

The Plain Paper Copier Industry¹

The volume of information being processed by corporations and individuals continues to increase. In a typical office, a fax machine processed 300 to 400 pages per month, a printer produced 1000 pages, and a copier reproduced 3,000 to 4,000 pages per month. After economic slowdowns of the early 1990s, sales of office automation (OA) equipment were projected to grow 6% annually through the year 2000. Equipment was being replaced by new models as a result of rapid technological innovations that characterized OA products. Most competitors were now selling their fourth or fifth generation of copiers. Products that lacked advanced features did not sell, even with reduced prices. Competitors were being forced to improve their own operating productivity as copier prices fell and margins were squeezed.

Xerography was first invented by Chester Carlson, a Queens patent attorney, more than 50 years earlier. While the process was developed in 1941, the first copier was marketed in 1959 by Xerox Corp. The first plain paper copier, the Xerox 914, weighed 648 lbs. and produced just seven copies per minute. But the high price and large size of copiers kept the market from taking off until the 1970s. In 1972, the major players, Xerox, Eastman Kodak and IBM, utilized their own direct sales organizations. In the mid-1970s, Japanese manufacturers like Canon, Minolta, Mita and Ricoh entered the market and successfully created dealer networks for selling low volume copiers with advanced technology and features. With the exception of Xerox and Eastman Kodak, most U.S. companies exited copier production. In 1988, IBM exited the industry by selling its copier division to Kodak. U.S. firms like Monroe, Pitney Bowes and Savin Corp. marketed re-labeled Japanese-made copiers. Even Eastman Kodak's lower volume machines were being sourced from Canon. There were rumors that Kodak was merging with Canon, as they developed a strategic partnership. Analysts expected sales of copiers to continue their decline through 1997, forcing further industry consolidation. With the drive to improve productivity, customers were moving to more expensive and faster systems. Only seven or eight copier manufacturers were expected to survive the projected shakeout. Future success depended on the ability of competitors to develop new products in fields where differentiation was possible, and to launch high value added products. The maturing of analog technologies was driving companies to continue product downsizing, improve copier speed, and reduce prices. The advent of digital technology was shifting the focus to improved productivity and multi-functional operations for new machines.

Plain Paper Copiers.

Copiers can be divided into three types: direct electrostatic-process copiers, indirect electrostatic-process copiers called plain paper copiers (PPCs), and diazo copiers. Diazo copiers, used mainly to copy large poster-sized originals like blueprints, had little demand for general offices use. Direct electrostatic process copiers have been replaced by dry plain paper copiers and are no longer manufactured in Japan. In 1992, Japanese PPC production accounting for 93.3% of the total copier production and 85.9 percent of the total production value. In spite of the large market share of PPCs, total production declined 12.7% to 2.22 million units in 1992, or \$4.7 billion in value (a 3.9% decrease from 1991). Because PPCs accounted for the overwhelming majority of copier production, they have become synonymous with the term *copiers*.

When an original document is placed on a copier glass, called the "platen," and the "print" button is depressed, the copy process begins. First, the photoconductor drum or belt, which is

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coated with a photoconductive material, receives a charge as it revolves and passes the corona wire. Next the original document is scanned by a mechanical analog or digital scanner and the image is read and transferred to the drum either through fiber optics, a series of lenses and mirrors, or electronically via a laser diode. An electrostatic charge forms a latent image on the drum. Toner and developer receive opposite electrostatic charges so that fine toner particles cling to larger iron oxide developer particles which acts as the carrier. As the photoconductor revolves, toner clings to a magnetic roller or brush and is deposited on the latent image of the drum. Next, the toner is transferred to the paper via a charge from the corona. Heat is then applied to “fix” the image to the paper. Finally, excess toner is cleaned from the drum by a brush or a blade before the cycle begins again.

Toner determines the quality of the photocopy. Dry toner copiers are either dual component or mono-component. Dual-component copiers mix toner and developer in a hopper. Mono-component toner needs no developer. Dual component provides very good gray-scale rendition due to fine particle sizes. It also tends to be less expensive than mono-component toner. However, mono-component toning allows for simpler copier designs, easier access to internal components, and lower maintenance costs. Liquid toner copying systems are lower cost and eliminate dust from dry powders. Savin leads in liquid toner technology with its 1989 introduction of a toner injection canister system to dispense the toner, eliminating the tanks found on earlier machines.

There are several types of photoconducting materials that cover the drum. Selenium (Se) costs between \$307 and \$951 per drum; Selenium tellurium alloy (SeTe) costs between \$185 and \$515 per drum, and organic materials cost between \$175 and \$578 per drum. Selenium drums are more durable and can withstand copying volumes of between 60,000 and 500,000 copies. Organic photoconductors are better for color but produce only 10,000 to 300,000 copies. Newer materials like amorphous silicon cost from \$1,425 to \$1,570 per drum but have a life of 700,000 to 3 million copies. Arsenic selenium, with durability and sensitivity that yields of about 280,000 copies, costs between \$243 and \$863 per drum.

Quality and overall productivity have improved rapidly. Competitors improved the price and performance of standalone copiers through modular product designs that improved performance and reliability. Copier technology had progressed rapidly from mechanical to electromechanical components. Modular options allowed customers to select their desired features like multiple paper sources, document feeders and sorters, and duplexing. This allowed customers to easily add functions like document feeders and larger paper supplies. Document feeders and sorters have increased productivity. Desk sized copiers that made 20 copies per minute (cpm) were now desktop size with better reliability and productivity without higher costs. Features like zoom reduction and enlargement and two-sided duplex copying had become standard. Minolta introduced zoom reduction and enlargement in a desktop copier in 1983.

Over the past decade, copier downtime fell from over 15% to under 1%. Technical improvements reduced the number of moving parts and improved copier reliability. By placing a document on a stationary platen, fewer moving parts were needed and fewer malfunctions occurred. Development teams improved a copiers’ ability to work at rated speeds during duplexing, feeding, sorting and stapling. A great deal of progress had been made in extending the life of photoreceptors, particularly organic ones. The current generation of photocopiers employed long-life, small-diameter organic photoreceptors. Prices had increased only 5% to 7% a year.

The Growth in Color Copiers

While color displaced black and white in photography, movies, television and printing, it had been slow to replace black and white copiers. Though Xerox introduced its 6500 color copier in 1973, it wasn't until the mid-1980s that competitors entered this product segment. Kodak introduced the ColorEdge color copier in 1985 capable of producing 23 copies per minute, nearly five times the speed of Xerox's newest 1005 color copier. By the 1990s, there were five major processes being used in analog and digital PPC copiers: electrophotographic, photographic, Cyclicolor, thermal transfer and ink jet. By 1993, the U.S. market had grown to \$4 billion in sales and was expected to top \$15 billion by 1996.

The electrostatic process is used for plain paper black and white copiers. Toner is transferred onto the paper by means of static electricity. With three or four developing units and drums, maintenance is high and complex. Analog systems use a lens and mirror system to transfer the image to a color filter that is applied to a photoconductor drum or belt followed by color applications. Digital systems use a laser diode to transfer the scanned image to the drum. Color software filters then determine the amount of color required from each developing unit. The image is then fused to the paper with heat or pressure.

Photographic processes are equivalent to a photo lab in a box. Light is reflected off the original onto a photosensitive material that is immersed in developer and exposed to a light source. It is then bleached in a fixer solution, rinsed in a stabilizer liquid, and dried by heat. While this provides the best color image, the required disposal of chemicals and ventilation is a problem. It requires special photosensitive paper. The equipment is large and maintenance intense.

Cyclicolor, developed by Mead Corporation, was a simple process that incorporated all of the needed chemicals for color in either a "donor" film or a "receiver" paper. Light sensitive capsules reflect the colors from the original according to their light intensity. The film and paper were then pressed together to burst the capsules and transfer the image. Because of its simplicity and single exposure, the process was inexpensive and had little maintenance. Copy quality was good with brilliant color reproduction. Unfortunately, the process was slow, at 2 copies per minute, and expensive per page due to paper costs. The paper also required special storage since it was sensitive to light, humidity and heat.

Thermal transfer uses either wax or dye-based thermal ribbon to transfer color. The original is transferred by digital image from the ribbon to the calendared paper via a heated "print head.". While the process is simple, it is slow due to the repeat cycles by ribbon color. It also requires special paper.

Bubble jet technology sprays liquid ink onto the paper through tiny nozzles. Electric current is applied to a resistor that surrounds an ink channel at each nozzle and causes a vapor bubble to form and break off several thousand times a second for each nozzle. This technology is relatively simple, inexpensive to manufacture and inherently reliable. Unfortunately, it is slow at 1 copy per minute, requires special paper for good quality, and often has uneven ink absorption.

Canon offered color electrostatic digital copiers for \$23,000 and \$52,400, and digital ink jet copiers for \$4,495 and \$5,995. Kodak's digital electrostatic ColorEdge copiers color copiers were priced at \$24,900 and \$49,900. Xerox offered one for \$47,500. Konica, Minolta and Panasonic offered digital electrostatic color copiers for \$19,480, \$41,500 and \$16,695

respectively. Ricoh offered two analog electrostatic color copiers for \$13,495 and \$14,724, and one digital model for \$51,995. Toshiba offered a digital thermal transfer copier for \$10,599. Sharp introduced color copiers using thermal transfer. While the demand for color grew with the introduction of color computer monitors, the market growth for color copiers was co-opted by the introduction of affordable computer peripherals that generated color originals with dot matrix and other non-impact printers. Prospective users with limited budgets could not justify top quality color copiers and settled for lower quality color printers. Color copiers reached sales of about \$2 billion by 1990, compared to total U.S. copier sales of \$14 billion.

With the arrival of precise color copiers, currency counterfeiting recently has become a problem in Japan and abroad. In September of 1992, a group of Japanese governors and ministers issued a request that manufacturers of color copiers voluntarily develop and adopt technologies to foil those who forge currency. In response, the Japan Business Machine Makers Association announced that its members should apply existing forgery-prevention techniques in cooperation with law enforcement and treasury authorities. By 1993, the copier manufacturers were announcing numerous proprietary techniques for foiling counterfeiters. However, manufacturers, law enforcement agencies and treasury officials agree that they must cooperate closely to refine solutions. Meanwhile, copier manufacturers continued developing advanced technologies to offer the functions that users request and to upgrade the performance of their products. Multifunction peripherals that do fax, copy, scan and print were seen as an untapped \$1.5 billion market for the 1990s.

Industry Structure

Japanese manufacturers commanded the largest share of the world's copier market. Starting in 1975, copier production and exports had grown rapidly. With growing trade friction between Japan and its export markets in the 1980s, Japanese manufacturers were shifting to overseas production. As shown in Tables 1 and 2, Japanese production dropped 14.4% to a low of 2.21 million units or 458 billion yen in 1987. After a period of recovery, copier production in volume for 1992 totaled 2.38 million units (a 10.5% increase over 1991), while sales stayed flat at 550.7 billion yen. Exports fell in 1992 to 1.7 million units and 346.7 billion yen. While dropping 7.8% in units and 7.2% in value, exports still accounted for 71.6% of volume, and 62.9% of Japan's production value. In 1993, copier production fell 7.8% with 2.21 million units. The value reached 524.1 billion, down 4.8% from 1992. In 1993, Japan's copier exports continued to fall, reaching 1.52 million units (down 10.7%) and 316.2 billion yen (down 8.8%). Exports accounted for 68.8% of the copier production quantity and 60.3% of production value in 1993. As yen values increased export prices in the 1990s, Japanese manufacturers were pressured to reduce costs.

