineering groups and staff organizations.

It was difficult to infuse a large organization like Xerox with new enthusiasm to improve return on assets, customer satisfaction and market share. Employees complained that "While you said all the three things were equal, you always listed return on assets first." Kearns, then senior vice president, recognized the need for a comprehensive quality strategy to meet and surpass the competition. He appointed the first vice president of quality, a quality implementation team of senior managers, and a supporting quality training task force. He had read Phillip Crosby's "Quality is Free." Crosby argued that 20% of a company's costs were due to its lack of quality. For a company with \$10 billion in revenues, that equaled \$2 billion.

In consultation with two dozen of Xerox's highest ranking executives, Kearns created a process that became known as *Leadership Through Quality*. In 1983, the team defined "quality" as "meeting customer requirements" and made their quality commitment:

Xerox is a quality company. Quality is the basic business principle for Xerox. Quality means providing our internal and external customers with innovative products and services that fully satisfy their requirements. Quality improvement is the job of every Xerox employee.

Beginning in 1984, Kearns began training his reports as a team, using the LUTI (learn, use, teach, inspect) technique. Senior management were to learn leadership through quality, then use it, then teach it to the next lower management level, then inspect their own usage. Employees worldwide were trained in statistical process controls, just-in-time production systems, problem-solving methodologies, departmental quality circles, and product design teams with supplier participation. Senior management quality improvement teams (QIT) provided the role models. The employee satisfaction measurement system (ESMS) was used for employee input about quality and continuous improvements. According to Shimelonis,

One of the keys to the success of our quality process was the cascading of Leadership Through Quality from the top down. Everyone knew that, when the top of the house was using these principles, they were serious about quality. And when senior and middle managers were meeting in teams, using interactive skills and the problem-solving processes, I knew that it was working.

The quality strategy extended employee-involvement teams across the organization to implement five programs:

- A six step **problem-solving process**: identifying and selecting a problem, analyzing the problem, generating potential solutions, selecting and planning a solution, implementing the solution, and evaluating the solution.
- A nine step **quality improvement process**: identify output, identify customer, identify customer requirements, translate requirements into supplier specifications, identify steps in work process, select measurements, determine process capability, evaluate results, and recycle.
- **Competitive benchmarking**: The continuous process of measuring Xerox products, services and practices against the company's toughest competitors or those companies recognized as the leaders.
- **Closer ties with the best suppliers** reduced supplier numbers from 5000 to 300 and improved quality and delivery capabilities.
- **Cross-functional design teams** that included suppliers and customers in the early stages of new designs.
- **Universal employee training**, with all employees expected to receive 48 hours by 1988.

By 1985, all middle and senior managers had been trained in the use of quality tools and, by 1986, 2,500 quality improvement teams were operating. By the end of 1988, all 100,000 of Xerox employees had received a minimum of 28 hours of quality training. In four years, four million man-hours of training had been given at a cost of \$125 million.

Competitive Performance

The company addressed different market segments better and faster at lower levels in the organization with different strategies. Xerox reengineered product development, manufacturing, and customer service. The customer satisfaction management system was created to identify customer requirements and needs. William W. Kane, a Xerox business process manager, described the transformation:

The entire value system was built upon a fundamental understanding of customer requirements and delivering to those customer requirements. We came to understand the customer's requirements, developed the process capabilities to meet those requirements, and continued to measure those processes' performance to assure that we could meet those requirements.

Based on Xerox's research, customer service was defined as frequency of service needed, response to service calls, length of service calls, and copy quality. A performance measurement system quantified service responsiveness and set measurable standards for service quality in its markets. New copier models had specific service level targets: the average number of copies between service calls. When service requirements exceeded target, the company replaced the unit. Every customer also had a targeted response time from time of service call to problem resolution. Copy quality was randomly sampled, using a test pattern, to check for image quality, including darkness, background, distortion, deletion, streaks, and spots. The information was used to guide product development goals. Beginning in 1987, sales representatives were rated on surveys of their accounts.

