Graduate School of Business Administration, Keio University

Iwatsuki Plant, Fuji Xerox Co., Ltd.

—Investment Plan for Automation of Physical Distribution—

In the fall of 1984, Mr. Ishii (Head of the Iwatsuki plant and Director responsible for production), Mr. Moriyama (General Manager of the Manufacturing Department) and Mr. Hayakawa (Manager of the Parts Section) were discussing day after day in Mr. Ishii's office how physical distribution could be improved at the Iwatsuki plant. They were sure that the head office's Management Department would strongly recommend at a meeting to be held only in ten days that the plant include in its budget for the next fiscal year an investment plan for building a large automatic warehouse designed for parts storage. The three of them, however, believed that the advantages and disadvantages of large-scale automation needed to be discussed carefully.

Company History

History of Iwatsuki Plant

The Iwatsuki plant is located in Iwatsuki, Saitama, which is about 20 minutes east of Omiya. Ever since Fuji Xerox Co., Ltd. was founded in 1962, the plant has been contributing toward Fuji Xerox's development as part of the core of the company's producing division, along with the Ebina plant (located in Ebina, Kanagawa) and the Takematsu plant (located in Minami-Ashigara Gun, Kanagawa). (See Appendix 1.) The plant was initially established as Iwatsuki Koki Co., Ltd. and started manufacturing photography-related equipment in 1961, gradually increasing the proportion of copiers in its total production thereafter. In 1971, its name was changed to Fuji Xerox Iwatsuki Plant. In response to Fuji Xerox's reorganization of its divisions (based on product categories) early in 1983, it was renamed Iwatsuki Branch and became a main plant of Fuji Xerox's division that is engaged in the production of medium-and-large-sized copiers. In 1984, the Iwatsuki plant had a site area of about 56,000 m2, a work force of 1,200 and four buildings on the premises. The plant had been assembling copiers and processing on its own some of the copier parts used there (See Appendix 2 for its financial statements for recent five years. See Appendix 3 for the layout of the plant.) Its main

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This case study was written by Hirokazu Kono, Assistant Professor at Graduate School of Business Administration, Keio University, with the total cooperation of Fuji Xerox Co., Ltd. based on the data shown in Appendixes. This case is solely intended for classroom discussions, not for judging the suitability of the company's management philosophy or any of the decisions made by the persons concerned. Some of the names and figures given in this case are disguised. (Written in June 1991)

products included very large copiers capable of copying A0-size paper in its original size and medium-speed copiers capable of handling any size of paper between B5 and A3 at a speed of 15 to 20 pages per minute.

Plants of Fuji Xerox Co., Ltd.

In 1984, each of Fuji Xerox's plants was mainly producing the following products.

Ebina Plant: medium-and-high-speed copiers capable of copying 30 to 60 pages or more per minute and system products including printers, facsimiles and workstations.

Takematsu Plant: photosensitive materials (drums) used for copiers and supplies including toner (fine powder predominantly composed of iron and used to form printed images and characters).

As suggested above, only the Iwatsuki and Ebina plants had sections engaged in assembly. The Takematsu plant was supplying these plants and users with materials. In 1982, Fuji Xerox Co., Ltd. founded Suzuka Fuji Xerox Co., Ltd. (a wholly-owned subsidiary) in Suzuka, Mie, demonstrating its intention to start producing, within the Fuji Xerox group, printed circuit boards for system products, input/output units necessary for picture-information digitalization and other components. As far as physical distribution was concerned, the Ebina and Takematsu plants, which already had large automatic warehouses for parts storage, were ahead of the Iwatsuki plant. The Iwatsuki plant was the only plant that did not have any automatic warehouse for storing parts delivered from subcontract factories. This was one of the reasons why the investment plan for automation of physical distribution was drawn up. However, the automatic warehouses at the Ebina and Takematsu plants, despite the fact that they were only a few years old, could not, in terms of both software and hardware, keep up with (i) dramatic advances in the technology used for physical distribution equipment, (ii) design changes to products and (iii) introduction of new products. These warehouses had operation rates that were lower than those originally planned, and often needed the assistance of manual work. The lessons learned at these plants led the head office to seek ample capacity for both storage and sorting so that the Iwatsuki plant could have a fully automated warehouse requiring no manual work. Consequently, the investment plan involved a sum of money that was far larger than any other involved in the company's investment plans in the past.

