



Canon: Competing on Capabilities

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This case was prepared by Mary Ackenhuse, Research Associate, under the supervision of Sumantra Ghoshal, Associate Professor at INSEAD. It is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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In 1961, following the runaway success of the company's model 914 office copier, Joseph C. Wilson, President of Xerox Corporation, was reported to have said, "I keep asking myself, when am I going to wake up? Things just aren't this good in life". Indeed, the following decade turned out to be better than anything Wilson could have dreamed. Between 1960 and 1970, Xerox increased its sales 40 percent per year from \$40 million to \$1.7 billion and raised its after-tax profits from \$2.6 million to \$187.7 million. In 1970, with 93 percent market share world-wide and a brand name that was synonymous with copying, Xerox appeared as invincible in its industry as any company ever could.

When Canon, "the camera company from Japan", jumped into the business in the late 1960s, most observers were sceptical. Less than a tenth the size of Xerox, Canon had no direct sales or service organization to reach the corporate market for copiers, nor did it have a process technology to by-pass the 500 patents that guarded Xerox's Plain Paper Copier (PPC) process. Reacting to the spate of recent entries in the business including Canon, Arthur D. Little predicted in 1969 that no company would be able to challenge Xerox's monopoly in PPC's in the 1970s because its patents presented an insurmountable barrier.

Yet, over the next two decades, Canon rewrote the rule book on how copiers were supposed to be produced and sold as it built up \$5 billion in revenues in the business, emerging as the second largest global player in terms of sales and surpassing Xerox in the number of units sold. According to the Canon Handbook, the company's formula for success as displayed initially in the copier business is "synergistic management of the total technological capabilities of the company, combining the full measure of Canon's know how in fine optics, precision mechanics, electronics and fine chemicals". Canon continues to grow and diversify using this strategy. Its vision, as described in 1991 by Ryuzaburo Kaku, President of the company, is "to become a premier global company of the size of IBM combined with Matsushita".

Industry Background

The photocopying machine has often been compared with the typewriter as one of the few triggers that have fundamentally changed the ways of office work. But, while a mechanical Memograph machine for copying had been introduced by the A.B. Dick company of Chicago as far back as 1887, it was only in the second half of this century that the copier market exploded with Xerox's commercialisation of the "electrophotography" process invented by Chester Carlson.

Xerox

Carlson's invention used an electrostatic process to transfer images from one sheet of paper to another. Licensed to Xerox in 1948, this invention led to two different photocopying technologies. The Coated Paper Copying (CPC) technology transferred the reflection of an image from the original directly to specialized zinc-oxide coated paper, while the Plain Paper Copying (PPC) technology transferred the image indirectly to ordinary paper through a rotating drum coated with charged particles. While either dry or liquid toner could be used to develop the image, the dry toner was generally preferable in both technologies. A large

number of companies entered the CPC market in the 1950s and 1960s based on technology licensed from Xerox or RCA (to whom Xerox had earlier licensed this technology). However, PPC remained a Xerox monopoly since the company had refused to license any technology remotely connected to the PPC process and had protected the technology with over 500 patents.

Because of the need for specialized coated paper, the cost per copy was higher for CPC. Also, this process could produce only one copy at a time, and the copies tended to fade when exposed to heat or light. PPC, on the other hand, produced copies at a lower operating cost that were also indistinguishable from the original. The PPC machines were much more expensive, however, and were much larger in size. Therefore, they required a central location in the user's office. The smaller and less expensive CPC machines, in contrast, could be placed on individual desks. Over time, the cost and quality advantages of PPC, together with its ability to make multiple copies at high speed, made it the dominant technology and, with it, Xerox's model of centralized copying, the industry norm.

This business concept of centralized copying required a set of capabilities that Xerox developed and which, in turn, served as its major strengths and as key barriers to entry to the business. Given the advantages of volume and speed, all large companies found centralized copying highly attractive and they became the key customers for photocopying machines. In order to support this corporate customer base, Xerox's product designs and upgrades emphasized economies of higher volume copying. To market the product effectively to these customers, Xerox also built up an extensive direct sales and service organization of over 12,000 sales representatives and 15,000 service people. Forty percent of the sales reps' time was spent "hand holding" to prevent even minor dissatisfaction. Service reps, dressed in suits and carrying their tools in briefcases, performed preventative maintenance and prided themselves on reducing the average time between breakdown and repair to a few hours.

Further, with the high cost of each machine and the fast rate of model introductions, Xerox developed a strategy of leasing rather than selling machines to customers. Various options were available, but typically the customers paid a monthly charge on the number of copies made. The charge covered not only machine costs but also those of the paper and toner that Xerox supplied and the service visits. This lease strategy, together with the carefully cultivated service image, served as key safeguards from competition, as they tied the customers into Xerox and significantly raised their switching costs.

Unlike some other American corporations, Xerox had an international orientation right from the beginning. Even before it had a successful commercial copier, Xerox built up an international presence through joint ventures which allowed the company to minimize its capital investment abroad. In 1956, it ventured with the Rank Organization Ltd. in the U.K. to form Rank Xerox. In 1962, Rank Xerox became a 50 percent partner with Fuji Photo to form Fuji Xerox which sold copiers in Japan. Through these joint ventures, Xerox built up sales and service capabilities in these key markets similar to those it had in the United States. There were some 5,000 sales people in Europe, 3,000 in Japan and over 7,000 and 3,000 service reps, respectively. Xerox also built limited design capabilities in both the joint ventures for local market customization, which developed into significant research establishments in their own rights in later years.

Simultaneously, Xerox maintained high levels of investment in both technology and manufacturing to support its growing market. It continued to spend over \$100 million a year in R&D, exceeding the total revenues from the copier business that any of its competitors were earning in the early 70s, and also invested heavily in large-size plants not only in the U.S., but also in the U.K. and Japan.

Competition in the 1970s

Xerox's PPC patents began to expire in the 1970s, heralding a storm of new entrants. In 1970, IBM offered the first PPC copier not sold by Xerox, which resulted in Xerox suing IBM for patent infringement and violation of trade secrets. Canon marketed a PPC copier the same year through the development of an independent PPC technology which they licensed selectively to others. By 1973, competition had expanded to include players from the office equipment industry (IBM, SCM, Litton, Pitney Bowes), the electronics industry (Toshiba, Sharp), the reprographics industry (Ricoh, Mita, Copyer, 3M, AB Dick, Addressograph/Multigraph), the photographic equipment industry (Canon, Kodak, Minolta, Konishiroku) and the suppliers of copy paper (Nashua, Dennison, Saxon).