The 10 series of copiers were introduced in 1982. Product costs were reduced 40% to 50%. About \$600 million was eliminated from the cost base. Product development was shortened by 25% to 50%. Inventory was reduced 5-6 months of production to 36-37 days. Quality of incoming parts increased from 92% to 99.2% defect-free. Machine performance during the first

30 days after install improved 40% in four years. Billing accuracy improved by 20%. In 1986, Xerox gained market share for the first time in the decade. In 1987, president Paul A. Allaire changed the corporate priorities at Xerox Corporation. “Effective immediately, the order is number one: customer satisfaction; number two: ROA (return on assets); number three: market share.”

Between 1982 and 1988, Xerox's operating revenues increased from \$8.5 billion to \$16 billion, while net income increased only slightly, from \$367.7 million to \$388.0 million. During the six-year period ending in 1987, total revenues increased at a compound annual rate of only 3% as rental income declined at a compound annual rate of 13%; service grew at 24% annually; and equipment sales increased at a 9% growth rate. Rentals decreased as a percentage of total revenues from 51% in 1981 to 18% in 1987, and were projected to fall to 6% by 1992. With the decline in rentals, equipment sales grew from 40% in 1981 to 55% in 1987, and were planned to reach 56% by 1992. Rental retirements were the highest in the high-end and mid-range sectors. Services grew from 9% of total revenues in 1981 to 27% in 1987 with plans to reach 37% by 1992. The growth in service and equipment sales did not offset the precipitous decline in rentals. Growth in equipment sales had increased the volatility of Xerox's revenue and earnings streams.

Gross margins in the copier business decline as customers converted from the highly profitable rental business to outright sales, and as lower-margin products sold through discount distribution channels increased. Operating margins had collapsed from 14.1% in 1981 to 6.3% in 1987, with a low of 5.6% in 1986. By 1989, revenues and income reached record levels with \$16.5 billion and \$704.0 million, respectively, as shown in Table 1. Between 1988 and 1989, Xerox's return on assets and return on equity nearly doubled from 2.4% to 4.2%, and from 6.8% to 12.6%, respectively.

Heated competition from the Japanese contributed to declining profit margins, although a sharp rise in the yen's value slowed the decline in prices. To overcome the yen's appreciation in value, Japanese competition aggressively established local manufacturing facilities in countries where they operated. Anti-dumping duties in the European Economic Community restrained Japanese copier shipments to that geographic region. The Japanese were also moving into the mid- and upper-range of the market, where profit margins were more attractive. The Japanese dependence on independent business equipment dealers limited their success in the upper end of the market. Xerox actively cut costs (particularly related to SG&A expenses) to help profitability in the office equipment side of the business. Despite major downsizing from 121,000 employees in 1981 to 99,000 at the end of 1987, decreases in copier prices during the period impacted gross margins as rental assets were sold. After years of decline, industry prices remained flat in 1987.

To reduce Xerox's dependence on the maturing copier business, it also diversified into financial services through the Xerox Credit Corporation's leasing business and the acquisition of Crum and Forster in 1983. Crum and Forster raised financial services net income to 40% of Xerox's total in 1983. In 1985, the collapse in Crum and Forster's earnings resulted in financial services accounting for only 8% of total earnings, but rebounded in 1986 and 1987. As shown in Table 2, financial services accounted for nearly half of Xerox's net income.

Table 1: Xerox Corporation's Financial Performance 1986-1989.