Organization of Iwatsuki Plant

As shown in Appendix 4, the Iwatsuki plant was made up of two departments, namely, the Manufacturing Department and the Management Department. The Manufacturing Department had four producing sections, namely, the Second Assembly Section (2nd floor, Building L), which manufactured copiers on three assembly lines; the First Assembly Section (1st floor, Building L), which assembled assay products supplied to the three assembly lines (partly assembled parts units including paper trays and paper feed units); the System Assembly Section (1st floor, Building F), which assembled very large copiers; and the Machining Section (Building G), which processed (machined and applied paint to) various rolls used for copiers. All these sections were on normal day shift (from 8:30 a.m. to 5:00 p.m., an hour's lunch break included) and on a five-day week, with the exception of a part of the Machining Section.

Parts from subcontract factories outside the company were delivered to the parts delivery area on the first floor of Building L (See Appendix 3), where acceptance inspections and delivery confirmation (data entry into a computer and checking of incoming goods) were carried out. The parts were then sorted by the date of use and for each production line and kept in storage before being carried to each production line on the date of actual use. This series of operations was called "in-plant parts distribution."

Orders for parts were placed with subcontract factories based on monthly production schedules. Firm orders for a month's worth of parts were given one month before use. The parts scheduled to be used during the month after next were ordered in the form of tentative orders, which were changed to firm orders in one month's time. When the amount of tentatively ordered parts increased or decreased by 20% or more, delivery dates and prices were negotiated between subcontract factories and the Iwatsuki plant's Purchasing Section (the section responsible for placing orders). Deliveries within a given month were categorized on the basis of the size/weight of parts, productive capacity/location of subcontract factories, shipping costs and other factors into "daily (everyday), " "weekly (once or twice a week) " and "monthly (once a month)." One of these was specified every time an order was placed. However, the Iwatsuki plant did not have a well-established system for providing enough feedback on any delay in production so as to control deliveries in a flexible manner. Moreover, deliveries were usually made ahead of schedule. Consequently, assembly lines in Building L and elsewhere on the premises and the parts delivery area on the first floor of Building L were flooded with delivered parts, especially when production was suffering delays.

The Parts Section was in charge of parts distribution. About 50 workers working in several groups carried out operations such as delivery acceptance, acceptance inspections, temporary storage, unpacking (unpacking of the containers of delivered goods), sorting (by date and for each production line) and delivery of parts to the shop-floor (in-plant delivery). In addition, about 20 workers of subcontract factories were engaged in sorting and in-plant delivery under the Parts Section's direct supervision. The Parts Section had been a part of the Management Department until two years ago, but it was integrated into the Manufacturing Department at the strong request of Mr. Moriyama, General Manager of the Manufacturing Department, that the improvement of assembly sections needed to be carried out in parallel with that of in-plant parts distribution.

On the whole, the Iwatsuki plant had many employees with long service records, and personnel changes within the plant were rare. This led the employees to develop a strong sense of solidarity, which in many cases made it a time-consuming process for those transferred from other plants to adjust to their new workplace. As Appendix 4 shows, the plant did not have any upstream producing sections responsible for planning, designing and development. All these sections were at the Ebina plant at the time. Information on technical issues were exchanged through the Manufacturing Engineering Section, which was why the person in charge had to come to Iwatsuki from Ebina (a three hours' journey) in a great hurry when, for example, a design-related trouble caused assembly lines to stop.

Market Environment

Fuji Xerox had been sustaining its development by means of a strategy of selling "copying" itself (functions, print quality and customer service), not "copiers," ever since it was established. Its leasing of copiers to customers for a certain period (renting) therefore formed a higher proportion than its sales of copiers (outright sales).

Fuji Xerox had an overwhelmingly large share as far as its major users such as public agencies, companies and universities, which rely heavily on copiers, are concerned. (The number of pages copied by a major user per month ranges between several tens of thousands to several hundreds of thousands.) The company, however, had a lower share in the customer segment where the number of pages copied per month is about 1,000 or less. Additionally, it offered only a limited selection of

low-speed copiers intended for this customer segment.