By the 1980s many of these new entrants, including IBM, had lost large amounts of money and exited the business. A few of the newcomers managed to achieve a high level of success, however, and copiers became a major business for them. Specifically, copiers were generating 40 percent of Canon's revenues by 1990.

Canon

Canon was founded in 1933 with the ambition to produce a sophisticated 35mm camera to rival that of Germany's world-class Leica model. In only two years' time, it had emerged as Japan's leading producer of high-class cameras. During the war, Canon utilized its optics expertise to produce an X-ray machine which was adopted by the Japanese military. After the war, Canon was able to successfully market its high-end camera, and by the mid-1950s it was the largest camera manufacturer in Japan. Building off its optics technology, Canon then expanded its product line to include a mid-range camera, an 8mm video camera, television lenses and micrographic equipment. It also began developing markets for its products outside of Japan, mainly in the U.S. and Canada.

Diversification was always very important to Canon in order to further its growth, and a new products R&D section was established in 1962 to explore the fields of copy machines, auto-focusing cameras, strobe-integrated cameras, home VCRs and electronic calculators. A separate, special operating unit was also established to introduce new non-camera products resulting from the diversification effort.

The first product to be targeted was the electronic calculator. This product was challenging because it required Canon engineers to develop new expertise in microelectronics in order to incorporate thousands of transistors and diodes in a compact, desk model machine. Tekeshi Mitarai, President of Canon at that time, was against developing the product because it was seen to be too difficult and risky. Nevertheless, a dedicated group of engineers believed in the

challenge and developed the calculator in secrecy. Over a year later, top management gave their support to the project. In 1964, the result of the development effort was introduced as the Canola 130, the world's first 10-key numeric pad calculator. With this product line, Canon dominated the Japanese electronic calculator market in the 1960s.

Not every diversification effort was a success, however. In 1956, Canon began development of the synchroreader, a device for writing and reading with a sheet of paper coated with magnetic material. When introduced in 1959, the product received high praise for its technology. But, because the design was not patented, another firm introduced a similar product at half the price. There was no market for the high priced and incredibly heavy Canon product. Ultimately, the firm was forced to disassemble the finished inventories and sell off the usable parts in the "once-used" components market.

Move into Copiers

Canon began research into copier technology in 1959, and, in 1962, it formed a research group dedicated to developing a plain paper copier (PPC) technology. The only known PPC process was protected by hundreds of Xerox patents, but Canon felt that only this technology promised sufficient quality, speed, economy and ease of maintenance to successfully capture a large portion of the market. Therefore, corporate management challenged the researchers to develop a new PPC process which would not violate the Xerox patents.

In the meantime, the company entered the copier business by licensing the "inferior" CPC technology in 1965 from RCA. Canon decided not to put the name of the company on this product and marketed it under the brand name Confax 1000 in Japan only. Three years later, Canon licensed a liquid toner technology from an Australian company and combined this with the RCA technology to introduce the CanAll Series. To sell the copier in Japan, Canon formed a separate company, International Image Industry. The copier was sold as an OEM to Scott Paper in the U.S. who sold it under its own brand name.

Canon's research aiming at developing a PPC technical alternative to xerography paid off with the announcement of the "New Process" (NP) in 1968. This successful research effort not only produced an alternative process but also taught Canon the importance of patent law: how not to violate patents and how to protect new technology. The NP process was soon protected by close to 500 patents.

The first machine with the NP technology, the NP1100, was introduced in Japan in 1970. It was the first copier sold by Canon to carry the Canon brand name. It produced 10 copies per minute and utilized dry toner. As was the standard in the Japanese market, the copier line was sold outright to customers from the beginning. After two years of experience in the domestic market, Canon entered the overseas market, except North America, with this machine.

The second generation of the NP system was introduced in Japan in 1972 as the NPL7. It was a marked improvement because it eliminated a complex fusing technology, simplified developing and cleaning, and made toner supply easier through a new system developed to use liquid toner. Compared with the Xerox equivalent, it was more economical, more compact, more reliable and still had the same or better quality of copies.

With the NP system, Canon began a sideline which was to become quite profitable: licensing. The first generation NP system was licensed to AM, and Canon also provided it with machines on an OEM basis. The second generation was again licensed to AM as well as to Saxon, Ricoh, and Copyer. Canon accumulated an estimated \$32 million in license fees between 1975 and 1982.

Canon continued its product introductions with a stream of state-of-the-art technological innovations throughout the seventies. In 1973 it added colour to the NP system; in 1975, it added laser beam printing technology. Its first entry into high volume copiers took place in 1978 with a model which was targeted at the Xerox 9200. The NP200 was introduced in 1979 and went on to win a gold medal at the Leipzig Fair for being the most economical and productive copier available. By 1982, copiers had surpassed cameras as the company's largest revenue generator (see Exhibits 1 and 2 for Canon's financials and sales by product line).

The Personal Copier

In the late 1970s, top management began searching for a new market for the PPC copier. They had recently experienced a huge success with the introduction of the AE-1 camera in 1976 and wanted a similar success in copiers. The AE-1 was a very compact single-lens reflex camera, the first camera that used a microprocessor to control electronically functions of exposure, film rewind and strobe. The product had been developed through a focused, cross-functional project team effort which had resulted in a substantial reduction in the number of components, as well as in automated assembly and the use of unitized parts. Because of these improvements, the AE-1 enjoyed a 20 percent cost advantage over competitive models in the same class.

After studying the distribution of offices in Japan by size (see Exhibit 3), Canon decided to focus on a latent segment that Xerox had ignored. This was the segment comprised of small offices (segment E) who could benefit from the functionality offered by photocopiers but did not require the high speed machines available in the market. Canon management believed that a low volume "value for money" machine could generate a large demand in this segment. From this analysis emerged the business concept of a "personal side desk" machine which could not only create a new market in small offices, but potentially also induce decentralization of the copy function in large offices. Over time, the machine might even create demand for a personal copier for home use. This would be a copier that up to now no one had thought possible. Canon felt that, to be successful in this market, the product had to cost half the price of a conventional copier (target price \$1,000), be maintenance free, and provide ten times more reliability.