	1989	1988	1987
Revenues			
Business equipment	\$11,720	\$11,152	\$10,438
Equipment financing	711	536	396
Financial services	<u>5,204</u>	<u>4,753</u>	<u>4,274</u>
Total Revenues	\$17,635	\$16,441	\$15,108
Net Income			
Business equipment	\$333	\$36	\$270
Equipment financing	155	112	83
Financial services	<u>216</u>	<u>240</u>	<u>225</u>
Net Income	\$704	\$388	\$578
Assets			
Business equipment	\$7,710	7,780	7,399
Equipment financing	5,566	4,423	3,258
Financial services	<u>16,812</u>	<u>14,238</u>	<u>11,793</u>
Total Assets	30,038	26,441	22,450
Allocated Debt			
Business equipment	\$1,334	712	384
Equipment financing	4,444	3,364	2,334
Financial services	<u>4,976</u>	<u>3,798</u>	<u>3,004</u>
Total Allocated Debt	10,754	7,874	5,722

Source: Annual Report

Table 2: Xerox Corporation's Sources of Net Income (per share)

	1985	1986	1987	1988
Total financial services	-0.20	1.84	2.34	2.70
As % of total	8%	47%	48%	49%
% change		1040.6%	27.3%	15.5%
Business products & systems	3.65	2.68	3.02	3.14
As % of total	92%	53%	52%	51%
% Change		-26.5%	12.6%	4.0%
Total earnings per share	3.45	4.52	5.36	5.84
% Change		30.9%	18.6%	9.0%

Rebuilding Product Leadership

Management gave top priority to product development. In 1988 and 1989, Xerox introduced more new copiers and laser printers than during any five-year period in its history. The "50" series, introduced during 1988 and 1989, included nine new copiers with premium prices 10%-15% higher than previous models. The new line cost 20%-30% less to manufacture than older models. As shown in Figure 2, the "50" series had models ranging from a very low-end personal copier, which depended on efficient manufacturing, to a high-end duplicator capable of 135 pages per minute (PPM), which depended on effective service. The new 50 series represented advanced price/performance and

lower costs. This new product line moved Xerox from the stand-alone, analog, copier business into the digitally-based, networked document business. This shift in technology caused Xerox to deal with “different customers, different decision-makers, different competitive models, different customer requirements, and different ways of selling.” Xerox also introduced two new high-end laser printers to strengthen its position in the \$1.8 billion laser printer business. Rapid changes in markets and technologies were forcing giants like Xerox to become more flexible, market focused and customer responsive organizations.²

Figure 2: New 50 Series Copiers

Copier Model	Pages Per Minute	Price	Availability
5090	135	\$145,000	Second Half 1988
5052	50	17,795	June 1988
5046	35	8,505	June 1988
5042	35	9,470	Spring 1989
5028	28	5,659	June 1988
5018	18	2,995	October 1988
5014	12	2,850	Spring 1989
5012	12	2,325	Spring 1989
5008R/E	8	1,695	June 1988
5008	8	1,295	June 1988

Source: Prudential-Bache Securities

Low-end machines had very narrow profit margins. Xerox’s recovery in the low volume market segments demonstrated its ability to compete with the Japanese. Discounting was standard practice in the industry, and Xerox’s older "10" series was steeply discounted. Xerox's new 10 series products put the company in its strongest competitive position in recent years. Xerox had increased market share in product segments “1” and “2”, described in Table 3, from 8.6% in 1984, to 11.4% in 1986, to 14.5% in 1989. As shown in Tables 4 and 5, Xerox increased its share in low-volume markets throughout the 1980s. To bolster profits for 1988 after years of price cuts, Xerox initiated a 5% price increase on new models. Kodak followed suit with an average 5% price hike on new copiers, on renewed copier service contracts, and on rentals.

A growing demands for faster and more sophisticated copiers were drawing foreign competitors into higher speed market segments. While Xerox’s market share had increased in low speed segments, market share in the higher-speed segments (segments 5 and 6) fell from 53% in 1985 to 40% in 1986. Japanese competitors had a competitive disadvantage in high-end segments, lacking major metropolitan centers to service malfunctioning copiers within eight hours of notification, the maximum service time provided by Xerox and Kodak. Xerox’s 12,000 service representatives were located within 30 minutes of a call for help. Canon, Ricoh and Sharp began making gains in sectors traditionally ruled by IBM, Kodak, and Xerox as their technological strength improved and they moved up-market. Xerox and Eastman Kodak continued to dominate segment 6 as Japanese manufacturers increased their share of segment 5 between 1988 and 1991.