Table 1: Production of Japanese Copier Machines (million yen)

	1986	1987	1988	1989	1990
Copiers	503,012	457,963	481,856	501,829	523,319
Copier exports	386,413	335,933	297,769	329,718	352,824

Source: MITI's Annual Machinery Statistics

U.S. Copier Industry.

Sales, rentals and service for plain-paper copiers in the U.S. generated \$14.2 billion in 1993 sales; the placements totaled 1.29 million units. Several key factors will effect future growth of unit placements for copier product in he U.S. As market growth has slowed, manufacturing and

distribution companies have formed alliances and consolidated. Conditions have made it difficult for hardware vendors and distribution outlets to generate large profit margins on copier sales. The yen-to-dollar exchange rate continued to fall during 1994 and 1995. As a result, vendors could not maintain both pricing levels and profit margins. As prices increased, alternative products such as network printers become more cost effective than copiers.

Table 2: Trends in Japan's copier production

Year	Quantity (units)	Change from prior year (%)	Value (million of yen)	Change from prior year (%)
1988	2,286,826	103.5	481,855	105.2
1989	2,261,048	98.8	501,827	104.1
1990	2,398,054	106.0	523,323	104.2
1991	2,654,657	110.7	550,597	105.2
1992	2,376,824	89.5	552,737	100.3
1993 (1-6)	1,078,433	90.7	252,391	88.7

Source: MITI machine production statistics

The U.S. installed base totaled 5.9 million copiers which analysts believe will reach about 6.8 million by 1997. The large installed-base of copiers slowed the demand for new copiers. Since the early 1990s, U.S. corporations have reorganized to more effectively process their business documents for improved productivity and profitability. As companies moved to higher speed copiers, trade-ins added used machines to the market. Because of economic recession and resulting delays in new purchases, users were keeping their existing copiers longer, instead of upgrading and replacing them. Higher exchange rates, corporate downsizing, and tight equipment budgets impacted all segments of the copier market, causing new copier sales to slacken as used copier sales reached 200,000 units in 1993, approaching 15% of the new copier market. Fewer equipment purchases combined with the rapid installation of computer networks with higher speed printers and the introduction of multifunction machines has put the U.S. copier market in turmoil. Corporations are now focused on all aspects of communications including document creation and duplication. While copiers provided the foundation of such systems in the past, pressure for price and performance improvements have intensified to compete with new technologies. End users are very sensitive to price as alternative products, like network printers, are proving to be more cost effective than copiers.

A customer's justification for purchasing copiers was based on the cost per page. The retail price was depreciated over a five-year period at selected monthly volumes. The service contract cost was then dividing by the copying volume. The cost per copy of supplies and any parts not covered by the service contract were then added. Table 3 shows these calculations for a \$6795 machine, with a full-service contract of \$56.25 per month plus \$0.012 per copy over 9,000 copies, plus paper, toner, and developer. The move to centralized copy centers with higher volume output lowers the overall per page costs.

Table 3: The Cost per Copy in Purchasing Equipment

Monthly Volume	Depreciated Purchase Price	Service per copy	Paper cost	Toner cost	Developer cost	Total cost per copy
2,000	5.663	3.563	0.696	0.575	0.210	10.7
5,000	2.265	2.145	0.661	0.545	0.210	5.8
10,000	1.133	1.673	0.627	0.545	0.195	4.2
15,000	0.755	1.515	0.627	0.545	0.195	3.6

Note: Assumes volume discounts for paper, toner and developer.

For comparison purposes, Table 4 shows the typical rental cost for the same machine. It might cost \$232.50 per month for the first 1,750 copies. The additional cost per copy to 3,000 is \$0.056, to 5000 is \$0.029, and to over 5000 copies is \$0.022 per copy. While the cost per page was significantly higher, a firm has more flexibility in replacing the unit as their output needs changed.

Table 4: The Cost per Copy in Renting Equipment

Monthly Volume	Rental	Paper cost	Toner cost	Developer cost	Total cost per copy
2,000	12.263	0.696	0.575	0.210	13.7
5,000	7.083	0.661	0.545	0.210	8.5
10,000	4.641	0.627	0.545	0.195	6.0
15,000	3.828	0.627	0.545	0.195	5.2

Note: Assumes volume discounts for paper, toner and developer.

According to a 1994 Dataquest survey of buyers, the six most important criteria for buying copiers on a five point scale included:

1. Reliability 4.8
2. Copy Quality 4.7
3. Service Support 4.3
4. Price 4.2
5. Ease of Use 4.1
6. Productivity 4.1
7. Extended guarantees 3.8
8. OEM reputation 3.7
9. Speed 3.7
10. Reputation of sales outlet 3.6

Because of the large volume of copies made, reliability and customer service critical to counter-act the wear and tear of machines. Lower volume machines, under 3,000 copies, require infrequent service that can be performed by the user. Higher volume copiers, between 10,000 and 22,000 copies per month, require monthly service. The highest volume machines, over 38,000 copies per month, require service every two to three weeks. Copy quality, price and ease of use had all increased in importance in 1994.

The copier industry's profit-producing structure is based on the production and sale of supplies like toner, and the sale of maintenance services. Profits are generated at four stages of the copier business: development, manufacturing, sales (including toner and paper), and maintenance. As a result, profitability depends on continued manufacturing and sales of copiers that need supplies and service. With the exception of Xerox and Kodak, copier industry' sales are generally carried out by large number of independent sales channels that tailor their operations closely to specific market segments. For example, certain office equipment dealers cater to the leading corporations.

Competitive Product Structure.

Dataquest, an industry research company, divided products into seven copier segments as shown in Table 5. Dataquest's categorization of segments differ according to price, speed of reproduction, volume of output per month, and other capabilities. On the low end of Segment 1, in

which the machines may have a monthly copy volume of only 1,000 copies, a photoreceptor that will last for 50,000 to 100,000 copies will be the only photoreceptor needed during a copiers useful life. Without the need to change the photoreceptor, maintenance contracts are not needed. This removed any incentive for dealers to sell low-end plain paper copiers. Improved data communications allowed vendors to offer remote diagnostic systems for top end models.

Table 5: Dataquest Copier Product 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	Minimally featured; easy to install; superior reliability; compact; light-weight; user serviceable
1	Up to 20	Tabletop/moving or stationary platen	Single or dual cassette	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)

Competitors were trying to strengthen their position in the market by increasing speed, lowering prices, and adding technology. The primary industry competitors were Canon, Kodak, Konica, Minolta, Panasonic, Ricoh, Selex, Sharp, Toshiba, and Xerox. As shown in Tables 6 and 7, the Canon, Xerox and Sharp were the overall industry leaders with 25.7%, 18%, and 14.3%, respectively, of the U.S. installed copier market by 1993. The leading competitors by segment include:

1. In the personal copier segment, Canon with 56.2%, Xerox with 24.4%, and Sharp with 17.5% accounted for 98.1%. Xerox had increased market share by 6.4% with equal loss to Canon and Sharp.
2. Competition in segment 1 was much more fierce with more equally matched firms. In 1993, Sharp, Xerox and Canon had similar shares with 17.2%, 15.6%, and 15.5% market shares. Mita held a 10.7% share, followed by Konica with 7.4%, Minolta with 6.9%, Lanier with 6.3% and Ricoh with 4.9%. Canon lost three percent share in 1993 to these other competitors.
3. In segment 2 markets, Canon and Xerox lead with 23.2% and 21.6% shares. Sharp and Minolta followed with 9.8% and 8.6% shares. Mita, Lanier, Ricoh, Toshiba and Konica had similar shares at 6.3%, 6.0%, 5.5%, 4.5%, and 4.2% respectively. Pitney Bowes held 3.1%. Mita lost 3.9% share in 1993, and Xerox lost 1.1% share to the other competitors.
4. Segment 3 was nearly equally distributed between Minolta, Mita, Canon, and Sharp with 11.2%, 11.1%, 11.0%, and 10.7% market shares. Both Minolta and Mita had gained share in 1993 at the expense of Canon and Sharp. The next group of competitors also had

similar shares. Xerox held 8.8% share, Ricoh 7.9%, Lanier 7.6%, and Konica 7.3%. Toshiba and Pitney Bowes followed with 5.6% and 5.4% shares.

Table 6: U.S. Plain Paper Copier Sales Estimates for 1993

(000 units)	PC	1	2	3	4	5	6	Total	1993 Market Share (%)	1992 Market Share (%)
Canon	230.0	76.8	51.9	15.5	37.2	8.8		420.2	29.4	29.1
Kodak						6.4	2.3	8.7	0.6	0.6
Konica		39.3	10.1	10.1	10.5	1.0		71.0	5.0	5.3
Minolta		37.0	19.2	14.9	4.8	1.8		77.7	5.4	5.5
Mita	3.8	63.8	19.2	19.6	23.4	5.2		135.0	9.5	10.3
Oce					3.9	0.6	0.5	5.0	0.4	0.3
Panasonic	3.8	19.1	3.2	6.7	0.3			33.1	2.3	2.6
Ricoh		33.8	21.1	16.9	12.3	5.3		89.4	6.3	5.8
Sanyo	0.1	0.4	0.2					0.7	0.0	0.2
Sharp	171.5	97.3	21.0	13.3	9.9	2.1		315.1	22.1	20.6
Toshiba		39.9	22.6	16.3	10.1			88.9	6.2	6.4
Xerox		75.0	46.5	11.0	34.5	2.0	14.0	183.0	12.8	13.4
Total	409.2	482.4	215.0	124.3	146.9	33.2	16.8	1,427.8	100.0	100.0
Percent	28.7%	33.8%	15.1%	8.7%	10.3%	2.3%	1.2%	100.0%		

Source: Dataquest (April 1994)

Table 7: U.S. Plain Paper Copier Installed-base Estimates for 1993

(000 units)	PC	1	2	3	4	5	6	Total	Market Share (%)
Canon	889.0	343.7	201.7	86.2	106.0	33.2		1,659.7	25.7
A.B.Dick		12.6	16.0	8.5	7.7	1.2		46.0	0.7
Eastman Kodak					48.4	73.6	11.8	133.8	2.1
Gestetner		25.2	10.1	6.7	5.3	0.8		48.2	0.7
Konica		156.3	62.9	55.4	38.8	8.3		321.7	5.0
Lanier		164.2	66.6	47.4	18.4	9.4	0.1	306.1	4.7
Minolta		135.8	119.0	37.6	22.6	2.1		317.1	4.9
Mita	25.3	205.8	70.4	59.8	75.6	9.7		446.6	6.9
Monroe		19.5	3.3	12.2	8.9	1.6		45.5	0.7
Oce					23.5	0.6	1.5	25.6	0.4
Olympia		20.2	2.1	2.0	0.7			25.0	0.4
Panasonic	21.8	44.6	20.5	7.6	12.8	0.2		107.5	1.7
Pitney Bowes		42.1	29.5	22.7	27.7	1.8		123.7	1.9
Ricoh	24.1	98.3	40.0	39.3	61.9	11.5		275.1	4.3
Royal		15.0	3.2	2.7	1.3	0.1		22.3	0.3
Sanyo	8.0	6.4	2.5	0.1				17.0	0.3
Savin		53.3	64.9	40.5	40.6	3.1		202.4	3.1
Selex		11.9	9.6	7.3	4.9	2.1		35.7	0.6
Sharp	341.9	363.5	101.0	46.9	65.3	5.9		924.5	14.3
Silver Reed	2.2							2.2	0.0
Swintec	6.2							6.2	0.1
Toshiba		114.8	35.7	27.6	22.6	0.4		210.1	3.1
Xerox	253.3	371.1	231.9	104.0	130.1	3.0	68.7	1,162.1	18.0
Total	1,571.8	2,204.3	1,090.8	614.6	723.1	168.6	82.1	6,455.2	100.0

Source: Dataquest (April 1994)

5. In segment 4, Xerox held 23.5% share, followed by Canon with 18.4% and Mita with 12.1% shares. Shares were relatively stable with other players having smaller shares. Sharp had a 6.7% share, Konica 6.1%, Kodak 5.9%, Ricoh 5.5%, Lanier 3.7%, and Toshiba 3.1%.