Top management took their "dream" to the engineers, who, after careful consideration, took on the challenge. The machine would build off their previous expertise in microelectronics but would go much further in terms of material, functional component, design and production engineering technologies. The team's slogan was "Let's make the AE-1 of copiers!", expressing the necessity of know-how transfer between the camera and copier divisions as well as their desire for a similar type of success. The effort was led by the director of the Reprographic Production Development Center. His cross-functional team of 200 was the second largest ever assembled at Canon (the largest had been that of the AE-1 camera).

During the development effort, a major issue arose concerning the paper size that the new copier would accept. Canon Sales (the sales organization for Japan) wanted the machine to use a larger-than-letter-size paper which accounted for 60 percent of the Japanese market. This size was not necessary for sales outside of Japan and would add 20-30 percent to the machine's cost as well as make the copier more difficult to service. After much debate world-wide, the decision was made to forego the ability to utilize the larger paper size in the interest of better serving the global market.

Three years later the concept was a reality. The new PC (personal copier) employed a new-cartridge based technology which allowed the user to replace the photoreceptive drum, charging device, toner assembly and cleaner with a cartridge every 2,000 copies, thus eliminating the need to maintain the copier regularly. This enabled Canon engineers to meet the cost and reliability targets. The revolutionary product was the smallest, lightest copier ever sold, and created a large market which had previously not existed. Large offices adjusted their copying strategies to include decentralized copying, and many small offices and even homes could now afford a personal copier. Again, Canon's patent knowledge was utilized to protect this research, and the cartridge technology was not licensed to other manufacturers. Canon has maintained its leadership in personal copiers into the 1990s.

Building Capabilities

Canon is admired for its technical innovations, marketing expertise, and low-cost quality manufacturing. These are the result of a long-term strategy to become a premier company. Canon has frequently acquired outside expertise so that it could better focus internal investments on skills of strategic importance. This approach of extensive outsourcing and focused internal development has required consistent direction from top management and the patience to allow the company to become well grounded in one skill area before tasking the organization with the next objective.

Technology

Canon's many innovative products, which enabled the company to grow quickly in the seventies and eighties are in large part the result of a carefully orchestrated use of technology and the capacity for managing rapid technological change. Attesting to its prolific output of original research is the fact that Canon has been among the leaders in number of patents issued world-wide throughout the eighties.

These successes have been achieved in an organization that has firmly pursued a strategy of decentralized R&D. Most of Canon's R&D personnel are employed by the product divisions where 80-90 percent of the company's patentable inventions originate. Each product division has its own development center which is tasked with short- to medium-term product design and improvement of production systems. Most product development is performed by cross-functional teams. The work of the development groups is coordinated by an R&D headquarters group.

The Corporate Technical Planning and Operation centre is responsible for long-term strategic R&D planning. Canon also has a main research centre which supports state-of-the-art research in optics, electronics, new materials and information technology. There are three other corporate research centres which apply this state-of-the-art research to product development.

Canon acknowledges that it has neither the resources nor the time to develop all necessary technologies and has therefore often traded or bought specific technologies from a variety of external partners. Furthermore, it has used joint ventures and technology transfers as a strategic tool for mitigating foreign trade tensions in Europe and the United States. For example, Canon had two purposes in mind when it made an equity participation in CPF Deutsch, an office equipment marketing firm in Germany. Primarily, it believed that this move would help develop the German market for its copiers; but it did not go unnoticed among top management that CPF owned Tetras, a copier maker who at that time was pressing dumping charges against Japanese copier makers. Canon also used Burroughs as an OEM for office automation equipment in order to acquire Burroughs software and know-how and participated in joint development agreements with Eastman Kodak and Texas Instruments. Exhibit 4 provides a list of the company's major joint ventures.

Canon also recognizes that its continued market success depends on its ability to exploit new research into marketable products quickly. It has worked hard to reduce the new product introduction cycle through a cross-functional programme called TS 1/2 whose purpose is to cut development time by 50 percent on a continuous basis. The main thrust of this programme is the classification of development projects by total time required and the critical human resources needed so that these two parameters can be optimized for each product depending on its importance for Canon's corporate strategy. This allows product teams to be formed around several classifications of product development priorities of which "best sellers" will receive the most emphasis. These are the products aimed at new markets or segments with large potential demands. Other classifications include products necessary to catch up with competitive offerings, product refinements intended to enhance customer satisfaction, and long-run marathon products which will take considerable time to develop. In all development classifications, Canon emphasizes three factors to reduce time to market: the fostering of engineering ability, efficient technical support systems, and careful reviews of product development at all stages.

Canon is also working to divert its traditional product focus into more of a market focus. To this end, Canon R&D personnel participate in international product strategy meetings, carry out consumer research, join in marketing activities, and attend meetings in the field at both domestic and foreign sales subsidiaries.

Marketing

Canon's effective marketing is the result of step-by-step, calculated introduction strategies. Normally, the product is first introduced and perfected in the home market before being sold internationally. Canon has learned how to capture learning from the Japanese market quickly so that the time span between introduction in Japan and abroad is as short as a few months. Furthermore, the company will not simultaneously launch a new product through a new distribution channel - its strategy is to minimize risk by introducing a new product through

known channels first. New channels will only be created, if necessary, after the product has proven to be successful.

The launch of the NP copier exemplifies this strategy. Canon initially sold these copiers in Japan by direct sales through its Business Machines Sales organization, which had been set up in 1968 to sell the calculator product line. This sales organization was merged with the camera sales organization in 1971 to form Canon Sales. By 1972, after three years of experience in producing the NP product line, the company entered into a new distribution channel, that of dealers, to supplement direct selling.

The NP copier line was not marketed in the U.S. until 1974, after production and distribution were running smoothly in Japan. The U.S. distribution system was similar to that used in Japan, with seven sales subsidiaries for direct selling and a network of independent dealers.

By the late 1970s, Canon had built up a strong dealer network in the U.S. which supported both sales and service of the copiers. The dealer channel was responsible for rapid growth in copier sales, and, by the early 1980s, Canon copiers were sold almost exclusively through this channel. Canon enthusiastically supported the dealers with attractive sales incentive programmes, management training and social outings. Dealers were certified to sell copiers only after completing a course in service training. The company felt that a close relationship with its dealers was a vital asset that allowed it to understand and react to customers' needs and problems in a timely manner. At the same time, Canon also maintained a direct selling mechanism through wholly owned sales subsidiaries in Japan, the U.S. and Europe in order to target large customers and government accounts.