² Ennala Ramcharamdas, “Xerox Creates a Continuous Learning Environment for Business Transformation,” Planning Review, March/April 1994, p. 34.

IBM exited from the copier market in 1988 by selling its service contracts to Kodak. Until IBM's installed copier base was converted to Kodak or Xerox copiers, it was counted as IBM's installed base as shown in Table 6 and 7. The installed base of Xerox and Kodak provided economies of service that were hard for Japanese to match.

Table 3: Dataquest Segment Definition

Dataquest Segment	Multicopy Speed (ppm)	Machine Form/ Platen	Paper Feed	Average Monthly Copy volume	Average Retail Price (\$)	Machine Description
PC	Up to 12	Tabletop/ moving or stationary platen	Single cassette	400	1,103	Minimal features; easy to install; superior reliability; compact; light-weight; user serviceable
1	Up to 20	Tabletop/ moving or stationary platen	Single or dual cassettes	1,700	3,066	Possible features; reduction, enlargement, zoom, sheet bypass, optional input/output devices
2	21-30	Tabletop/ stationary platen	Dual or triple cassettes or trays	6,000	5,104	Possible features; reduction, enlargement, zoom, optional input/ output devices, LCC
3	31-44	Tabletop or console/ stationary platen	Dual or triple cassettes or trays	11,600	7,257	“Systems” with standard features of reduction/enlargement, zoom, feeder, sorter, and LCC
4	45-69	Console or tabletop/ stationary platen	Dual or triple cassettes or trays	18,500	16,113	Highly featured
5	70-90	Console/ stationary platen	Dual or triple cassettes or trays	55,000	18,000-80000	Highly featured with finishing, input/output devices, magnification
6	91 & above	Console/ stationary platen	Dual or triple trays	158,000	78,000-235,000	Large units with numerous peripherals and special features

Source: Dataquest (April 1994)

High speed copiers continued to hold about 3.0% of the market, followed by moderate volume units with 18.3% of the market. Mid-level copiers were gaining market share as customers demanded faster performing copiers, as shown in Table 8. Xerox had been able to maintain share of the mid-volume market as shown in Tables 9 and 10. The dominant volume continued to be in the low speed market with a 78.7% share, down from its high of 80.0%.

Table 4: Low-Volume Copier (0-29 PPM-Plus) Unit Placements

(000 Of Units)	1986	1987	1988	1989	1990	1991
Xerox	77	102	110	122	132	143
Market Share	11.4%	13.7%	13.8%	14.5%	15.0%	15.5%
Growth Rate	16.7%	31.8%	8.3%	11.0%	8.3%	8.0%
Canon	100	104	116	128	140	153
Market Share	14.8%	14.1%	14.6%	15.2%	15.9%	16.6%
Sharp	73	81	89	96	102	107
Market Share	10.7%	10.9%	11.2%	11.4%	11.6%	11.7%
Ricoh	34	46	52	56	60	65
Market Share	5.0%	6.3%	6.4%	6.7%	6.8%	7.1%
Konica	34	41	45	48	51	55
Market Share	5.0%	5.5%	5.7%	5.7%	5.8%	6.0%
Pitney Bowes	19	21	25	28	31	34
Market Share	2.8%	2.8%	3.1%	3.3%	3.5%	7.7%
Savin	20	19	18	18	19	19
Market Share	2.9%	2.6%	2.3%	2.1%	2.1%	2.0%
Other	321	325	342	345	348	343
Market Share	47.4%	44.0%	42.9%	41.0%	39.4%	37.3%
Total	677	738	797	841	884	918
Growth Rate	(1.5)%	9.1%	8.0%	5.5%	5.1%	3.9%

Source: Dataquest for 1986-1988 company-specific data include shipments less rental retirements. Actual unit sales are higher for most companies. Prudential-Bache Securities for 1988-1992 company-specific and total placements.