6. In segment 5, Kodak lead with 18.7%, followed by Canon with 18.4%. Ricoh and Mita held 11.5% and 10.2% shares, followed by Sharp with 6.3%, Lanier with 6.3%, Xerox with 6.0%, and Minolta with 5.1%. Savin and Pitney Bowes lagged with 3.3% and 2.7% shares.

7. In segment 6, Xerox dominated with 83.3% share. Kodak followed with 13.1%. Oce and Lanier held only 3.0% and 0.6% respectively.

As shown in Table 8, markets were divided by copier needs into low volume personal use markets (with 27% of the market), moderate volume convenience markets(with 61% of the market), high volume copy center markets, and super fast central printing markets. Personal copier markets typically purchased copiers with speeds up to 10 copies per minute (cpm). Convenience markets purchase copiers with speeds ranging from 10 to 45 cpm. Most larger customers were replacing existing models with higher speed machines. As a result, competitors were increasing the capabilities of their models. Panasonic had introduced low-end models with speeds of 12 cpm. Such strategies of up-rating machines within each market without increasing prices were becoming common and was affecting definitions of market segments. Convenience and personal copier users are looking for low price, compactness, and ease of use. Copy centers used machines with speeds between 46 and 90 cpm. Copy centers and central sites accounted for 13.8 percent of the PPC units sold. Central duplicating centers used the highest speed copiers with over 91 cpm. Central sites want the high tech, top of the line copiers with color capabilities, high speed, and interaction with computers.

Table 8: U.S. Copier Market Usage Projections

Category	Speed (ppm)	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
Center-site Xerographic Duplicating	91 or more	178,000	162,000

Source: BIS Strategic Decisions

The **personal copier market** now included copiers with copy speeds as high as 10 to 12 pages per minute. Personal copiers had an average retail price in 1993 of \$1103. Dataquest (April 1994) projected a decline in segment 1 copier placements from 480,000 units in 1993 to 380,000 units in 1998, declining an average of -4.66% annually. Competitors targeted the growth in home offices to sustain future growth. However, copiers faced growing pressure from less expensive printers that can create multiple original copiers. The rapid decline in laser printer prices was making personal copiers less attractive. Panasonic was selling its laser quality post script LED

printer for only \$475. Multiple-function products that included printers, copiers, scanners and fax also challenged the personal copier market. Most copier and printer firms introduced such products in 1995 for prices ranging from \$769 to \$1500. Hewlett Packard and Panasonic introduced printer/fax/copier machines for prices under \$800 in early 1994. Lexmark introduced its printer/fax/scanner/copier at only \$825 in 1995. These new low priced multifunction products were being primarily sold through mass merchandisers and discounters, including mail order. For the typical low volumes required for personal use, these new machines were more than adequate. BIS Strategic Decision estimates that the personal copier market will still account for 27% of the copies produced by 1997.

Convenience copiers that produced between 10 and 45 ppm and generated between 1,300 and 7,750 copies per month accounted for 66% of the U.S. installed base. Convenience markets needed in-house capability of making copies as needed. As shown in Table 9, the mid-volume copiers had maintained market share as users traded up to more productive machines. Accounting for two-thirds of the copier market, convenience copiers provided the primary business for dealers that installed and maintained most Japanese copier machines. The dealer sells high profit margins supplies and services for these copiers. Dataquest expected segments 2 and 3 copier sales to continue through the end of the 1990s as buyers enter into their third generation of copier purchases and seek higher productivity, higher speed, and output finishing capabilities. These products will also generate significant revenue and profits for the dealer community that relies on suppliers and service revenue associated with these machine placements to generate profit. This segment is now being targeted by manufacturers with copiers that incorporate digital technology. Manufacturers are now offering 30-ppm copiers with digital imaging front ends. The digital front end allows for other network functions such as printing, faxing, and scanning. As the network environment grows in the business community, these multi-function products may penetrate under one percent of this mid-volume segment that represents several hundred thousand units per year. For example, the market does not understand the benefits of digital machines and users are typically not responsible for network development. To make matters worse, manufacturers are using proprietary operating systems that are not compatible with other software systems. Finally, these new multi-functional systems are expensive and poorly positioned as a copier offering add-ons.

Table 9: Total Unit Placements by U.S. 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

Only a few machines had copy rates of 75 to 100 cpm. Products include such features as duplexing, reduction/enlargement, copy editing, screen programming, photo mode, book copying, cover insertion, automatic stapling, and job programming. Duplexing allows for as many as 50 two-sided copies to be made. Reduction/enlargement allows for copies smaller or larger than originals to be made. The copy editing option allows users to make changes to the copy using electronic pens. TV style screens, including touch pads, allow for on screen control. Photo mode allows for photographic reproductions to be enhanced. Book copying allows for left and right pages in an open book to be copied in a single pass. Cover insertion is part of the finishing process

that allows users to insert document covers when sorting, binding, and stapling. Automatic stapling is a finishing process options allow for staples to be placed in up to three different places. Job programming allows copiers to handle a complete job with just the press of a few buttons.

Copy center machines producing 46 to 90 ppm and 17,000 to 49,500 copies per month. Units in this market segment range in price from \$25,000 to \$40,000. Heavy duty copiers in this segment, referred to as copier-duplicators, post speeds above 85 ppm and cost as much as \$150,000. BIS believes that the market will split between products offering 46 to 69 ppm machines and more rapid digital equipment between 70 and 90 ppm. Central-site copiers, averaging 178,000 copies per month, are expected to fall to about 162,000 copies per month as jobs move to digital equipment for copying functions.² The lower prices and growing acceptance of digital technology could make copiers the least-sought-after machine in the office. As desktop digital printers gained speed and affordability, they allowed individuals to make multiple originals rather than copies. Office copiers were becoming machines of last resort when digital alternatives were not available. Dataquest predicted a decline in the high-end plain paper, analog copier market over the next several years.

The copier volume from segments 2 through 5 (convenience and copy center markets) represented the primary opportunity for profitability for copier dealers. This is also the targets for networked printer devices that offer post-processing functions and multi-functional devices that serve as a printer first, moving the traditional standalone copy volume to other devices. The predicted decline in paper use may now become a reality as local area networks, operating systems, software applications, and connectable printers become integrated. If copier dealers are unable to sell and service a wider range of networked equipment, they will lose in the competitive battle for this copy volume and, therefore, will lose profitability.

Placements in Segment 5 were expected to increase in the immediate future as Japanese manufacturers stressed sales of traditional analog machines in the 70- to 85-ppm range. While Kodak enjoyed the largest market share for Segment 5 placements, competition was increasing from both downscale and upscale competitors. Foreign firms entering this segment included Canon, Konica, Mita and Ricoh. Oce, a Dutch manufacturer, also produced high volume copiers with advanced features. Kodak's 1570/1575 digital product success was less than anticipated due to technical problems. However, that engine has been adapted to act as a printer/copier. With Kodak's long-standing reputation and penetration in this market, it is well positioned to take advantage of the digital potential. If its new product line is successful, introduced in early 1994, it expects to convert half of the Segment 5 placements to digital over the next five years. Kodak also began selling high-end machines to Lanier in 1993 in an effort to penetrate Xerox's dominance of the Segment 6 market. While Lanier may compete with Kodak, Lanier is expected to compete with Xerox's sales and service of 1090 and 5100 model placements. Kodak had existing capacity to supply Lanier, thereby reducing overhead costs to its imaging division.

As Kodak expands its placements through OEM sales, Xerox was offering networked solutions to high-volume users. Xerox introduced the networked version of DocuTech and the lower-volume DocuTech 90 in 1992. Improvements to its network server have improved Xerox's position with central reproduction departments. While Xerox was targeting the offset press market with its DocuTech family of products, it has actually displaced high-speed standalone analog copiers, thereby differentiating its products from the Japanese manufacturers and strengthening its

² "U.S. Copier Market Faces Threat From Color Printing Systems." Office Equipment & Products. October 1994, p. 32.

position in the lucrative, very high volume central reproduction department market. Kodak's LionHeart publishing system was the only close competitor and had limited success in this market.

Copiers operating in **central copying departments** must sustain large--volume output. The average copy volumes reach 178,000 copiers per month. By 1997, analysts expect this volume to drop to about 162,000 copies a month as users move growing numbers of jobs to digital equipment with copying functions. Nevertheless, the copiers for central operations will account for more than 21 percent of all copied pages during 1997. Xerox dominated the central duplicating market with three times the models and four times the sales and service staff of Kodak. Xerox introduced network software tied its digital copiers to computers, allowing documents and books to be printed quickly from one's personal computer. This was Xerox's attempt to keep central copiers from being replaced by electronic network printers, which can produce multiple originals at speeds of 22 pages per minute. Digital technology fit the needs of high volume users for either standalone or networked publishing demands. It increases central reproduction department's productivity while reducing idle time between jobs. While the first job is being imaged and output, the operator can program and scan another job, to be processed next. The reduction of down time between jobs will improve machine productivity. As much as 80 percent of desktop PCs are expected to be networked by the end of the 1990s. Networked versions of high volume output devices allowed large numbers of people to use a single output device.

Oce also decided in 1993 to sell OEM to Alco Office Products for sales and service of Segment 6 machines. Their product was considered user friendly and reliable and fit in the decentralized high-volume environment that was appropriate for Alco dealers. It was Alco's first vendor relationship since prior sourcing was left up to individual dealers. Oce had never developed brand recognition in the U.S. and was prime for Alco's national sales and service network. Dataquest felt that it would allow Alco to become a major player in this market.

Color copier sales in 1993 topped 9,000 units in the U.S. Over 60 percent were digitally connected to host systems in order to provide color copies in a network environment. This provides special advantage in the printing industry by providing proofs to clients before final offset-press versions are completed for printing or advertising customers. Customers also want to be able to send files to printing professionals either through modems or on some kind of disc-based digital medium that the printer could use when printing out data. Color laser printers were expected to enter this market in 1994 and 1995. Compared to the price of full color copiers with digital interfaces, color laser printers sold for as little as \$4500 and were more affordable to a wider range of users. According to BIS, color laser printers sales will grow from 650 units in 1993 to 40,000 units in 1998.

Printer vendors also watched profit margins dwindle for hardware. This trend affected all segments of the printer industry, from the low end (under 20 ppm) to the high volume segments. Hoping to sustain the flow of revenue, printer vendors began concentrating on selling consumables such as paper, toner, and developer in markets that generated a large volumes of prints. One such market was copier customers.