The introduction of its low-end personal copier in 1983 was similarly planned to minimize risk. Initially, Canon's NP dealers in Japan were not interested in the product due to its low maintenance needs and inability to utilize large paper sizes. Thus, PCs were distributed through the firm's office supply stores who were already selling its personal calculators. After seeing the success of the PC, the NP dealers began to carry the copier.

In the U.S., the PC was initially sold only through existing dealers and direct sales channels due to limited availability of the product. Later, it was sold through competitors' dealers and office supply stores, and, eventually, the distribution channels were extended to include mass merchandisers. Canon already had considerable experience in mass merchandising from its camera business.

Advertising has always been an integral part of Canon's marketing strategy. President Kaku believes that Canon must have a corporate brand name which is outstanding to succeed in its diversification effort. "Customers must prefer products because they bear the name Canon", he says. As described by the company's finance director, "If a brand name is unknown, and there is no advertising, you have to sell it cheap. It's not our policy to buy share with a low price. We establish our brand with advertising at a reasonably high price".

Therefore, when the NP-200 was introduced in 1980, 10 percent of the selling price was spent on advertising; for the launch of the personal copier, advertising expenditure was estimated to be 20 percent of the selling price. Canon has also sponsored various sporting events including World Cup football, the Williams motor racing team, and the ice dancers Torvill and Dean.

The company expects its current expansion into the home automation market to be greatly enhanced by the brand image it has built in office equipment (see Exhibit 1 for Canon's advertising expenditures through 1990.)

Manufacturing

Canon's goal in manufacturing is to produce the best quality at the lowest cost with the best delivery. To drive down costs, a key philosophy of the production system is to organize the manufacture of each product so that the minimum amount of time, energy and resources are required. Canon therefore places strong emphasis on tight inventory management through a stable production planning process, careful material planning, close supplier relationships, and adherence to the **kanban** system of inventory movement. Additionally, a formal waste elimination programme saved Canon 177 billion yen between 1976 and 1985. Overall, Canon accomplished a 30 percent increase in productivity per year from 1976 to 1982 and over 10 percent thereafter through automation and innovative process improvements.

The workforce is held in high regard at Canon. A philosophy of "stop and fix it" empowers any worker to stop the production line if he or she is not able to perform a task properly or observes a quality problem. Workers are responsible for their own machine maintenance governed by rules which stress prevention. Targets for quality and production and other critical data are presented to the workers with on-line feedback. Most workers also participate in voluntary "small group activity" for problem solving. The result of these systems is a workforce that feels individually responsible for the success of the products it manufactures.

Canon sponsors a highly regarded suggestion programme for its workers in order to directly involve those most familiar with the work processes in improving the business. The programme was originally initiated in 1952 with only limited success, but in the early 1980s, participation soared with more than seventy suggestions per employee per year. All suggestions are reviewed by a hierarchy of committees with monetary prizes awarded monthly and yearly depending on the importance of the suggestion. The quality and effectiveness of the process are demonstrated by a 90 percent implementation rate of the suggestions offered and corporate savings of \$202 million in 1985 (against a total expenditure of \$2 million in running the programme, over 90 percent of it in prize money).

Canon chooses to backward integrate only on parts with unique technologies. For other components, the company prefers to develop long-term relationships with its suppliers and it retains two sources for most parts. In 1990, over 80 percent of Canon's copiers were assembled from purchased parts, with only the drums and toner being manufactured in-house. The company also maintains its own in-house capability for doing pilot production of all parts so as to understand better the technology and the vendors' costs.

Another key to Canon's high quality and low cost is the attention given to parts commonality between models. Between some adjacent copier models, the commonality is as high as 60 percent.

Copier manufacture was primarily located in Toride, Japan, in the early years but then spread to Germany, California and Virginia in the U.S., France, Italy and Korea. In order to mitigate trade and investment friction, Canon is working to increase the local content of parts as it

expands globally. In Europe it exceeds the EC standard by 5 percent. It is also adding R&D capability to some of its overseas operations. Mr. Kaku emphasizes the importance of friendly trading partners:

"Frictions cannot be erased by merely transferring our manufacturing facilities overseas. The earnings after tax must be reinvested in the country; we must transfer our technology to the country. This is the only way our overseas expansion will be welcomed."

Leveraging Expertise

Canon places critical importance on continued growth through diversification into new product fields. Mr. Kaku observed,

"Whenever Canon introduced a new product, profits surged forward. Whenever innovation lagged, on the other hand, so did the earnings... In order to survive in the coming era of extreme competition, Canon must possess at least a dozen proprietary state-of-the-art technologies that will enable it to develop unique products."

While an avid supporter of diversification, Mr. Kaku was cautious.

"In order to ensure the enduring survival of Canon, we have to continue diversifying in order to adapt to environmental changes. However, we must be wise in choosing ways toward diversification. In other words, we must minimize the risks. Entering a new business which requires either a technology unrelated to Canon's current expertise or a different marketing channel than Canon currently uses incurs a 50 percent risk. If Canon attempts to enter a new business which requires both a new technology and a new marketing channel which are unfamiliar to Canon, the risk entailed in such ventures would be 100 percent. There are two prerequisites that have to be satisfied before launching such new ventures. First, our operation must be debt-free; second, we will have to secure the personnel capable of competently undertaking such ventures. I feel we shall have to wait until the twenty-first century before we are ready."

Combining Capabilities

Through its R&D strategy, Canon has worked to build up specialized expertise in several areas and then link them to offer innovative, state-of-the-art products. Through the fifties and sixties, Canon focused on products related to its main business and expertise, cameras. This prompted the introduction of the 8 mm movie camera and the Canon range of mid-market cameras. There was minimal risk because the optics technology was the same and the marketing outlet, camera shops, remained the same.

Entrance into the calculator market pushed Canon into developing expertise in the field of microelectronics, which it later innovatively combined with its optics capability to introduce

one of its most successful products, the personal copier. From copiers, Canon utilized the replaceable cartridge system to introduce a successful desktop laser printer.