In contrast, its rivals such as Rikoh and Canon offered a wide selection of medium- and low-speed copiers and were focusing more on increasing their outright sales. Although Fuji Xerox ranked first in Japan as far as sales proceeds from its copier business was concerned, it ranked third behind the two rivals above in terms of the number of copiers sold. These rival companies were seeking a larger market share by recommending major users to purchase additional copiers. On the whole, market competition was excessive and threatening to escalate into a price-cutting war that could result in reductions in unit prices (per-page prices of copying), which provided the biggest source of income to Fuji Xerox. On top of this, rapid advances were being made in information technology (digitalization in particular). Establishing dominance in the field of "system products" such as workstations, printers and facsimiles, which process images digitally, was a major challenge in terms of both technology and marketing.

System products were different from copiers in their structure and composition of parts. Although normal printers and facsimiles were only a bit smaller than copiers, they consisted of half the number of parts or fewer in comparison with copiers. This was made possible by integrating important functional parts into several printed circuit boards. Moreover, since other parts including those related to input/output were integrated into units, less than ten of the total 200 - 300 parts usually accounted for over 70% of their purchase prices. Therefore, the number of parts requiring strict quality and cost control was considered nearly one fifth in comparison to copiers.

In 1975, Fuji Xerox released, in advance of its rivals, the facsimile, which it developed by applying the image-scanning and printing technologies used for copiers, but the product did not generate expected sales because the market was not perfectly ready yet. Ironically, home electrical products manufacturers such as Matsushita Electric Industrial and Toshiba and Fuji Xerox's rival companies such as Ricoh and Canon turned out to be the ones that were offering a wider selection in response to recent growth in demand for facsimiles. With respect to workstations, "XINS (Xerox Information Network System)," which was developed by the US Xerox Corp., put the company far ahead of others in terms of functions, but the workstation and the functions it offered were not in popular demand yet. The sections responsible for planning, developing and designing these system products were located inside the Ebina plant. In addition, almost all products were manufactured in

Ebina, with the exception of some printers manufactured in Iwatsuki.

Improvement of the Shop-Floor and Physical Distribution

Problems of the Shop-Floor

Fuji Xerox, which had achieved outstanding success in its QC (Quality Control) activities, was awarded the Deming prize in 1980. This gave the company the impetus to pursue various shop-floor improvement activities aimed at making operations faster, easier and safer by applying the techniques and ideas of IE (Industrial Engineering).

At first, the activities directed toward improving the shop-floor were carried out primarily for the assembly lines of the Second Assembly Section (2nd floor, Building L) and the sub-assembly process of the First Assembly Section (1st floor, Building L). The assembly lines of the Second Assembly Section, where parts were assembled by hand, comprised some 60 stages on average (there were minor variations in the number of stages performed on each assembly line depending on the type of product). Each of the assembly lines had a daily output of several hundred copiers (normal working hours per day: seven hours and 15 minutes). The number of parts required for a medium- or small-sized copier was between 500 and 600 on average (the actual number varied depending on the type of product and how to distinguish between parts manufactured inside the company and those manufactured outside the company). Therefore, about ten parts were assembled in one assembly stage.

The sub-assembly process, which was the other target of the above activities, had two types of work area. In the former, workers were individually producing sub-assay products. In the latter, workers were assembling parts in groups using machinery arranged to look like assembly lines. In 1981, the operating efficiency of these work areas was not high at any rate. In addition to workers' waiting time, an obvious waste caused by shortages of parts and imbalance between assembly lines, much time was wasted in work areas by workers' body movements that did not add any value to products (for example, walking, turning around and passing parts or tools from one hand to the other). Moreover, there were many other problems (long distances between work areas and the parts supply point, stoppages of operations during removal of empty parts boxes, etc.). The Parts Section was supposed to be in charge of supplying parts to the shop-floor, but, since the plant did not have a well-established system for providing enough feedback on any delay in production so as to control deliv-

eries in a flexible manner, excessive amounts of parts supplied to the shop-floor sometimes formed piles that were taller than workers when production was behind schedule. Consequently, the right parts could not be found easily, and parts were stocked in an ill-balanced manner. Assembly lines stopped because the shop-floor was overstocked with one type of parts and short on another at the same time. This caused the supply of parts to outpace production, increasing the total amount of parts in stock. The shop-floor was caught up in this vicious circle.