Future winners were expected to be those companies that launched the most competitive products, improved productivity, and strengthened marketing power. Canon was one of the strongest, moving into laser beam printers, color digital plain paper copiers (PPCs) and bubble jet printers ahead of its competitors. As their installed base grew, high margin consumables such as replacement cartridges (toner and drums) generated profits for the company both in Japan and abroad. Japanese production of copiers and printers abroad had grown in the second half of the

1980s. Canon and Ricoh began overseas expansion early and were building local parts distribution channels. Star Micronics was building its position in the Chinese market and was highly cost competitive in manufacturing printers.

The European Market. Generally, the European copier market concentrated on Western Europe where users were familiar with copier products through decades of use. Analysts believed demand for copiers in Eastern European countries would grow. According to reports, copiers were extremely scarce in Eastern Europe, often available only to top-level managers and officials. Thus many businesses in the region desired to upgrade their office equipment to include copiers. However, lack of funds was a problem. For now, most vendors considered Eastern European demand to be latent, though real.

Competitive Strategies

“More for less” defined the trend in the U.S. document creation and production marketplace. Users had a wider selection of equipment than ever before to meet specific needs. Furthermore, acceptable machines were available at lower prices than ever before. Against this backdrop, vendors of copiers and printers were evaluating various product options to attract sales. Competitors explored alternatives for selling hardware and consumables, such as multifunction and color copiers. Research and development expenses for the industry average over five percent of sales.

Canon Incorporated. Canon entered the copier business in 1965 and introduced its first copiers into the U.S. market in 1974. As shown in Table 10, Canon offered 16 different copier models, from its small personal PC310 or NP6030 black and white models to its high speed, full color CLC700/800 models released in 1994. As Japan’s leading copier company, Canon had total sales in 1993 of \$10.3 billion, of which 31% or \$3.1 billion were copier sales. With the U.S. recession and rising Japanese yen exchange rates, sales of copiers fell 8.1% in 1993. Profits also fell to \$203.1 million in 1993, a fourth year of decline from the 1990 high of \$548.3 million. To counter the fall in sales and profits, Canon was diversifying into OA equipment and shifting its market focus to Japan and Asian markets. Laser printers and ink jet printers were pushing total sales.

Canon also introduced its new high speed and easy to use CLC700 and CLC800 are full color copiers that can produce color copies at a rate of seven copies per minute (cpm), and black and white copies at 28 cpm. The CLC800 can produce two-sided copies automatically. The new machines were designed to cut maintenance costs by reducing the number of components and putting servicing items into easy to remove cartridges. The company began this strategy with the introduction of its personal copiers in 1982. By using large photosensitive drums, the development system can be stationary, allowing for constant toner quality. Artificial intelligence supports the direct ejection system and varies the amount of toner by paper or transparency density regardless of environmental factors. Laser beam and digital technology allow for superior color copies. Fuzzy logic then analyzes this information and compensates accordingly to make the best possible copies. Its high powered copier engines and precise controls have formed the basis of CLC line of copiers. The new auto exposure system can distinguish between background and image areas, automatically controlling density and color balance. It can change or delete background image, without altering the color or density of the foreground image. The Intelligent Processing Unit can handle originals from various electronic sources. The PostScript version links computers to the copier for output of full-color documents. The Film Scanner permits output of 35mm and 4x5 inch

negative or positive film. It features automatic focus, automatic negative and positive identification, a wide zoom range, and trimming. A larger unit also handles 6x6 inch and 8x10 inch films. This model prints negative film, and overhead transparencies. A front loading design draws from three 500-sheet cassettes plus a 50-sheet manual feed tray for originals as large of A3 and objects as heavy as 2kg. It also incorporates anti-counterfeiting functions.

Table 10: Canon's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Canon PC-311	1	\$ 795	500	
Canon PC-330	6	\$ 795	500	
Canon PC-330L	6	\$ 995	500	
Canon-PC-6RE	8	\$ 1,295	750	
Canon-PC-7	8	\$ 1,595	750	
Canon PC-11	10	\$ 1,685	750	
Canon PC-11RE	10	\$ 1,695	750	
Canon PC-12	10	\$ 1,795	750	
Canon NP-1020	10	\$ 2,325	5,000	
Canon NP-1500	15	\$ 3,085	10,000	
Canon NP-2120	21	\$ 4,220	20,000	
Canon NP-3050	30	\$ 6,655	40,000	
Canon NP-4050	40	\$ 8,850	60,000	
Canon NP-4080	40	\$ 11,800	60,000	
Canon NP-6030	30	\$ 5,940	40,000	
Canon NP-6060	60	\$ 23,235	125,000	Kodak Ektaprint 95
Canon NP-6650	50	\$ 19,000	70,000	Kodak Ektaprint 90
Canon NP-6650E	50	\$ 20,165	70,000	
Canon NP-6650SF	50	\$ 19,735	70,000	
Canon NP-8530	83	\$ 26,865	150,000	Lanier 6483
Canon NP-9800	83	\$ 39,135	150,000	Lanier 6583
Canon NP-9850	85	\$ 74,000	300,000	Kodak 2085
Canon CJ10 Color BJ Copier	0.69	\$ 5,999	500	
Canon CJ7 Color BJ Copier	0.65	\$ 4,495	500	
Canon Color BJ Copier AI	0.17	\$ 120,000	500	
Canon Color Laser 300	5	\$ 20,400	5,000	
Canon Color Laser 350	5	\$ 23,000	5,000	Kodak Coloredge 1525
Canon Color Laser 550	5	\$ 52,400	10,000	Kodak Coloredge 1550
Canon GP55 Multifunctional	30	\$ 12,995	40,000	

Canon is also competing in printers, scanners and fax machines. Its flexible world-wide manufacturing system was decentralized and sourced many parts locally to keep costs down. Dealers were provided a full range of product and market support. In 1989, Canon USA was named manufacturer of the year by the National Office Machine Dealers Association, winning gold and silver medals in all nine areas of dealer support: product profitability, dealer relations, marketing and advertising support, and sales training and service. The company sold its personal copiers through all distribution outlets, from stationary and department stores to mail-order outlets.

Sharp Corporation. Sharp entered the copier business in 1972. The company had been first to introduce a stationary platen on a desktop exposure type copier in the 1970s. As one of the top three copier makers, the company had 15% of the world copier market and 7.5% of the Japanese market in 1993. The company's product line is shown in Table 11. In the U.S., Sharp's market share fell from 22.1% in 1993 to 14% in 1994. Sharp had total sales of \$14.6 billion in 1994 with a net income of \$311.7 million. Exports accounted for 49% of sales. In the 1980s, Sharp introduced its SF-750, a smaller and lighter copier. In the low-end market, Sharp developed

compact and affordable copiers with features found on larger machines. Its low volume copier sales had grown from 64,300 units in 1986 to 85,200 units in 1992. In the 1990s, the company introduced the SD-3075, a fast, high volume copier that won Buyers Laboratory's Outstanding Achievement Award for unmatched reliability for one million copies. In 1993, it introduced the world's lightest personal plain paper copier. To minimize downtime, Sharp developed modular designs to shorten maintenance and repair times. To improve productivity, Sharp had the fastest first copy time in low volume copiers at 5.9 seconds.

Table 11: Sharp's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Sharp Z-20	3	\$ 550	150	Xerox 5201
Sharp Z-27	3	\$ 749	150	Xerox 5306
Sharp Z-52II	8	\$ 1,000	800	
Sharp Z-57II	8	\$ 1,100	800	
Sharp Z-85II	10	\$ 1,399	800	
Sharp Z-88	10	\$ 1,500	800	
Sharp SF-2010	10	\$ 2,350	2,000	Xerox 5280/5309/5310
Sharp SF-7320	13	\$ 2,195	10,000	Lanier 6413
Sharp SF-7370	14	\$ 2,950	10,000	Lanier 6514
Sharp SF-7800	15	\$ 3,650	15,000	
Sharp SF-7855	15	\$ 3,995	15,000	
Sharp SF-7900	20	\$ 4,850	25,000	
Sharp SF-2022	22	\$ 4,895	30,000	
Sharp SF-2027	27	\$ 5,595	40,000	
Sharp SF-2035	35	\$ 6,795	50,000	
Sharp SF-8875	40	\$ 7,695	60,000	
Sharp SF-9400	50	\$ 15,450	70,000	
Sharp SF-9800	60	\$ 19,450	100,000	
Sharp SD-2060	60	\$ 22,500	125,000	
Sharp SD-3062	62	\$ 28,500	150,000	
Sharp SD-3075	75	\$ 37,950	175,000	

Sharp's newest Basic Series of copiers were considered the best in class, offering top quality copies at exceptional speed. Simplicity of the design made the copiers compact enough to be used by smaller organizations and were easy to use. Using developer in toner cartridges, Sharp solved the problem of having to continually replace developer - a process which required service and related delays. Sharp's new basic copiers, such as the SF-2014, offered the best quality and speed for its class. A new developer system contained developer in nospill toner cartridges. With Sharp's technology, the old developer is flushed out of the system and replaced with new developer resulting in higher quality, consistent copies every time. While it has an automatic shut off feature to save energy, the heat roller temperature is maintained to allow for 30 second restart. It also avoids misfeeds and resets the controls. Auto-start allows for programs to be set while another task is being accomplished. The model SF-2114 adds zoom/enlargement features. The model SF-2214, is a high quality model with a single-pass feeder. Paper jams are minimized with the use of double-feeder rejecter rolls trap a second unnecessary document and keeps the copier from misfeeding. Toner replacement uses no spill cartridges. An easy to use display panel reduces mistakes and resets after a certain time interval. The three models weigh 26.2 kg, 26.7 kg, and 29.5 kg. Sharp's CX-7700 analog color copier was the fastest in the market at 7.5 cpm, and cost \$20,000, as compared to \$15,000 for Ricoh's 4 cpm color copier, or over \$58,000 for either Canon or Fuji Xerox's 5 cpm color copiers.

Sharp concentrated on selling in the personal and segment 1 copier markets in the U.S., segments 2 and 3 in Europe, and segments 4 and 5 in Japan. Sharp had six models in the personal copier segment, five models in segment 1, three models in segment 2, two models in segment 3, three models in segment 4, and one model in segment 5. Besides producing in Japan, segment 1 copiers are produced in Brazil, France, the U.K. and, by the end of 1995, in China. Segment 2 machines were produced in Brazil.

Ricoh Company, Ltd. Ricoh began to produce copiers in the 1960s. Ricoh had \$9.4 billion in sales \$92 million in profits in 1994. Over 84 percent of sales were in office equipment, including facsimiles, printers, and copiers. Copiers were 66 percent of sales. Twenty five percent of sales came from abroad. Both sales and profits had been declining in recent years as the value of the yen increased. With a goal of automating the office, Ricoh produced the first digital fax machines in 1973, establishing the fax transmission standard for telephone lines. The company produced optical, chemical and digital components for its image processing products. Ricoh is one of only three companies, along with Canon and Mita, to make photoreceptors, the high value added component of copiers. Beginning in the mid 1980s, Ricoh went on the attack to overcome Canon's first to market strategy. In 1984, Ricoh introduced 17 new models, including two high speed models that beat Canon's to the market. Ricoh's product line is shown in Table 12. Until 1982, Ricoh sold its copiers under the names of Savin and Pitney Bowes in the U.S. With the introduction of its own brand, the company began working to develop its dealer network and mass distribution system. Ricoh had become the second largest competitor in the U.S. by 1985.