In the early seventies, Canon entered the business of marketing micro-chip semiconductor production equipment. In 1980, the company entered into the development and manufacture of unique proprietary ICs in order to strengthen further its expertise in electronics technology. This development effort was expanded in the late eighties to focus on opto-electronic ICs. According to Mr. Kaku:

"We are now seriously committed to R&D in ICs because our vision for the future foresees the arrival of the opto-electronic era. When the time arrives for the opto-electronic IC to replace the current ultra-LSI, we intend to go into making large-scale computers. Presently we cannot compete with the IBMs and NECs using the ultra-LSIs. When the era of the opto-electronic IC arrives, the technology of designing the computer will be radically transformed; that will be our chance for making entry into the field of the large-scale computer."

Creative Destruction

In 1975 Canon produced the first laser printer. Over the next fifteen years, laser printers evolved as a highly successful product line under the Canon brand name. The company also provides the "engine" as an OEM to Hewlett Packard and other laser printer manufacturers which when added to its own branded sales supports a total of 84 percent of world-wide demand.

The biggest threat to the laser printer industry is substitution by the newly developed bubble jet printer. With a new technology which squirts out thin streams of ink under heat, a high-quality silent printer can be produced at half the price of the laser printer. The technology was invented accidentally in the Canon research labs. It keys on a print head which has up to 400 fine nozzles per inch, each with its own heater to warm the ink until it shoots out tiny ink droplets. This invention utilizes Canon's competencies in fine chemicals for producing the ink and its expertise in semiconductors, materials, and electronics for manufacturing the print heads. Canon is moving full steam forward to develop the bubble jet technology, even though it might destroy a business that the company dominates. The new product is even more closely tied to the company's core capabilities, and management believes that successful development of this business will help broaden further its expertise in semiconductors.

Challenge of the 1990s

Canon sees the office automation business as its key growth opportunity for the nineties. It already has a well-established brand name in home and office automation products through its offerings of copiers, facsimiles, electronic typewriters, laser printers, word processing equipment and personal computers. The next challenge for the company is to link these discrete products into a multifunctional system which will perform the tasks of a copier, facsimile, printer, and scanner and interface with a computer so that all the functions can be performed from one keyboard. In 1988, with this target, Canon introduced a personal computer which incorporated a PC, a fax, a telephone and a word processor. Canon has also

introduced a colour laser copier which hooks up to a computer to serve as a colour printer. A series of additional integrated OA offerings are scheduled for introduction in 1992, and the company expects these products to serve as its growth engine in the first half of the 1990s.

Managing the Process

Undergirding this impressive history of continuously building new corporate capabilities and of exploiting those capabilities to create a fountain of innovative new products lies a rather unique management process. Canon has institutionalized corporate entrepreneurship through its highly autonomous and market focused business unit structure. A set of powerful functional committees provide the bridge between the entrepreneurial business units and the company's core capabilities in technology, manufacturing and marketing. Finally, an extraordinarily high level of corporate ambition drives this innovation engine, which is fuelled by the creativity of its people and by top management's continuous striving for ever higher levels of performance.

Driving Entrepreneurship: The Business Units

Mr. Kaku had promoted the concept of the entrepreneurial business unit from his earliest days with Canon, but it was not until the company had suffered significant losses in 1975 that his voice was heard. His plan was implemented shortly before he became president of the company.

Mr. Kaku believed that Canon's diversification strategy could only succeed if the business units were empowered to act on their own, free of central controls. Therefore, two independent operating units were formed in 1978, one for cameras and one for office equipment, to be managed as business units. Optical Instruments, the third business unit, had always been separate. Since that time, an additional three business units have been spun off. The original three business units were then given clear profitability targets, as well as highly ambitious growth objectives, and were allowed the freedom to devise their own ways to achieve these goals. One immediate result of this decentralization was the recognition that Canon's past practice of mixing production of different products in the same manufacturing facility would no longer work. Manufacturing was reorganized so that no plant produced more than one type of product.

Mr. Kaku describes the head of each unit as a surrogate of the CEO empowered to make quick decisions. This allows him, as president of Canon, to devote himself exclusively to his main task of creating and implementing the long-term corporate strategy. In explaining the benefits of the system, he said:

"Previously, the president was in exclusive charge of all decision making; his subordinates had to form a queue to await their turn in presenting their problems to him. This kind of system hinders the development of the young managers' potential for decision-making.

"Furthermore, take the case of the desktop calculator. Whereas, I can devote only about two hours each day on problems concerning the calculator, the CEO of Casio Calculator could devote 24 hours to the calculator... In the fiercely competitive market, we lost out because our then CEO was slow in coping with the problem."

In contrast to the Western philosophy of stand-alone SBUs encompassing all functions including engineering, sales, marketing and production, Canon has chosen to separate its product divisions from its sales and marketing arm. This separation allows for a clear focus on the challenges that Canon faces in selling products on a global scale. Through a five-year plan initiated in 1977, Seiichi Takigawa, the president of Canon Sales (the sales organization for Japan), stressed the need to "make sales a science". After proving the profitability of this approach, Canon Sales took on the responsibility for world-wide marketing, sales and service. In 1981, Canon Sales was listed on the Tokyo stock exchange, reaffirming its independence.

Canon also allows its overseas subsidiaries free rein, though it holds the majority of stock. The philosophy is to create the maximum operational leeway for each subsidiary to act on its own initiative. Kaku describes the philosophy through an analogy:

"Canon's system of managing subsidiaries is similar to the policy of the Tokugawa government, which established secure hegemony over the warlords, who were granted autonomy in their territory. I am "shogun" [head of the Tokugawa regime] and the subsidiaries' presidents are the "daimyo" [warlords]. The difference between Canon and the Tokugawa government is that the latter was a zero-sum society; its policy was repressive. On the other hand, Canon's objective is to enhance the prosperity of all subsidiaries through efficient mutual collaboration."

Canon has also promoted the growth of intrapreneurial ventures within the company by spinning these ventures off as wholly owned subsidiaries. The first venture to be spun off was Canon Components, which produces electronic components and devices, in 1984.

Building Integration: Functional Committees

As Canon continues to grow and diversify, it becomes increasingly difficult but also ever more important to link its product divisions in order to realize the benefits possible only in a large multiproduct corporation. The basis of Canon's integration is a three dimensional management approach in which the first dimension is the independent business unit, the second a network of functional committees, and the third the regional companies focused on geographic markets (see Exhibit 5).