Progress of Improvement in Workability

After IE activities were started at the end of 1981, the working conditions of the shop-floor gradually improved. In the six months following the start of the activities, the plant implemented various plans to improve the layout of each work area, the balance between assembly lines, tools and assembly procedures. In another six-month period, the number of man-hours was reduced by nearly 10%. Additionally, the shop-floor began to have a general atmosphere of support for improvement. The goal of "making the shop-floor a tidier place with more space" caused the need to reduce parts in stock to be felt more strongly. Thereafter, nothing but necessary parts supplied at the right time were placed at the sides of assembly lines. The shop-floor became more neatly organized. This resulted in the Parts Section being required to supply "necessary parts as much as necessary when necessary." Some of the parts were returned to the Parts Section if their arrival was untimely.

Meanwhile, deliveries from subcontract factories to the Iwatsuki plant were still classified into the same categories ("daily," "weekly" and "monthly"). The number of deliveries made ahead of schedule remained the same. The amount of delivered parts (the number of delivered containers) varied widely (with the maximum being twice as much as the minimum) depending on the day of the week and time (before or after noon). (See Appendix 5.) Under these circumstances, in-plant deliveries to the shop-floor were strictly controlled without any action being taken to change how deliveries from subcontract factories were made. Unnecessary parts that used to be left on the shop-floor were moved to the Parts Section. Consequently, the strain was shifted to the Parts Section. Mr. Moriyama, General Manager of the Manufacturing Department, had a clear policy on this issue. He believed that improving downstream processes first (by making the work flow in these processes smoother and by reducing unnecessary parts in stock) would in turn make it possible to improve upstream processes according to the requirements of the improved downstream processes. He thought that repeating this process was essential in improving the series of processes as a whole. He further

assumed that improving manufacturing sections would lead to reductions in the amount of unnecessary parts left on the production lines, making the shop-floor a tidier place with more space. He anticipated that this would naturally influence upstream processes. The next step he was planning to make was improvement of the Parts Section (positioned upstream of manufacturing sections), which he expected would give an impact to subcontract factories. He considered that transferring oversupplied parts in the Iwatsuki plant back to the subcontract factories would in the end make all the persons concerned strongly feel the need to establish a system for providing feedback on the progress of production to the timing of parts deliveries. He supposed that this system would finally connect subcontract factories and the shop-floor in such an efficient manner that would shorten lead times and reduce the amount of parts in stock. From this viewpoint, he decided to move the Parts Section from the Management Department to the Manufacturing Department so that he himself could lead the process of improving the Parts Section.

Progress of Physical Distribution Improvement

Immediately after the move of the Parts Section to the Manufacturing Department, IE activities directed toward improving in-plant parts delivery were carried out under the leadership of Mr. Moriyama (almost one year behind manufacturing sections). The Parts Section, however, did not have a well-defined yardstick since its operations involved acceptance of parts (checking of incoming goods), delivery inspections, storage of parts and delivery of parts to the shop-floor, which were essentially different from those repetitive operations performed by the workers of assembly sections. (In the case of assembly sections, "reduction in the number of man-hours" provided a yardstick.) Moreover, the Parts Section had to perform many wasteful operations. A case where the shop-floor needed 80 of 160 pieces that arrived in three 50-piece containers and one 10-piece container would provide a good example.

In this case, 30 pieces in one of the 50-piece containers went to the shop-floor, but the remaining 20 pieces stayed in the container. After 80 pieces were delivered to the shop-floor, 20, 50 and 10 pieces were left in the remaining three containers, respectively. These irregularities in the number of remaining parts often made it necessary to check which parts box contained how many. Keeping track of the number of remaining parts was one of the factors behind inefficiency. Another was unpacking. Many parts were over-packaged. For example, parts wrapped in newspaper were packed in plastic bags and then bound up into bundles of several pieces using gummed tape. Unwrapping

packages and taking out parts from them required many man-hours. To remedy the situation, a down-to-earth approach, which would allow assembly-line workers and other employees to list up problems so that they could deal with them one by one, was adopted. The primary goal of this approach was to make operations easier and to cut down wasteful operations that was not adding any value to products. Six months later, activities directed toward remedying the situation gradually began to produce results. Activities that started to show favorable results by the middle of 1983 (about one year later) are as follows:

◇Simplification and reduction of acceptance inspections

◇Rearrangement and integration of a large number of forms that had been used in the Parts Section

◇Reduction of physical labor (carrying heavy parts boxes etc.)