Table 12: Ricoh's Product Line

MODEL	SPEED	PRICE	VOLUME TO	ALSO SOLD AS
Ricoh DS320 CX Multifunction	20	\$ 10,837	12,000	
Ricoh FT3113	13	\$ 2,090	7,500	
Ricoh FT3313	13	\$ 2,610	7,500	Savin 9130
Ricoh FT4220	20	\$ 4,385	15,000	Savin 9130Z
Ricoh FT4222	22	\$ 4,990	20,000	Savin 9020
Ricoh FT4415	15	\$ 3,590	10,000	Savin 9022
Ricoh FT4427	27	\$ 5,860	30,000	Savin 9150
Ricoh FT4727	27	\$ 6,891	30,000	Savin 9270
Ricoh FT5433	33	\$ 6,590	40,000	
Ricoh FT5733	33	\$ 7,835	40,000	Savin 9330/Gestetner 2533Z
Ricoh FT5570	43	\$ 9,497	60,000	Savin 9335/Gestetner 2533ZD
Ricoh FT5590	50	\$ 11,295	65,000	Savin 7430/Pitney Bowes D743
Ricoh FT6645	45	\$ 11,249	60,000	Pitney Bowes M750/Savin 7500
Ricoh FT6655	55	\$ 15,499	85,000	Savin 9450
Ricoh FT6750	52	\$ 15,961	85,000	Savin 9550
Ricoh FT7870	71	\$ 21,009	120,000	Savin 9520
Ricoh FT8780	80	\$ 38,104	175,000	Savin 9710/Minolta EP 9720/Toshiba 7110
Ricoh FT8880	80	\$ 38,104	175,000	Savin 9080
Ricoh NC305 Full-color	5	\$ 14,724	20,000	Savin 9080RF/Toshiba 8050/Gestetner 2580
Ricoh NC8015 Full-color	15	\$ 51,995	20,000	
Ricoh VT1730 Duplicator	130	\$ 5,995	100,000	Gestetner 5303/AB Dick PrinTech 6120
Ricoh VT2105 Duplicator	120	\$ 9,865	120,000	Gestetner 5325/AB Dick PrinTech 6520

By 1992, Ricoh had lost share and profit due to the rising yen. In response, it stressed low cost manufacturing, quality control, and product development to meet customer needs. The company offered both low end and high end electrostatic copiers. It focused on growth markets like multi-function and color machines. Ricoh's two new FT 6600 series FT 6645 and FT 6665 models were productive, functional, and reliable, offering 45 cpm and 65 cpm, respectively with

1,000 and 500 sheet cassettes, a 1,500 sheet tray, a 50 sheet bypass tray, and a 3,500 optional sheet tray for large tasks. The ST 25 sorter-stapler allowed for four different stapling positions. The ST 400 finisher stacked up to 1,500 large size copies, or 30 sets of documents per task. An LCD touch panel turned off with non-use and alerted users to lack of toner or paper. Ricoh's non-polluting organic photoconductor drums require little service. Image transfer was improved using fuzzy logic controls.

Konica Corporation. Konica was founded in 1873 as a photographic and lithographic supply store. It entered the camera business in 1903. In 1971, Konica introduced its first plain paper copier. The company placed over 63,000 machines in 1993. By 1994, Konica had sales of \$5 billion and net income of \$42.6 million. Its copier products are listed in Table 13. To stimulate sales growth, the company was in pursuit of market share by targeting the mid- to high-end copier segments and next generation PC driven multifunctional digital products that incorporated facsimile, copier and printer functions into a single stand-alone unit. The Konica's PC-driven Fax 860L and 865L provided laser printing on plain paper, memory for fax transmission, and copies in 9 seconds. Konica's 7728 multifunctional digital color copier/printer, priced at \$20,065, targeted the color market. The PC-driven Konica 7310, also a multi functional copier/printer/facsimile priced at \$3,695, was targeting segment 1 where the market was shifting to multifunctional units. To assist its five regional sales managers, digital products managers were appointed in each region. Konica provides distribution through dealers.

Table 13: Konica's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Konica 9028 COLOR	6.5	\$ 19,480	20,000	
Konica 1112	12	\$ 2,300	5,000	
Konica 1290RE	12	\$ 2,980	5,000	ABDick 2012RE
Konica 1590	15	\$ 3,490	10,000	
Konica 2020	20	\$ 4,440	30,000	ABDick2018/7120
Konica 2028	28	\$ 5,880	40,000	ABDick7226
Konica 8028	28	\$ 8,140	20,000	
Konica 3135	35	\$ 7,160	50,000	ABDick7335
Konica 4090	40	\$ 6,130	50,000	
Konica 4145	45	\$ 10,350	70,000	ABDick7445
Konica 4155	55	\$ 17,773	100,000	ABDick7455
Konica 4255	55	\$ 21,288	100,000	ABDick7455RDH
Konica 6090	60	\$ 19,560	150,000	ABDick2060
Konica 4065	65	\$ 21,990	150,000	ABDick7463
Konica 7090S	70	\$ 21,400	150,000	ABDick2070
Konica 7090RF	70	\$ 23,995	150,000	
Konica 5080	80	\$ 26,920	150,000	ABDick7577

Konica's new CS-PRO 6192 is a small but powerful machines capable of large volume copying at 92 cpm. It makes the first copy of a run in 3.3 seconds. Up to 9,999 copies can be put into memory, allowing for interruptions for small tasks. It can remember up to 25 different settings and holds up to 7,500 sheets of paper. It can automatically adapt toner applications to different paper types. It feeds 100 originals a minute, while offering 100 percent efficiency in copy output. It can also copy two originals onto a single sheet, or two sided originals onto two-sided copy sheets. The photo mode evaluates variations in density and sets the correct amount of toner. The touch sensitive control panel used a full-dot LCD for conversational operations. Custom selections include copy quantity, density, magnification, and size. Mixed sizes can be stacked together without resetting the machine. The automatic magnification selection function matches

specified zoom ratios with multiple sizes of originals. Frame erasure deletes shadows that some copiers leave around the borders of a copied page. The automatic reset function designates a specific setting after a designated period of time. A power saving key put the machine in a low power mode until controls are retouched. The front loading paper trays hold 2,000 sheets, plus two 500 sheet paper trays make paper loading fast. An optional paper feeder unit stores two 2,000 sheet trays sandwiching one 500-sheet tray. The resulting 7,500 capacity handles large volume production. The copier comes with photo and text modes. Sorter hold up to 21 copies of 50 sheets and have in-bin stapling functions.

Konica's National Customer Support Center solves customer problems and arranges for on-site repairs. The company provides loaner machines if a unit cannot be serviced in the field. This has been key to Konica's success in mid-range machines. According to one industry publication, "If we could pick only one mid-volume copier vendor to look at, right now we'd go for Konica." Konica's Technical Support Group was awarded the top ranking by *Office Products Analyst* for the fifth consecutive year for its training, engineering, technical publications, hotline and field support, and parts distribution. Konica was awarded manufacturer of the year gold medals by the National Office Machine Dealers Association for 1992-1994 in such areas as advertising support, sales training and support materials, administrative support, parts support, long term profitability of line and fair equitable agreements. Table 14 shows the competitive rankings for service.

Table 14: Supplier Support Ratings

	<u>Universe</u>	<u>Canon</u>	<u>Konica</u>	<u>Minolta</u>	<u>Mita</u>	<u>Panasonic</u>	<u>Ricoh</u>	<u>Sharp</u>	<u>Toshiba</u>
Parts availability	8.7	8.8	8.8	8.9	9	8.8	8.1	9.2	7.9
Order processing	8.4	8.1	8.6	8.5	8.7	8.3	8.5	8.7	7.1
Trouble shooting	8	8.8	8.9	8	8.4	7.9	8.1	7.3	6.6
Service hotline	7.6	8.3	8.7	6.9	7.9	6.9	8.1	6.7	7.8
Service communication	7.9	8.3	8.8	8.2	8.3	7.4	8.1	7.3	7.9
Retrofit announcements	7.8	8.1	8.2	8	8	7.5	8	7.1	8.6
Service training	8.5	8.7	9	8.8	8.6	8.2	9.1	8.2	8
Product training	8.2	8	8.7	8.5	8.5	7.5	8.7	8	8
Parts reliability	8.5	8.3	8.4	8.2	8.5	8.5	8.6	8.9	8.1
Product reliability	8	8.1	7.7	8.3	7.9	7.6	7.7	8.6	8.1
Product durability	8.3	8.4	8	8.4	8.1	8.1	8.5	8.6	8.1
Retrofit reliability	8.3	8.4	8.2	8.4	8.1	8.3	8.3	8.4	7.9
OVERALL AVERAGE	8.2	8.4	8.5	8.3	8.3	7.9	8.3	8.1	7.8

Source: Office Products Analyst, 1994.

Minolta Corporation. With sales of \$2.9 billion and a net loss of \$3.7 million in 1994, Minolta had gone through three years of painful financial losses and sales declines. About 70% of sales, \$2 billion, were in the copier business. The photocopier market had been flat except for digital products, which now accounted for 20% of unit sales volume. Strategies were now aimed at improving product development capabilities, expanding overseas manufacturing and procurement activities, and increasing efficiency and effectiveness of marketing operations to counter shorter product life cycles. The company introduced its first monochrome digital plain paper copier (Di30), a computer interface for its full color digital copier (Fiery 200i), an enhanced laser beam printer (FineWriter 401), and three facsimile machines for use as a printer with the computer (Minoltafax 2300, 3300, and 3700). The Fiery 200I color controller acts as an interface between the CF80 full-color copier/scanner/printer and PCs. The company invested 60% of its R&D for

digital-based products, and consolidated departments to develop multifunctional products. To cut costs, the company had established a factory for these products in China.

Minolta designed their line of CS-Pro copiers to save space, time and the environment. It included ease of operation, minimal maintenance, service, premium reliability, quality and productivity, and earth friendly operation. A new type developer allowed for the best quality image transfers in the industry and lower levels of ozone emissions than previous models. Their smallest EP 2050 model reproduced up to 99 copies at 25 cpm using preset functions. It included automatic size and magnification selection to handle variable sized originals. Cassettes were automatically switched when one was empty. Preset functions allowed for repetitive tasks and job interruptions. The EP 1050 and EP 1080 offered lower copy speeds at 15 and 18 cpm, respectively. The EP 3050, the EP 4050 and EP 6000 operated at speeds of 35, 45, and 60 cpm. The company's product line is shown in Table 15.