Kaku feels there are four basic requirements for the success of a diversified business: 1) a level of competence in research and development; 2) quality, low-cost manufacturing technology; 3) superior marketing strength; and 4) an outstanding corporate identity, culture and brand name. Therefore, he has established separate functional committees to address the first three requirements of development, production and marketing, while the fourth task has been kept as a direct responsibility of corporate management. The three functional committees, in turn, have been made responsible for company-wide administration of three key management systems:

- The Canon Development System (CDS) whose objectives are to foster the research and creation of new products and technologies by studying and continuously improving the development process;
- The Canon Production System (CPS) whose goal is to achieve optimum quality by minimizing waste in all areas of manufacturing;
- The Canon Marketing System (CMS), later renamed the Canon International Marketing System (CIMS), which is tasked to expand and strengthen Canon's independent domestic and overseas sales networks by building a high quality service and sales force.

Separate offices have been created at headquarters for each of these critical committees, and over time their role has broadened to encompass general improvement of the processes used to support their functions. The chairpersons of the committees are members of Canon's management committee, which gives them the ability to ensure consistency and communicate process improvements throughout the multiproduct, multinational corporation.

Using information technology to integrate its world-wide operations, Canon began development of the Global Information System for Harmonious Growth Administration (GINGA) in 1987. The system will consist of a high-speed digital communications network to interconnect all parts of Canon into a global database and allow for the timely flow of information among managers in any location of the company's world-wide organization. GINGA is planned to include separate but integrated systems for computer integrated manufacturing, global marketing and distribution, R&D and product design, financial reporting, and personnel database tracking, as well as some advances in intelligent office automation. As described by Mr. Kaku, the main objective of this system is to supplement Canon's efficient vertical communications structure with a lateral one that will facilitate direct information exchange among managers across businesses, countries, and functions on all operational matters concerning the company. The system is being developed at a total cost of 20 billion yen and it is targeted for completion in 1992.

Managing Renewal: Challenges and Change

Mr. Kaku was very forthright about some of the management weaknesses of Canon prior to 1975:

"In short, our skill in management - the software of our enterprise - was weak. Management policy must be guided by a soundly created software on management; if the software is weak, the firm will lack clearly defined ideals and objectives. In the beginning we had a clearly defined objective, to overtake West Germany's Leica. Since then our management policy has been changing like the colours of a chameleon.

"In the past our management would order employees to reach the peak of Mount Fuji, and then before the vanguard of climbers had barely started climbing, they would be ordered to climb Mount Tsukuba far to the north. Then the order would again be suddenly changed to climb Mount Yatsugatake to the west. After experiencing these kind of shifts in policy, the smarter employees would opt to

take things easy by taking naps on the bank of the river Tamagawa. As a result, vitality would be sapped from our work force - a situation that should have been forestalled by all means."

Mr. Kaku's first action as President of Canon was to start the firm on the path to global leadership through establishing the first "premier company plan", a six-year plan designed to make Canon a top company in Japan. The plan outlined a policy for diversification and required consistently recurring profits exceeding 10 percent on sales.

"The aim of any Japanese corporation is ensuring its perpetual survival. Unlike the venture businesses and U.S. corporations, our greatest objective is not to maximize short-term profits. Our vital objective is to continually earn profits on a stable basis for ensuring survival. To implement this goal, we must diversify."

By the time the original six-year plan expired in 1981, Canon had become a highly respected company in Japan. The plan was then renewed through 1986 and then again into the 1990s. The challenge was to become a premier global company, defined as having recurring profits exceeding 15 percent of sales. R&D spending was gradually increased from 6 percent of sales in 1980 to 9 percent in 1985 as a prerequisite for global excellence. As described by Mr. Kaku:

"By implementing our first plan for becoming a premier company we have succeeded in attaining the allegorical top of Mount Fuji. Our next objective is the Everest. With a firm determination, we could have climbed Fuji wearing sandals. However, sandals are highly inappropriate for climbing Everest; it may cause our death."

According to Mr. Kaku, such ambitions also require a company to build up the ability to absorb temporary reversals without panic; ambition without stability makes the corporate ship lose its way. To illustrate, he described the situation at Canon during the time the yen depreciated from 236 to the dollar in 1985 to 168 to the dollar in 1986. With 74 percent of Canon's Japanese production going to export markets, this sudden change caused earnings to fall to 4.6 billion yen, one tenth of the previous year. Some board members at Canon sought drastic action such as a major restructuring of the company and cutting the R&D budget. Mr. Kaku had successfully argued the opposite:

"What I did was calm them down. If a person gets lost in climbing a high mountain, he must avoid excessive use of his energy; otherwise his predicament will deepen... Our ongoing strategy for becoming the premier company remains the best, even under this crisis; there is no need to panic. Even if we have to forego dividends for two or three times, we shall surely overcome this crisis."

While celebrating the company's past successes, Mr. Kaku also constantly reminds his colleagues that no organizational form or process holds the eternal truth. The need to change with a changing world is inevitable. For example, despite being the creator of the product division-marketing company split, he was considering rejoining these two in the nineties:

"In the future, our major efforts in marketing must be concentrated on clearly defining and differentiating the markets of the respective products and creating appropriate marketing systems for them. In order to make this feasible, we may have to recombine our sales subsidiaries with the parent company and restructure their functions to fully meet the market's needs."

While constantly aware of the need to change, Kaku also recognizes the difficulties managers face in changing the very approaches and strategies that have led to past successes:

"In order for a company to survive forever, the company must have the courage to be able to deny at one point what it has been doing in the past; the biological concept of "ecdysis" - casting off the skin to emerge to new form. But it is difficult for human beings to deny and destruct what they have been building up. But if they cannot do that, it is certain that the firm can not survive forever. Speaking about myself, it is difficult to deny what I've done in the past. So when such time comes that I have to deny the past, I inevitably would have to step down."