◇Improvement of the style of packing (to simplify unpacking procedures required for over-packaged parts)

◇Simplification of procedures required to keep track of the number of remaining parts (reduction of discrepancies between the number of parts left in containers and the size of lots required by the shop-floor)

◇Improvement of the layout of work areas (to draw clear distinctions between the parts storage area and other areas including the sorting area)

An increasing number of Parts Section employees started to enjoy their involvement in the activities.

Two Investment Plans

Small-Scale Investment Plan

Mr. Hayakawa, Parts Section Manager, considered the progress of the above activities favorable. He, however, was at the same time apprehensive that the pace of shop-floor improvement might be too quick for his section to catch up with and that resultant strains might affect his section negatively. This was why he organized a project team, which was made up of roughly ten members. With the view of supplying the shop-floor with necessary parts in a timely manner while lightening physical labor at the same time, the project team started to prepare a plan to improve the general layout of the work area on the first floor of Building L. The members included two employees from assembly sections, one from the Information System Section (this section belonged to the head office, but some of its employees were stationed at the Ebina plant) and one from the Purchasing Section. The project team worked hard to arrange the details of the plan in its effort to carry out the intentions of

Mr. Moriyama (Manufacturing Department General Manager) and Mr. Hayakawa (Parts Section Manager). The plan did not aim to automate physical distribution sections in one stroke. The members rather opted to improve workability first by lessening physical labor and by reducing unnecessary movements (walking etc.) and to consider automating various aspects of operations in the next step.

They therefore decided to make operations easier by sliding parts boxes along a large number of conveyors. Another important feature of the plan was its classification of operations into two categories, namely, operations that the Parts Section had to carry out under any circumstances (basic operations) and operations that did not add any value to products. The latter included unpacking, inspections and adjusting of the number of remaining parts. It seemed difficult to eliminate these operations in one stroke, but the team members thought that improvements in the style of packing and quality would eventually enable them to do so in the future. This was why they made a distinction between the areas used for these operations and those used for basic operations. They marked clearly on their layout drawings which areas would be eliminated through further improvements. With this goal in mind, they completed Investment Plan No. 1 (shown in Appendix 6) in the summer of 1984. The plan, which did not aim to achieve a major breakthrough, employed some measures to cut down costs as far as possible (for example, utilization of idle conveyors and, where possible, utilization of self-made facilities). The total amount to be invested was estimated at nearly 100 million yen. The plan was expected to have the effect of cutting the plant's workforce by 20 jobs and realizing a space saving of 1,000 m2 (equivalent to about 100 million yen per year in total).

Large-Scale Investment Plan

The head office was naturally pleased to have heard that IE activities, which were started at the Iwatsuki plant immediately after it won the Deming prize, resulted in the workability of the plant's manufacturing sections being improved and physical distribution sections being closely involved in the activities. By this time, however, the cost of physical distribution was beginning to add up to a higher level at each plant. The head office's Management Department was therefore considering to step up the activities at the Iwatsuki plant substantially so that the productivity of the personnel engaged in physical distribution operations as well as productivity per unit area could be enhanced. The Iwatsuki plant had two warehouses nearby under lease. The rent for these warehouses and the expenses required for trucking parts to the plant had been increasing at a rate of roughly 15% per

year owing to a steep rise in both land prices and labor costs. The above-mentioned activities, however, were not likely to relieve this situation any time soon. In view of this situation and the fact that the Ebina and Takamatsu plants already had automatic warehouses for parts storage, the head office concluded that the Iwatsuki plant needed to have a "parts supply center" in the near future so that all the functions of the two warehouses under lease could be integrated into this on-the-premises center. The head office was planning to secure enough space by tearing down the cafeteria and part of Building L. (See the layout drawing provided in Appendix 3. The area outlined by a dotted line shows the location of the parts supply center.) The parts supply center was an automatic warehouse capable of accommodating a much larger amount of parts (See the illustration provided in Appendix 7.). The amount to be invested was estimated at 1.4 billion yen (including the cost of construction). This investment plan was expected to have the effect of cutting the plant's workforce by 60 jobs and eliminating the need to pay the rent for leased warehouses (approximately 130 million yen). The total effect of this investment plan was estimated to be equal to 400 million yen per year. This investment plan was formed by the head office's Management Department and Iwatsuki plant's Management Department under the supervision of the head office's Executive Director responsible for production (Mr. Ishii's superior). In addition, the plan was ready to be included in the following fiscal year's budget since the approval of the Accounting Department and the Executive Director had already been obtained.