Table 15: Minolta's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Minolta CF80 Color	7	\$ 41,500	10,000	
Minolta EP 2121	12	\$ 2,695	3,500	Olympia 1201/Panasonic FP-1275
Minolta EP 2130	13	\$ 2,050	12,500	Olympia 1320
Minolta EP 2130 pro	13	\$ 2,525	12,500	
Minolta EP 2151	15	\$ 3,135	7,500	Olympia 1501
Minolta EP 2152 pro	15	\$ 3,595	15,000	Olympia 1502
Minolta EP 2150	15	\$ 2,995	7,500	
Minolta EP 2152	15	\$ 2,845	15,000	
Minolta EP 3170	17	\$ 3,750	20,000	
Minolta EP 3190D	19	\$ 4,085	20,000	Olympia 1700
Minolta EP 4210	21	\$ 4,895	25,000	Olympia 2100
Minolta EP 4233 pro	23	\$ 5,935	30,000	Olympia 2301
Minolta EP 4300	30	\$ 6,995	40,000	
Minolta EP 4320	32	\$ 7,645	50,000	Olympia 3200
Minolta EP 5320	32	\$ 7,535	50,000	Olympia 3201
Minolta EP 4321	32	\$ 6,345	50,000	
Minolta EP 5401	40	\$ 8,500	50,000	
Minolta EP 5420	42	\$ 8,675	80,000	Olympia 4200
Minolta EP 8603	60	\$ 19,100	125,000	Olympia 6033
Minolta EP 8600	60	\$ 17,945	125,000	Panasonic FP-6070/Olympia 6000
Minolta EP 8601	60	\$ 23,395	125,000	Panasonic FP-6080/Olympia 6001
Minolta EP 8602	60	\$ 22,250	100,000	Panasonic FP-6090
Minolta EP 9720	71	\$ 25,450	125,000	Savin 9710/Toshiba 7110/Ricoh FT7870
Minolta EP 9760	76	\$ 27,250	200,000	Panasonic FP-7650

Matsushita Electric Industrial Co., Ltd. Panasonic is a brand name of Matsushita that is used for many of its consumer products. The company's communication and industrial equipment group accounted for about 25% of Matsushita's \$43.5 billion in sales, or \$12 billion. With net income of only \$431 million in 1994, the company had gone through much restructuring. Panasonic entered the copier market in 1982 and was #11 in share with 1.6 percent market share in 1993. Its product line is shown in Table 16. The company's least technically sophisticated personal copier models, the FP-820 and 830, had speeds of 12 copies per minute and a single cassette. They were lightweight, compact, and could be installed and serviced by the user. At a price of \$1,023, it also allowed for five different colors to be used for copies.

Table 16: Panasonic's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Panasonic FP-830	8	\$ 1,595	1,500	
Panasonic FP-1270	12	\$ 1,995	3,500	Olympia 1201/Minolta EP-2120D&2120
Panasonic FP-1680	16	\$ 3,595	15,000	
Panasonic FP-1780	17	\$ 3,795	15,000	Lanier 6717/Pitney Bowes 9317
Panasonic FP-2080	20	\$ 3,995	20,000	
Panasonic FP-2680S1	26	\$ 7,653	25,000	Pitney Bowes 9326
Panasonic FP-2680S2	26	\$ 9,504	25,000	Pitney Bowes 9332
Panasonic FP-3280S1	32	\$ 8,653	35,000	
Panasonic FP-3280S2	32	\$ 10,129	35,000	
Panasonic FP-4080S1	40	\$ 10,232	50,000	
Panasonic FP-4080S2	40	\$ 11,032	50,000	
Panasonic FP-5060	50	\$ 11,995	60,000	
Panasonic FP-6070	60	\$ 16,995	100,000	Minolta EP 8600/Olympia 6001
Panasonic FP-6090	60	\$ 23,095	100,000	Minolta EP 8602 Pro
Panasonic FP-7650	76	\$ 27,495	175,000	Minolta EP 9760

For segment 1, Panasonic had six new new 80-Series copier models that included digital microprocessor with neuro-fuzzy logic controlled copier functions through an array of sensors to determine exposure, voltage, and toner density. The result was stable, fine-quality copy images with dense, solid blacks, clean edges, and sharp image reproduction. The FP-1680 made 16 copies per minute, while the FP-4080 delivered 40 cpm. Optional sorters were 10 to 20 bins. The 20 bin system had a staple sorter. The modular front-loading design featured 250 sheet paper drawers for A3 to A5, plus 50-sheet bypass feeders, with optional paper drawers with up to 2,000 sheets. The FP-1680, 1780 and 2080 were rated as above standard reliability by a Office Products Analyst survey. These copiers had an average retail price of \$3,136.

For segment 2, Panasonic's FP-2680 model, part of the 80 series, operated at 26 cpm and included reduction, enlargement, and zooming features. The environmentally friendly machine was quiet, low dust and ozone emitting, and used recycled paper with its organic photoconductor drum with a capacity of up to 2800 sheets and automatic duplexing. For segment 3, Panasonic's FP-3280 and 4080 included automatic document feeders, 20 bin staple sorters, supermagnification, and a multicolor option. The FP-4080 won the Hanson's Guidelines gold Medal for Superior Copy Quality. It was also ranked as best in average number of copies between service calls, with the FP-3380 coming in second. For segment 4, there was the FP-7450 model. On January 3, 1995, Panasonic introduced the FP 7160 copier into segment 4. It used touch screen display to control its 60 cpm speed. Panasonic used Minolta's products to fill its line, as is done by 80 percent of the competitors. For segment 5 Panasonic included the FP-7650.

Panasonic redesigned its factories to produce the new 80 series copiers. Production comes from factories in Japan and Germany bearing ISO9002 certification. Panasonic produced its own copiers, except for the FP 7160/7650 which were purchased from Minolta. Canon, Minolta, and Pitney-Bowes all use Panasonic copiers to fill their low end market segment gaps. Panasonic produced approximately 70% of its copier components in-house and supplied components to Canon and Minolta. Panasonic had only 325 active U.S. copier dealers. It had begun to incorporate master dealers in central locations to support areas that with poor market share. With this central dealer system, the company's exclusive branch dealers enjoyed lower overall product costs to increase sales volume and promote expansion. The dealer service agreements consisted of either regular service, full service, or total maintenance service. The regular service agreement included parts and labor, but not supplies, for .9 cents per copy. Full service included everything

but paper for 1.8 cents per copy. Total maintenance included everything for 2.5 cents per copy. Dealers responded to service calls within 4 to 8 hours on-site. Leases on the newest machines were from 2 to 5 years with separate maintenance agreements.

Mita Corporation. Mita is a privately owned Japanese company established in 1934 to produce diazo (blueprinting) machines. The company employs 5,000 persons worldwide, and 430 in North America. Mita was focused on digital technology that allowed for office interconnectivity. About one-third of Mita's employees were engineers who worked in project teams to continuously improve and upgrade products. Its advertisements emphasize that "All we make is great copiers." The company developed full-featured products. They were working to design fax, copier, and scanner machines that interconnected with the computer as multifunctional machines. In fact, the company sold a full line of fax, copier, and printer equipment. Consumer awareness surveys found that 82 percent of individuals recognized the Mita name.

In 1946, Mita began producing diazo paper and became the leader after introducing the world's first compact blueprinting machine in 1951, the first office-use diazo copy machine in 1956, and the first electrostatic copier with moving platen in 1968. Its headquarters and main factory in Osaka produced over 60 percent of its copiers and printing equipment, but produced low end copiers in Hong Kong. The company produced its own drums, toner and developer in-house. Mita Copystar America, Inc. was established in New Jersey in 1973. In 1982, the company began production in its Saitama factory using the most advanced production technology available to supply the U.S. The U.S. was divided into five regions centered around Los Angeles, Dallas, Atlanta, Chicago and New Jersey. Dallas, the U.S. distribution and training center had a fully automated parts warehouse and distribution center with on-line computer connections to regional offices for high speed order processing and shipping. Mita entered Canada in 1977 and introduced the world's first desktop plain paper copier in 1978. In 1981, Mita launched the world's first voice activated copier. Mita was introducing the fastest copier in the industry (92 copies per minute) in 1995, as well as multifunctional copiers. Mita's product line is shown in Table 17.

Mita typically sold its high quality, full-featured machines for 10-15% below competitors prices. A comparison of Mita's new AC-6500 with Canon's NP-9330 is shown in Table 18. The primary concern for recent developments was quality, since one malfunction in a multifunction machine would cause all other components to be unusable. These developments have taken Mita away from being just a copier company. The company's overall mission was based on "reliability first." No machines were sold to dealers until Mita's officers were certain that they had a minimum defect probability. However, to facilitate repairs and service, Mita offered its customers access to Mail Boxes Etc. centers, located in 2,000 locations across the U.S., for packing and shipping to Mita. The company held regular meetings with its dealers to get feedback and internally to improve operations. Copiers with speeds of 45 cpm or higher had guarantees for three year or through the recommended maximum copy volume if purchasers maintained a full service maintenance agreement and used branded supplies.

Toshiba Corporation. Toshiba was the world's 25th largest industrial corporation with \$39.9 billion in sales and \$177 million in profits in 1993. Its businesses included information and communications systems, information equipment and consumer electronics, power systems and industrial equipment and electronic components and materials. The company's goals were targeted at growth in information and semiconductor businesses, focus on group developments, and globalize operations using strategic alliances. Portable personal computers, audio visual equipment, appliances and copiers were part of information and communications systems.

Table 17: Mita's Product Line

MODEL	SPEED	PRICE	VOLUME TO	ALSO SOLD AS
Mita DC-1415	14	\$ 2,195	5,000	Gestetner 2301/Monroe RL914/Copystar 1415
Mita DC-1435	14	\$ 2,545	5,000	Gestetner 2302/Pitney Bowes 9014/Monroe 914Z/Copystar 1435
Mita DC-1455	14	\$ 3,195	5,000	Gestetner 2303Z
Mita DC-1685	16	\$ 5,295	15,000	Royal 2018/Gestetner 2318Z/Monroe RL-918Z/Copystar 1855
Mita DC-1824ZS	16	\$ 12,495	5,000	
Mita DC-1855	18	\$ 3,795	15,000	Royal 2018/Gestetner 2318Z/Monroe RL-918Z/Copystar 1855
Mita AC-6500 Digital	20	\$ 8,995	15,000	
Mita DC-1824F	20	\$ 13,995	5,000	
Mita DC-2155	22	\$ 4,395	15,000	Pitney Bowes 9023/Copystar 2021/Monroe RL-922ZMR
Mita DC-2285	22	\$ 6,195	20,000	Royal 2222/Gestetner 2322ZD/Copystar 2085/Monroe RL-922DX
Mita DC-3055	30	\$ 4,995	25,000	Gestetner 2430/Royal 2030/Monroe RL-1230M
Mita DC-3555	35	\$ 5,895	40,000	Gestetner 2335Z/Royal 2035/Monroe RL-935
Mita DC-3755	37	\$ 6,595	45,000	Monroe RL-937/Gestetner 23337Z/Royal 2037
Mita DC-3785	37	\$ 9,495	45,000	Monroe RL-937DX/Pitney Bowes 9337/Gestetner 2337ZD/Royal 2237
Mita DC-4555	45	\$ 7,195	50,000	Royal 2045/Gestetner 2345Z/Monroe RL-945/Pitney Bowes 9045S
Mita DC-4655	46	\$ 8,195	50,000	Gestetner 2346Z/Monroe RL-946
Mita DC-4685	46	\$ 10,695	50,000	Monroe RL-946DX/Pitney Bowes 9346/Gestetner 2346ZD/Royal 2246
Mita DC-4685F	46	\$ 12,695	50,000	
Mita DC-5685	56	\$ 16,995	75,000	Monroe RL-956DS/Pitney Bowes 9056/Royal 2256/Gestetner 2356ZDF
Mita DC-5690	56	\$ 17,995	75,000	
Mita DC-7090	70	\$ 20,995	100,000	Pitney Bowes 9070/Monroe RL-970DS/Royal 2270
Mita DC-8585	85	\$ 33,995	200,000	Gestetner 2485ZDF/Monroe RL-985DS
Mita DC-6090	60		100,000	

Table 18: Comparison of Mita and Canon copiers

	Mita AC-6500	Canon NP-9300
Suggested Retail Price	\$8,995	\$19,500
Weight	55 pounds	324 pounds
Warm Up Time	90 seconds	6 minutes
First Copy	8 seconds	10 seconds
Copy Size Minimum	4.5" x 5.5"	8.5" x 11"
Paper Capacity	750 sheets	500 sheets
Reduction	Six modes	Three modes
Enlargement	Four modes	One mode
Color	Five colors	Black & Brown only
Duplexing	Standard	Optional for \$2,300
Marker Pen	Yes	No
Time/Date	Yes	No
Shadow Erase	Yes	No
Memory Card	Yes	No

Toshiba's models were generally priced higher than the average competitive product as shown in Table 19. It had 350 dealers with no other distribution or advertising activities. U.S. market share was only 3.6% in 1993, down from 3.8% in 1992. Toshiba produced copiers that ranged from small single sheet machines starting at 12 cpm to large multifunctional machines with dual paper trays and speeds up to 80 cpm. Actual 1993 sales of 51,100 units included 29,600 units in segment 1, 9,800 units in segment 2, 6,900 units in segment 3, 4,600 units in segment 4, and 200 units in segment 5. The company has targeted the mid-range market with its 5540 and 6550 models of 55 and 65 cpm. Toshiba's ease of use surpassed most other machines in the market. Its new digital Preimage 15DX copiers can act as a printer at 15 cpm.