Table 5: Low-Volume Copier (0-29 PPM) Installed Base

(000 Units)	1985	1986	1987	1988	1989	1990
Xerox	401.0	403.0	420.0	455.0	516.0	571.0
Percent	16.1%	14.2%	13.3%	13.2%	13.8%	14.3%
Growth Rate	8.1%	0.5%	4.2%	8.3%	13.4%	10.7%
Canon	315.0	391.0	449.0	524.0	599.0	659.0
Percent	12.6%	13.8%	14.3%	15.2%	16.0%	16.5%
Konica	125.0	153.0	175.0	201.0	218.0	233.0
Percent	5.0%	5.4%	5.6%	5.8%	5.8%	5.9%
Ricoh	102.0	126.0	143.0	166.0	183.0	199.0
Percent	4.1%	4.5%	4.6%	4.8%	4.9%	5.0%
Savin	216.0	218.0	193.0	182.0	173.0	167.0
Percent	8.6%	7.7%	6.1%	5.3%	4.6%	4.2%
Sharp	299.0	316.0	332.0	362.0	395.0	428.0
Percent	12.0%	11.1%	10.6%	10.5%	10.6%	10.7%
Pitney Bowes	72.0	78.0	85.0	104.0	123.0	139.0
Percent	2.9%	2.8%	2.7%	3.0%	3.3%	3.5%
Other	967.0	1,147.0	1,349.0	1,455.0	1,528.0	1,593.0
Percent	38.8%	40.5%	42.9%	42.2%	40.9%	39.9%
Total	2,494.0	2,833.0	3,146.0	3,450.0	3,734.0	3,988.0
Growth Rate	8.0%	13.6%	11.1%	9.6%	8.2%	6.8%

Source: Dataquest for installed base information, company-specific historical installed base estimates, and total installed base estimates. Prudential-Bache Securities for company-specific installed base forecasts.

Table 6: High-End Copier (70 PPM-Plus) Units Placed

(000 Units)	1986	1987	1988	1989	1990	1991
Xerox	11.9	15.4	15.6	16.9	18.0	18.9
Market Share	52.3%	52.3%	50.9%	53.5%	54.2%	54.2%
Growth Rate	6.9%	29.4%	1.0%	8.2%	7.1%	4.8%
Kodak	5.0	6.7	8.3	10.9	11.7	12.2
Market Share	22.0%	22.6%	27.0%	34.5%	35.0%	35.1%
Growth Rate	8.1%	32.9%	23.9%	31.5%	7.2%	5.1%
IBM	4.8	4.5	3.3	0.3	0.0	0.0
Market Share	21.0%	15.2%	10.8%	1.0%	0.0%	0.0%
Canon	1.4	1.6	1.7	1.8	1.9	1.9
Market Share	6.1%	5.4%	5.6%	5.7%	5.7%	5.4%
Other	0.7	1.3	1.8	1.6	1.7	1.8
Market Share	3.4%	4.4%	5.9%	5.2%	5.2%	5.3%
Total	22.8	29.5	30.6	31.5	33.3	34.9
Growth Rate	(17.4)%	29.4%	3.7%	2.9%	5.7%	4.8%

Source: Dataquest estimates are shipments less rental retirements. Actual unit sales are higher for most companies. Further, rental retirements are the largest in the high-end and mid-range sectors.