Comparison of Profitability

Mr. Ishii, Head of the Iwatsuki plant, thought that a comparison between the small-scale investment plan for improvement (Investment Plan No. 1) and the large-scale investment plan for automation (Investment Plan No. 2) was necessary to determine which of the two was more profitable to the company. He therefore ordered his subordinates to calculate how much of the invested amounts were going to remain unsettled every year (i.e. to calculate year-end net final worth for each year) using the payback method, a method widely used to assess the profitability of plant investment plans (capital interest rate: 10%). (The higher the net final worth, the more profitable the investment plan is. The time it takes for this value to turn positive from negative is equal to the payback period of the investment plan in question.) As shown in Appendix 8, Investment Plan No. 1 had a shorter payback period, but Investment Plan No. 2 was more profitable after the sixth year. In other words, Investment Plan No. 2 was more profitable than Investment Plan No. 1 in the long run. Another factor that needed to be taken into account was the fact that the copier business was following a general trend

toward a wider variety of products. Accordingly, the Iwatsuki plant was considering having its fourth production line. However, this "multi-product production," which would increase the variety of parts, was sure to increase the total amount of parts distributed inside the plant. It was feared that Investment Plan No. 1 might soon reach its limit in terms of handling capacity under such conditions. Although Investment Plan No. 2 involved a certain degree of risk in this regard, the parts supply center designed under this plan was going to more than double the current capacity (Appendix 9 shows changes in the number of parts items and that of containers in recent five years). Mr. Ishii (Head of the branch) was painfully aware of the positions of Mr. Moriyama (General Manager of the Manufacturing Department) and Mr. Hayakawa (Manager of the Parts Section), but could not totally disregard the economic appeal of Investment Plan No. 2.

Opinions of Project Members

The project menders, who took more than one year to complete Investment Plan No. 1, were feeling a special affinity for their own plan. It was therefore only natural that every member supported Investment Plan No. 1.

Mr. Tsujikawa (First Assembly Section)

"Although we have already achieved some favorable results, our activities to improve the shop-floor have just been started. The recent trend toward increasing the variety of products will require us to consider what we can do to manufacture different types of product on the same assembly line and to automate assembly processes, among other things. What is expected of in-plant physical distribution will change accordingly. Making a large investment in physical distribution sections will, before anything else, determine the amount of parts supplied from those sections to us, assembly sections. I think that the order is reverse here."

Mr. Sugimoto (responsible for information system operation)

"I do not think that our information system is ready for the introduction of a new automatic warehouse. Even now, I am having a difficult time keeping up with all the changes concerning which part is used in which process when assembly procedures are changed owing to improvements carried out on the shop-floor. When a new product is about to be launched, a lot of changes are added to product design and assembly procedures, causing communication mix-ups about the destinations of parts. It is not too much to say that what is in the memory of workers in charge of delivering parts to the

shop-floor is most trustworthy. If our parts distribution information system is automated under the present circumstances, we will be more confused."

Mr. Tamura (Parts Section)

"It is easy to talk about 'personnel reduction,' but I think that we need to think about how the people at our subcontract factories, who have been assisting us for a long time, will be affected. They have a large amount of know-how in parts distribution. I believe this will be a valuable help when we start improving the System Assembly Section and the Machining Section in the future. I think their know-how is something that cannot be replaced by money."

Mr. Takamatsu (Parts Section)

"Investment Plan No. 2 (large-scale plan) is supposed to make it possible for us to handle more than double the current amount of parts, but I think that we need to be more cautious in planning for an increase in the amount of parts distributed at our plant. If the number of parts items will increase by 50%, our distribution workload, which include sorting, will be doubled. We should assume that adding just one more production line to the existing three will increase our distribution workload by at least 50%. Under the present circumstances, we should attain a higher level of workability by introducing small-scale improvements repeatedly so that we can cope with changes that will take place in the future in a flexible manner."