Exhibit 1
Canon, Inc. - Ten-Year Financial Summary
(Millions of yen except par share amounts)

	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981
Net sales:										
Domestic ¥	508,747	413,854	348,462	290,382	274,174	272,966	240,656	198,577	168,178	144,898
Overseas	1,219,201	937,063	757,548	686,329	615,043	682,814	589,732	458,748	412,322	326,364
Total	1,727,948	1,350,917	1,106,010	976,711	889,217	955,780	830,388	657,325	580,500	471,262
Percentage to previous year	127.9%	122.1	113.2	109.8	93.0	115.1	126.3	113.2	123.2	112.5
Net income	61,408	38,293	37,100	13,244	10,728	37,056	35,029	28,420	22,358	16,216
Percentage to sales	3.6%	2.8	3.4	1.4	1.2	3.9	4.2	4.3	3.9	3.4
Advertising expense	72,234	54,394	41,509	38,280	37,362	50,080	51,318	41,902	37,532	23,555
Research and development	86,008	75,566	65,522	57,085	55,330	49,461	38,256	28,526	23,554	14,491
Depreciation	78,351	64,861	57,627	57,153	55,391	47,440	39,995	30,744	27,865	22,732
Capital expenditure	137,298	107,290	83,069	63,497	81,273	91,763	75,894	53,411	46,208	54,532
Long-term debt	262,886	277,556	206,083	222,784	166,722	134,366	99,490	60,636	53,210	39,301
Stockholders' equity	617,566	550,841	416,465	371,198	336,456	333,148	304,310	264,629	235,026	168,735
Total assets	1,827,945	1,636,380	1,299,843	1,133,881	1,009,504	1,001,044	916,651	731,642	606,101	505,169
Per share data:										
Net income:										
Common and common equivalent share	78.29	50.16	51.27	19.65	16.67	53.38	53.63	46.31	41.17	34.04
Assuming full dilution	78.12	49.31	51.26	19.64	16.67	53.25	53.37	45.02	38.89	33.35
Cash dividends declared	12.50	11.93	11.36	9.09	11.36	11.36	9.88	9.43	8.23	7.84
Stock price:										
High	1,940	2,040	1,536	1,282	1,109	1,364	1,336	1,294	934	1,248
Low	1,220	1,236	823	620	791	800	830	755	417	513
Average number of common and common equivalent shares in thousands	788,765	780,546	747,059	747,053	746,108	727,257	675,153	645,473	564,349	515,593
Number of employees	54,381	44,401	40,740	37,521	35,498	34,129	30,302	27,266	25,607	24,300
Average exchange rate (\$1 =)	143	129	127	143	167	235	239	238	248	222

Source: Canon 1990 Annual Report.

Exhibit 2
Canon - Sales by Product (Millions of Yen)

Year	Cameras	Copiers	Other Business Machines	Optical & Other Products	Total
1981	201,635	175,389	52,798	40,222	470,044
1982	224,619	242,161	67,815	45,905	580,500
1983	219,443	291,805	97,412	48,665	657,325
1984	226,645	349,986	180,661	73,096	830,388
1985	197,284	410,840	271,190	76,466	955,780
1986	159,106	368,558	290,630	70,923	889,217
1987	177,729	393,581	342,895	62,506	976,711
1988	159,151	436,924	434,634	75,301	1,106,010
1989	177,597	533,115	547,170	93,035	1,350,917
1990	250,494	686,077	676,095	115,282	1,727,948

Source: Canon Annual Report, 1981-1990

Exhibit 3
Office Size Distribution, Japan 1979

Copier Market Segment	Number of Office Workers	Number of Offices	Working Population
A	300+	200,000	9,300,000
B	100-299	30,000	4,800,000
C	30- 99	170,000	8,300,000
D	5- 29	1,820,000	15,400,000
E	1-4	4,110,000	8,700,000

Source: Breakthrough: The Development of the Canon Personal Copier, Teruo Yamanouchi, Long Range Planning, Vol. 22, October 1989, p. 4.

Exhibit 4
Canon's Major International Joint Ventures

CATEGORY	PARTNER	DESCRIPTION
Office Equipment	Eastman Kodak (U.S.)	Distributes Kodak medical equipment in Japan; exports copiers to Kodak
	CPF Germany	Equity participation in CPF which markets Canon copiers
	Olivetti (Italy) Lotte (Korea)	Joint venture for manufacture of copier
Computers	Hewlett-Packard (U.S.)	Receives OEM mini-computer from HP; supplies laser printer to HP
	Apple Computer (U.S.)	Distributes Apple computers in Japan; supplies laser printer to Apple
	Next, Inc. (U.S.)	Equity participation; Canon has marketing rights for Asia
Semiconductors	National Semiconductor (U.S.)	Joint development of MPU & software for Canon office equipment
	Intel (U.S.)	Joint development of LSI for Canon copier, manufactured by Intel
Telecommunications	Siemens (Germany)	Development of ISDN interface for Canon facsimile; Siemens supplies Canon with digital PBX
	DHL (U.S.)	Equity participation; Canon supplies terminals to DHL
Camera	Kinsei Seimitsu (Korea)	Canon licenses technology on 35 mm Camera
Other	ECD (U.S.)	Equity participation because Canon values its research on amorphous materials

Source: Canon Asia, Nomura Management School.