Table 19: Toshiba's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Toshiba 1210	12	\$ 1,825	5,000	Lanier 6112
Toshiba 1350	13	\$ 2,695	7,500	
Toshiba 1650	16		20,000	
Toshiba 1710	17	\$ 3,740	20,000	
Toshiba 2050	20		25,000	
Toshiba 2500	25	\$ 5,020	25,000	Lanier 6425
Toshiba 2550	25	\$ 6,999	30,000	Lanier 6725
Toshiba 3210	32	\$ 6,789	35,000	Lanier 6432
Toshiba 3220	32	\$ 7,935	40,000	Lanier 6532
Toshiba 4010	40	\$ 9,419	50,000	Lanier 6540
Toshiba 4550	45		50,000	
Toshiba 5010	50	\$ 11,999	60,000	Lanier 6450
Toshiba 5020	50	\$ 13,299	60,000	Lanier 6550
Toshiba 5540	55		100,000	Lanier 6755
Toshiba 6550	65	\$ 21,599	120,000	Lanier 6765
Toshiba 7110	71	\$ 20,999	120,000	Savin 9710/Ricoh FT7870/Minolta EP9720
Toshiba 8050	80	\$ 37,285	175,000	Ricoh FT8880/Savin9080RF/Gestetner 2580
Toshiba BD-9240	60	\$ 18,899	100,000	Lanier 6360
Toshiba 1000 Full-color	1	\$ 10,499	1,000	

Eastman Kodak Company. With \$16.4 billion in 1993 sales, Kodak lost \$1.5 billion. Its imaging products accounted for \$7.2 billion and had profits of \$1.1 billion. In 1988, Kodak became the leader in high volume color copiers with its ColorEdge copier for \$59,500 which allowed users to add color to any part of the copy by the touch of a pencil. These color copiers were four times faster than any in the market at that time. In 1991, Kodak introduced the 1500 series for prices between \$34,000 and \$47,000 which used scanner instead of copier technology, provided stapling, book making, insertion, and folding capabilities. Its product line is shown in Table 20.

The company introduced its Lionheart printing system to rival Xerox's DocuTech line. It held 35% and 30% of the high and medium volume markets, respectively. The company's goal was to improve office productivity and take sales and share away from Xerox. The company spent \$1.3 billion on R&D, developing new material and components. They are developing scanner, fax and printing capabilities into advanced copiers. The company was putting their focus on document imaging. Kodak models 1570 and 1575 could scan a document electronically, store images, and print upon demand. The company's copiers sold at premium prices. Delayed releases and reliability problems hindered Kodak's copier business until cost cuts and quality improvements were accomplished over the past several years.

Kodak had seven major distribution centers in the U.S. and fifty, worldwide. Copier factories were located in the U.S., Mexico and West Germany. The Customer Assistance Center made sure equipment worked and was installed properly. With the acquisition of IBM's copier business in 1989, Kodak obtained many of IBM's former clients. Kodak hired 1100 IBM's copier service representative and 200 sales representatives. By forming partnerships with Canon and Lanier, Kodak believed it could take share from Xerox. The company also sold its high end copiers OEM to Japanese firms. Kodak had little promotion of its copier business and relied on word of mouth sales. The growth in competition with lower priced machines caused problems.

Table 20: Kodak's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Kodak 1525 Coloredge	5	\$ 24,900	4,500	Canon Laser Copier350
Kodak 1550 Coloredge	5	\$ 49,900	10,000	Canon Laser Copier550
Kodak 7016 Ektaplus Multifunction	6	\$ 5,495	15,000	
Kodak 90 Ektaprint	50	\$ 18,000	50,000	Canon NP-6650II
Kodak 90E Ektaprint	50	\$ 19,200	50,000	
Kodak 95 Ektaprint	60	\$ 26,300	125,000	Canon NP-6060
Kodak 95S Ektaprint	60	\$ 28,400	125,000	
Kodak 95SS Ektaprint	60	\$ 29,400	125,000	
Kodak 150	70	\$ 21,000	200,000	
Kodak 150F	70	\$ 24,000	200,000	
Kodak 150P	70	\$ 26,000	200,000	
Kodak 220F	70	\$ 41,000	150,000	
Kodak 220FS	70	\$ 44,000	150,000	
Kodak 220S	70	\$ 44,000	150,000	
Kodak 225F	70	\$ 47,417	250,000	
Kodak 225S	70	\$ 50,357	250,000	
Kodak 225AF	70	\$ 53,297	250,000	
Kodak 1570 Digital	70	\$ 40,800	125,000	
Kodak 1575 Digital	70	\$ 57,300	125,000	
Kodak 1580 Digital	70	\$ 70,500	150,000	
Kodak 1580A Digital	70	\$ 78,500	150,000	
Kodak 185F	85	\$ 34,850	300,000	
Kodak 185AF	85	\$ 37,850	300,000	
Kodak 235F	85	\$ 67,500	300,000	
Kodak 235S	85	\$ 70,500	300,000	
Kodak 235AF	85	\$ 73,500	300,000	
Kodak 2085F Duplicator	85	\$ 74,000	500,000	Canon NP-9850
Kodak 2085S Duplicator	85	\$ 77,000	500,000	
Kodak 2085AF Duplicator	85	\$ 80,000	500,000	
Kodak 300F	100	\$ 99,000	500,000	
Kodak 300AF	100	\$ 105,000	500,000	
Kodak 3100F	100	\$ 101,000	1,000,000	Lanier 7100
Kodak 3100AF	100	\$ 107,000	1,000,000	
Kodak 3100AFB	100	\$ 113,000	1,000,000	
Kodak 2110	110	\$ 78,000	500,000	

Xerox Corporation. With sales of \$14.6 billion, Xerox had a net loss of \$193 million in 1993. Having introduced the plain paper copier in 1959, Xerox was the undisputed industry leader until the 1970s. With entry by Japanese competitors between 1976 and 1982, Xerox's market share fell from 82% to 41%. Xerox responded with total quality management and improved product development. Suppliers have been reduced from 6,000 to 400. Xerox was broadening its markets by selling to over 3000 retailers like Wal-Mart. With its three year total customer satisfaction guarantee, Xerox regained share in the low end markets. Development focused on first to market introductions.

Xerox is now third in the industry with 12.8% of the world market. Xerox is the industry leader in both the high-end and medium volume market segments, holding 54% and 35% respectively. Xerox's product line is shown in Table 21. Modular designs and development teams increased the speed of duplexing, feeding, sorting, and stapling plus related reliability. Its DocuTech series was digital and could be instructed on a network by a computer. The company

also introduced multifunctional machines with fax, print, and copy capabilities for \$1795, that sell for as little as \$1295. Xerox invested 6.6% of sales in R&D.

Table 21: Xerox's Product Line

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Xerox X-NOTE	1.5	\$ 249	50	QuadMark PassPort
Xerox 5201	3	\$ 299	300	Sharp Z-20
Xerox 5203	3	\$ 339	300	
Xerox 5305	3	\$ 359	300	Sharp Z-23/25
Xerox 5205	3	\$ 399	300	
Xerox 5210	3	\$ 399	300	
Xerox 5306	3	\$ 399	300	Sharp Z-27
Xerox 5220	5	\$ 995	500	Sharp Z30
Xerox 5760	6	\$ 29,750	10,000	
Xerox 5760ADF	6	\$ 31,580	10,000	
Xerox 5765	6	\$ 31,750	10,000	
Xerox 5775 SSE Full-color	7.5	\$ 47,500	30,000	
Xerox 5240	8	\$ 1,295	1,000	Sharp SF-Z55
Xerox 5260	8	\$ 1,695	1,000	Sharp SF-Z75
Xerox 5309	10	\$ 899	1,500	Sharp SF-2010
Xerox 5310	10	\$ 949	1,500	Sharp SF-2010
Xerox 5280	10	\$ 1,049	1,500	Sharp SF-2010
Xerox 3010 Multifunction	11	\$ 7,295	3,500	
Xerox 3010ED Multifunction	11	\$ 8,195	3,500	
Xerox 5313	12	\$ 1,599	2,000	
Xerox 5011 RE	12	\$ 1,695	3,500	
Xerox 5012	12	\$ 2,540	10,000	
Xerox 5312	12	\$ 2,540	10,000	
Xerox 5014	12	\$ 3,115	10,000	
Xerox 5314	12	\$ 3,115	10,000	
Xerox 5016ZT	18	\$ 2,995	20,000	
Xerox 5018	18	\$ 3,325	20,000	
Xerox 5016ZTA	18	\$ 3,995	20,000	
Xerox 5018Z	18	\$ 4,185	20,000	
Xerox 5016 ZTAS	18	\$ 4,995	20,000	
Xerox 5318	20	\$ 3,710	10,000	
Xerox 5320	20	\$ 4,265	10,000	
Xerox 5322	20	\$ 7,400	10,000	
Xerox 5021	21	\$ 4,505	20,000	
Xerox 5028	28	\$ 4,755	30,000	
Xerox 5328Z	28	\$ 5,375	30,000	
Xerox 5028Z	28	\$ 5,540	30,000	
Xerox 5034ZTA	28	\$ 8,300	30,000	
Xerox 5334	32	\$ 9,235	30,000	
Xerox 5335	35	\$ 8,900	45,000	
Xerox 5042 book copier	35	\$ 9,470	40,000	
Xerox 5046	35	\$ 9,670	45,000	AB Dick K357
Xerox 5340	40	\$ 11,900	50,000	
Xerox 5345	45	\$ 16,275	65,000	
Xerox 5050	50	\$ 11,095	65,000	
Xerox 1050	50	\$ 12,650	65,000	AB Dick K555
Xerox 5350	50	\$ 16,800	50,000	
Xerox 5053	53	\$ 18,775	65,000	
Xerox 5052	55	\$ 15,990	65,000	AB Dick K557
Xerox 5355	55	\$ 20,625	65,000	