Table 7: High-End Copier (70 PPM-Plus) Installed Base

(000 Of Units)	1986	1987	1988	1989	1990	1991
Xerox	67.6	76.3	89.7	98.2	111.0	126.5
Market Share	48.5%	47.5%	48.6%	48.6%	49.4%	50.7%
Growth Rate	27.1%	12.9%	17.6%	9.5%	13.0%	14.0%
Kodak	39.5	43.7	48.3	56.5	67.2	78.3
Unit Increase (Decr.)	(1.3)	4.2	4.6	8.2	10.7	11.1
Market Share	28.3%	27.2%	26.2%	28.0%	29.9%	31.4%
IBM	32.0	38.2	41.2	39.0	34.9	29.9
Unit Increase (Decr.)	7.6	6.2	3.0	(2.2)	(4.1)	(5.0)
Market Share	23.0%	23.8%	22.3%	19.3%	15.5%	12.0%
Canon	0.0	1.4	2.9	4.4	6.1	7.8
Unit Increase (Decr.)		1.4	1.5	1.5	1.7	1.7
Market Share	0.0%	0.9%	1.6%	2.2%	2.7%	3.1%
Other	0.3	0.7	1.3	1.7	1.3	1.5
Market Share	0.2%	0.6%	1.2%	2.0%	2.4%	2.7%
Total	139.4	160.6	184.4	202.1	224.6	249.4
Growth Rate	7.7%	15.2%	14.8%	9.6%	11.1%	11.0%

Source: Dataquest estimates for the historical placements in 1986 and 1987; Prudential-Bache Securities estimates for 1988-1990.

BIS consultants estimated the personal copier market to account for 27% of the copies by 1997. The personal copier market was maturing as low-cost computer printers allowed for multiple copies of originals to be printed. New multi-function desktop printer-copier-fax machines cost under \$1000. As shown in Figure 3, convenience copiers produce between 10 and 45 ppm and generate between 1,300 and 7,750 copies per month. The convenience market accounted for 66% of the U.S. installed base. Copy center machines produce 46 to 90 ppm and 17,000 to 49,500 copies per month. BIS believes the market will split between products offering 46 to 69 ppm machines and more rapid

digital copier-and-printer machines like Xerox's 70 and 90 ppm DocuTech machines. Central-site copiers, averaging 178,000 copies per month, were expected to fall to about 162,000 copies per month as jobs shifted to digital copying equipment.³

Table 8: Total Unit Placements by Market Segments

(000 units)	1986	1987	1988	1989	1990	1991
Total 70 plus ppm	22.8	29.5	30.6	31.5	33.3	34.9
High-volume share	2.7%	3.2%	3.1%	3.0%	3.0%	3.0%
Total 30-69 ppm	147.3	158.2	169.0	184.0	199.0	214.0
Mid-volume share	17.4%	17.1%	17.0%	17.4%	17.8%	18.3%
Total 0-29 ppm	677.0	738.0	797.0	841.0	884.0	918.0
Low-volume share	79.9%	79.7%	80.0%	79.6%	79.2%	78.7%
Total Industry	847.1	925.7	996.6	1056.5	1116.3	1166.9

Table 9: Mid-Volume Copier (30-69 PPM-Plus) Unit Placements

(000 Units)	1986	1987	1988	1989	1990	1991
Xerox	55.5	60.0	62.9	69.2	75.2	80.9
Market Share	37.7%	37.9%	37.2%	37.6%	37.8%	37.8%
Growth Rate	6.9%	8.0%	4.9%	10.0%	8.7%	7.5%
Kodak	7.2	7.2	8.3	9.2	10.6	11.9
Market Share	4.9%	4.6%	4.9%	5.0%	5.3%	5.6%
IBM	2.8	3.0	2.5	1.0	0.1	0.0
Market Share	1.9%	1.9%	1.5%	0.5%	0.0%	0.0%
Canon	12.4	15.8	17.4	19.1	20.9	22.7
Market Share	8.4%	10.0%	10.3%	10.4%	10.5%	10.6%
Konica	7.5	6.6	7.1	7.7	8.4	9.0
Market Share	5.1%	4.2%	4.2%	4.2%	4.2%	4.2%
Ricoh	6.5	8.7	9.6	10.3	11.3	12.2
Market Share	4.4%	5.5%	5.7%	5.6%	5.7%	5.7%
Savin	16.6	14.1	14.7	15.5	16.1	16.9
Market Share	11.3%	8.9%	8.7%	8.4%	8.1%	7.9%
Sharp	14.0	12.8	13.2	14.4	15.5	16.7
Market Share	9.5%	8.1%	7.8%	7.8%	7.8%	7.8%
Pitney Bowes	4.0	4.7	5.6	6.5	7.4	8.3
Market Share	2.7%	3.0%	3.3%	3.5%	3.7%	3.9%
Other	20.8	25.3	27.6	31.1	33.5	35.4
Market Share	14.1%	16.0%	16.3%	16.9%	16.8%	16.5%
Total	147.3	158.2	169.0	184.0	199.0	214.0
Growth Rate	7.4%	7.4%	6.8%	8.9%	8.2%	7.5%