Canon Organization Chart

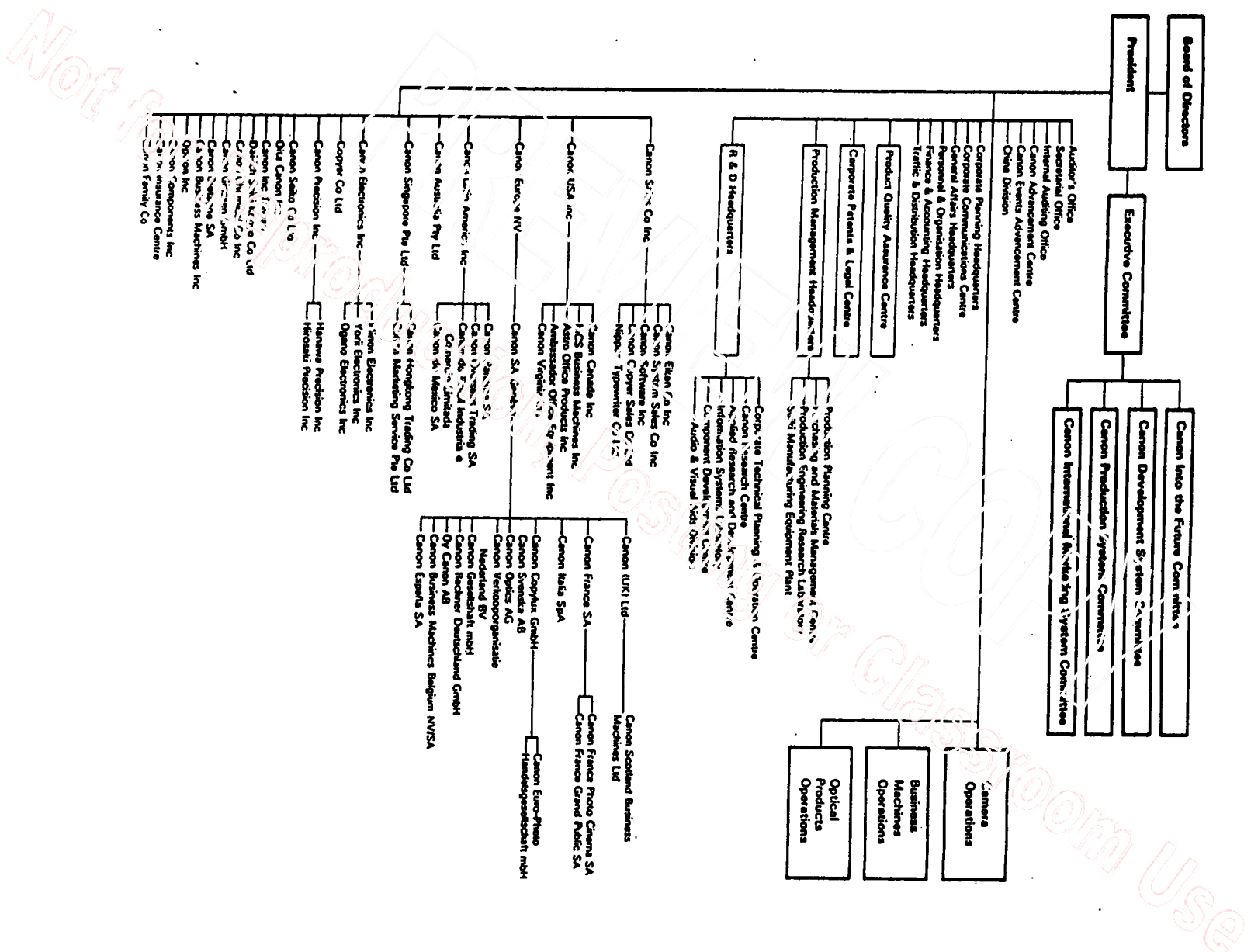
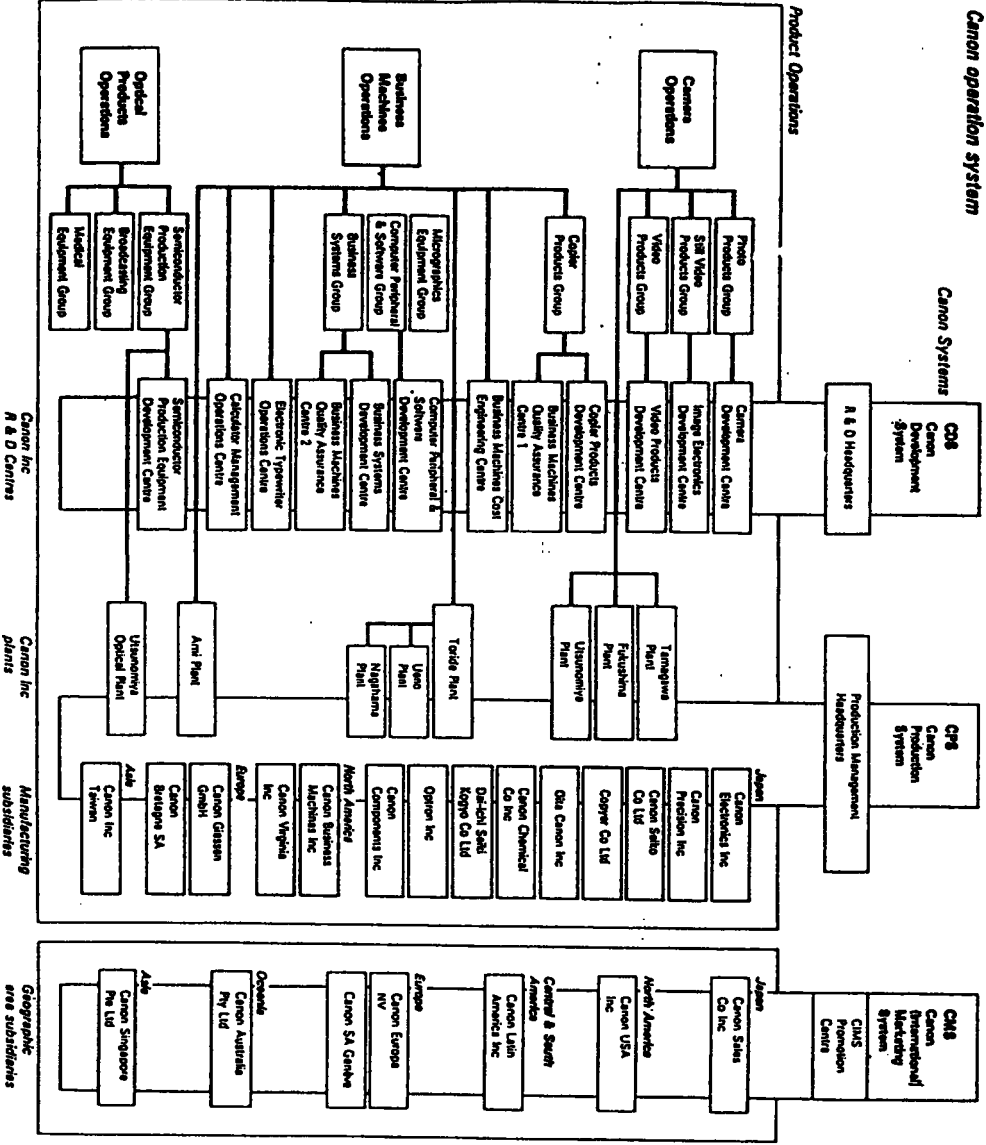


Exhibit 5 (Cont'd)



Source: Canon Handbook, published by Canon, Inc.