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME TO</u>	<u>ALSO SOLD AS</u>
Xerox 5065 Oct	62	\$ 27,600	125,000	
Xerox 5065 Fin	62	\$ 29,495	125,000	
Xerox 5365 Oct	65	\$ 28,100	125,000	
Xerox 5365 Fin	65	\$ 29,995	125,000	
Xerox 1075	70	\$ 31,575	200,000	
Xerox 5380	80	\$ 37,495	150,000	
Xerox 5385	80	\$ 41,495	150,000	
Xerox 1090	92	\$ 63,100	400,000	
Xerox 5388 HCS	92	\$ 75,950	400,000	
Xerox 5388 Fin	92	\$ 79,000	400,000	
Xerox Docutech 90	92	\$ 160,000	500,000	
Xerox 5100	100	\$ 99,500	400,000	
Xerox 9500VR	120	\$ 85,000	100,000	
Xerox 9500	120	\$ 86,400	100,000	
Xerox 9900	120	\$ 104,775	1,000,000	
Xerox 5090	135	\$ 154,000	1,000,000	
Xerox 5390	135	\$ 154,000	1,000,000	
Xerox Docutech 135	135	\$ 245,000	1,000,000	

Changing Distribution Structures

As a consequence of shrinking gross profit margins on sales transactions, dealers have moved further up volume in their territories, de-emphasizing the sales of low-end copiers. It was not unusual for a dealer to instruct sales representatives not to prospect or make cold calls for low-end units. Rather, low-end units should only be part of a larger, more lucrative sale. If a large order includes low-end copiers, dealers will fulfill the order, but they will not prospect for low-end business. As sales representatives effectively exit from low-end sales, new dealer placements in the low end of the market will further decline.

User Maintenance. Based on experience in the low-end printer market, users were capable of replacing items such as corona wires and wiper blades when these items are provided in a prepackaged preventative maintenance kit and sold over the counter. The combination of long-life photoreceptors and user repair allowed copier vendors to provide user maintained maintained of low-end copiers. Obviously, user maintenance further eroded the dealer's ability to sell maintenance contracts into low-volume copier applications. The Office Products Analyst, a monthly newsletter devoted to the cost/performance analysis of office products, conducted annual copier reliability studies based on input from 212 copier dealers. Kodak, Xerox and Pitney Bowes - companies distributing only through their own direct sales forces - were not included. The results shown in Table 22 identify the recommended purchase list from the survey results. The speed in cpm, the retail price, the maximum copy volume, and the reliability measure (100 is best) are listed. The bold print represents the "best in class" models as selected by the independent dealers representing Japanese manufacturers. Many of the models were also sold OEM to other firms.

Falling Dealer Profit Margins. Because the Japanese manufacturers relied heavily on independent dealers to bring copiers to market and because many manufacturers set up distribution systems with overlapping territories, dealers were accustomed to competing on price. Price competition was fierce in low end markets where it was an important buying factor. Price discounting lowered margins on low-end copiers to the point where profits were nonexistent in some transactions. For example, in Segment 1, a salesman may discount as deeply as 30 percent off the suggested retail price of the product. If that product had a gross profit margin of only 45 percent, that would leave only 15 percent gross margin. By the time the dealer paid a direct sales

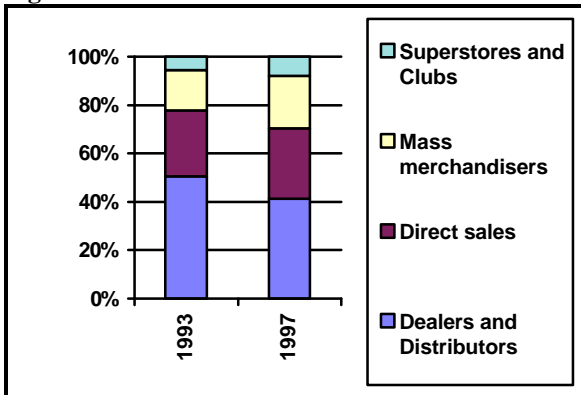
representative a selling commission and covered administrative, installation, warranty, and inventory carrying expenses, the dealer probably made no profit on the sales transaction. In order to make a profit, the dealer would need to maintain the service and supplies business for this unit throughout its useful life.

Table 22: Recommended Purchase List

<u>MODEL</u>	<u>SPEED</u>	<u>PRICE</u>	<u>VOLUME</u>	<u>RELIABILITY</u>	<u>ALSO SOLD AS</u>
Canon CJ10 Color BJ	0.69	\$ 5,999	500	93	
Canon NP-1020	10	\$ 2,325	5,000	85.5	
Konica 1112	12	\$ 2,300	5,000	88.5	
Minolta EP 3170	17	\$ 3,750	20,000	87.6	
Panasonic FP-1780	17	\$ 3,795	15,000	86.3	Lanier 6717/Pitney Bowes 9317
Panasonic FP-2080	20	\$ 3,995	20,000	86.4	
Minolta EP 4210	21	\$ 4,895	25,000	86.5	Olympia 2100
Panasonic FP-2680S1	26	\$ 7,653	25,000	85.6	Pitney Bowes 9326
Konica 2028	28	\$ 5,880	40,000	86.1	ABDick7226
Minolta EP 5320 PRO	32	\$ 7,535	50,000	86.2	Olympia 3201
Panasonic FP-3280S1	32	\$ 8,653	35,000	85.8	
Mita DC-3755	37	\$ 6,595	45,000	85.6	Monroe RL-937/Gestetner 23337Z
Panasonic FP-4080S1	40	\$ 10,232	50,000	87.5	
Minolta EP 5420 PRO	42	\$ 8,675	80,000	88.7	Olympia 4200
Ricoh FT5570	43	\$ 9,497	60,000	85.5	Savin 9335/Gestetner 2533ZD
Ricoh FT5590	50	\$ 11,295	65,000	85.0	Savin 7430/Pitney Bowes D743
Canon NP-6650	50	\$ 19,000	70,000	91.0	Kodak Ektaprint 90
Mita DC-5685	56	\$ 16,995	75,000	85.9	Pitney Bowes 9056/Gestetner 2356ZDF
Konica 6090	60	\$ 19,560	150,000	87.1	ABDick2060
Sharp SD-2060	60	\$ 22,500	125,000	88.7	
Mita DC-6090	60		100,000	85.6	
Sharp SD-3062	62	\$ 28,500	150,000	89.0	
Konica 4065	65	\$ 21,990	150,000	86.0	ABDick7463
Mita DC-7090	70	\$ 20,995	100,000	85.0	Pitney Bowes 9070
Konica 5080	80	\$ 26,920	150,000	87.1	ABDick7577
Canon NP-8530	83	\$ 26,865	150,000	88.1	Lanier 6483
Mita DC-8585	85	\$ 33,995	200,000	88.2	Gestetner 2485ZDF/

Alternative Distribution Channels. In the channel mix for 1993, dealer and distributor outlets accounted for more than 50 percent of all sales. As dealers look askance at cold-calling for very low-end placements, manufacturers are forced to employ discount and retail outlets for low-end copiers. With permanent photoreceptors, user maintenance, and lower profit margins, the low-end copier was being sold through alternate distribution channels. Without the need for a service technician to set up the machine, the machine can, indeed, be sold off the shelf in a retail environment where selling expense is relatively low and deep discounting can be maintained. As product prices declined, and performance improved, a growing number of channels to sell copiers will provide new ways for customers to generate copies. While segment 1 sales were actually up in 1993, one manufacturer tried to increase its share of the dealer market by discounting its price to dealers. Other manufacturers pushed products through distributors and low-volume dealers to maintain the unit volume placements in segment 1. Dataquest predicted that alternate channels of distribution would expand. From now on, alternate channels will begin eroding the share of the copier business that dealers and distributors now hold as shown in Figure 1.

Figure 1: Shifts in the channel mix shares



Merging Distribution Channels. Copier vendors had to consider more than the latest user requirements for product performance; they also had to consider how they sold their products. As changes threaten pricing arrangements and profitability, copier vendors had seen a shakeout in the sales channels, with a subsequent consolidation in the number of available channels. Price pressure combined with a slowing growth rate in industry sales had lead manufacturers and distributors to form alliances and consolidate activities. For example, the National Office Machine Dealers Association and the Local Area Network Dealers Association merged in 1993 to become the Business Technology Association (BTA). Of the 4,200 dealers registered in 1993, BIS expected about 3,000 dealers in 1997 to deal with both color and digital document creation and processing. Xerox was striving to offer document management systems that functioned as part of a comprehensive office work-flow system. The biggest weakness in copiers had been their slowness to conform to digital technology, a technology that was shaping the office of the future. Digital technology for creating, storing, transmitting and printing documents was becoming an integral part of the U.S. workplace. Workers were increasingly transmitting work from their homes by telecommunications. Mobile workers operating outside the main office were growing. Printer vendors had responded to this demand more rapidly, placing increased pressure on copier makers. Copier vendors needed to find ways to work within the parameters of the distribution channels. BTA channels needed to learn more about network technology. Selling printer boxes with facsimile interfaces was about as sophisticated as the channel can currently handle. Dealers needed to be educated to handle tomorrow's digitally networked products.

Digital Networks

Digital technology for creating, storing, transmitting and printing documents is becoming an accepted part of the U.S. workplace. As growing numbers of workers use telecommunications to transmit work from their homes, the ability to connect with digital data sources moves high on the list of user demands. Mobile workers operating outside the main office, and the growing use of information network services will spur additional demand for such data sources. Copier manufacturers had been slow in offering digital technology, a technology that will integrate the office of the future. Printer vendors were faster than copier vendors to understand user requirements in these areas, and to provide products responding to such demand. Many segments of the copier market now are feeling the pinch from such competition.

Customers wanted to be able to send files to printing professionals either through modems or on some kind of disc-based digital medium that the printer could use when printing out data. Digital systems required a common software architecture to move copier paper flow onto

departmental, connected devices. *Microsoft At Work* linked different pieces of office electronic equipment into systems with integrated or complementary functions. Many analysts believed this software-based system represented an important trend for the future, particularly because numerous corporations now relied on in-house networks for efficient use of data and equipment. However, the At Work architecture only became available in the U.S. at the end of 1994. Given the time required for adoption of this architecture, applications are not expected to replace existing office hardware applications until around 1997. By that time, 20 ppm standalone printers, with sorters, mail boxes, and post-processing finishing are expected to be compatible with Microsoft At Work. This will broaden the competitive landscape as copier companies battle with printer companies for share of the large paper volume office market. This will further threaten the existence of the copier distribution channel's core strength, its dealers.

Color copier sales had been strong among users who operated pay-for-print outfits or service bureaus. Color copier sales in 1993 reached a little more than 9,000 units in the U.S. More than 60 percent of the sales involved a digital connection to a host system. These connections to host systems had helped bring color copiers into network printer environments in graphics design businesses, advertising agencies, and pre-press proofing houses. More than 70 percent of the respondents to a printing industry survey said they expected color capabilities to expand their businesses. More than 30 percent said their customers demanded such functions. Users were creating color pages on host systems and printing the pages on color copiers, either for customer approval before offset-press printing, or as the final print version for customers.