Source: Dataquest estimates for 1986 and 1987 company-specific data and for 1986-1991 total placements. Dataquest placement estimates are shipments less rental retirements making actual unit sales higher for most companies. Prudential-Bache Securities estimates are used for 1988-1992 company-specific placements.

³ "U.S. Copier Market Faces Threat From Color Printing Systems." Office Equipment & Products. October 1994, p. 32.

Figure 3: Copier Use Trends

Category	Speed (ppm)	Estimated Average Monthly Volume	
		1992	1997
Personal copying	10 or fewer	400	400
Convenience copying	10 to 13	1,300	1,240
	14 to 19	1,850	1,750
	20 to 30	4,100	3,850
	31 to 45	7,750	7,000
Copy-center copying or duplicating	46 to 69	17,600	14,350
	70 to 90	49,500	46,000
Central-site xerographic duplicating	91 or more	178,000	162,000

Source: BIS Strategic Decisions

Table 10: Mid-Volume Copier (30-69 PPM) Installed Base

(000 Units)	1985	1986	1987	1988	1989	1990
Xerox	241.0	249.5	233.5	267.4	310.1	360.7
Unit Change	39.3	8.5	(16.0)	33.9	42.8	50.6
Percent	44.0%	39.1%	33.2%	33.2%	33.3%	33.7%
Growth Rate	19.5%	3.5%	(6.4)%	14.5%	16.0%	16.3%
Kodak	2.3	9.5	16.6	24.7	33.7	44.1
Unit Change	2.3	7.2	7.1	8.1	9.0	10.4
Percent	0.4%	1.5%	2.4%	3.1%	3.6%	4.1%
IBM	24.0	17.8	17.8	15.1	11.1	6.0
Unit Change	(5.5)	(6.2)	0.0	(2.7)	(4.0)	(5.1)
Percent	4.4%	2.8%	2.5%	1.9%	1.2%	0.6%
Canon	65.2	77.2	90.7	104.1	119.2	136.1
Percent	11.9%	12.1%	12.9%	12.9%	12.8%	12.7%
Konica	32.7	39.7	44.5	48.6	53.3	58.7
Percent	6.0%	6.2%	6.3%	6.0%	5.7%	5.5%
Ricoh	21.5	25.8	32.7	39.3	47.6	56.9
Percent	3.9%	4.0%	4.6%	4.9%	5.1%	5.3%
Savin	56.8	73.0	83.4	83.6	85.0	87.4
Unit Change	18.8	16.2	10.4	0.2	1.4	2.4
Percent	10.4%	11.4%	11.8%	10.4%	9.1%	8.2%
Sharp	29.0	42.3	48.3	58.5	70.9	83.4
Percent	5.3%	6.6%	6.9%	7.3%	7.6%	7.8%
Pitney Bowes	7.1	10.9	15.4	20.7	26.9	34.0
Percent	1.3%	1.7%	2.2%	2.6%	2.9%	3.2%
Other	68.7	93.2	121.3	144.1	172.2	201.9
Percent	12.5%	14.6%	17.2%	17.9%	18.5%	18.9%
Total	548.3	638.9	704.2	806.2	930.2	1069.3
Growth Rate	14.5%	16.5%	10.2%	14.5%	15.4%	15.0%

Source: Dataquest estimates are installed base information and Prudential-Bache Securities estimates are for company-specific installed base estimates.