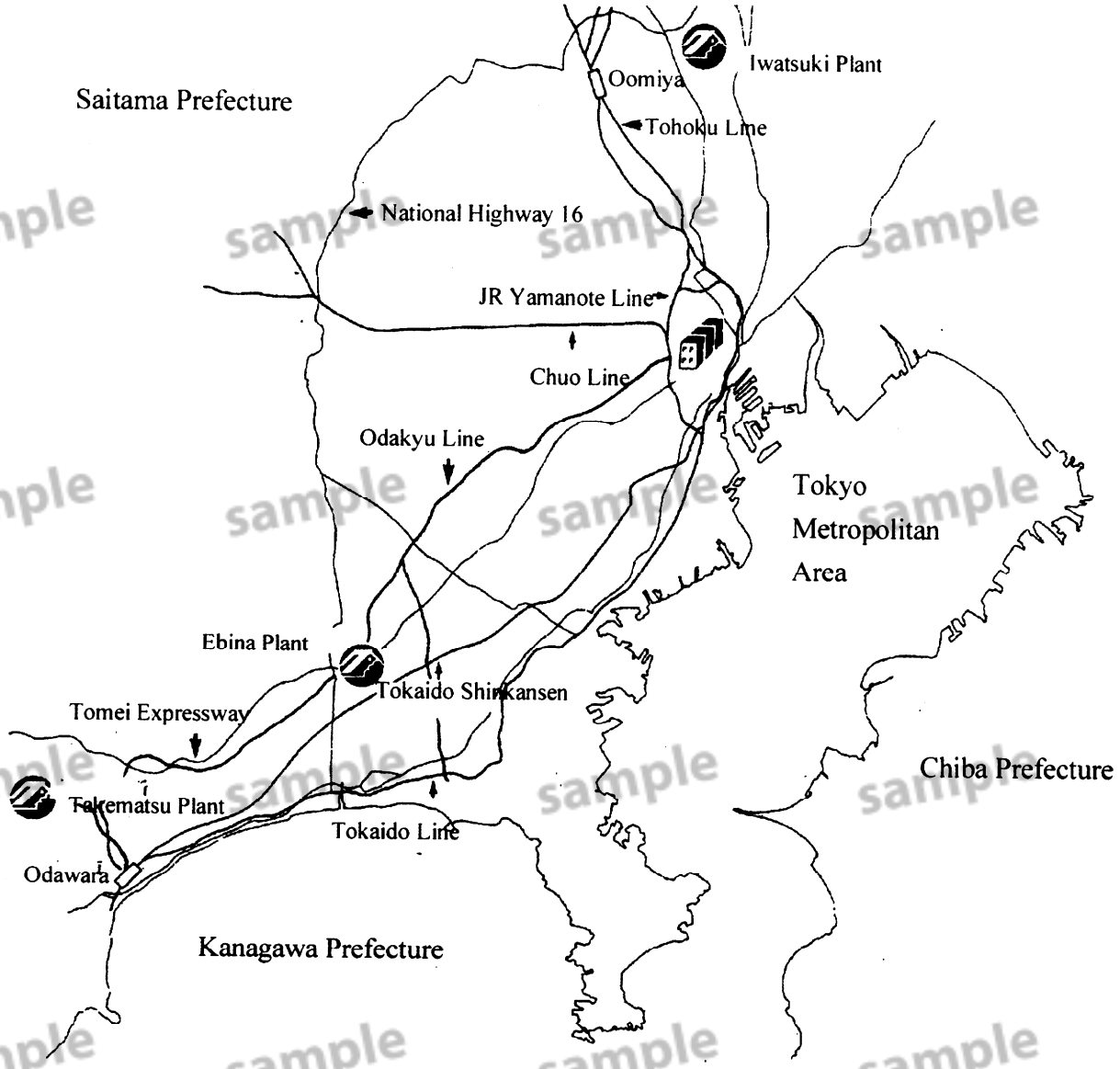
Mr. Hayakawa (project leader/Parts Section Manager) talked to them everyday, and agreed entirely with their opinions. He strongly objected to anything that might dampen their enthusiasm. There was no doubt that adopting Investment Plan No. 1 would provide a significant boost to their activities directed toward improving physical distribution. However, he was also aware that persistently objecting to the investment plan for automation was not appropriate because reduction of physical distribution costs was a task requiring the cooperation of every member of the company. He and Mr. Moriyama (General Manager of the Manufacturing Department) had recognized that they needed a logical basis for their opinions on how to improve physical distribution if they were to persuade people of the head office. Repeating phrases such as "an atmosphere of support for improvement" and "motivation of project members" was not enough to dissuade the head office from adopting Investment Plan No. 2. Even under Investment Plan No. 1, these phrases were not very likely to provide any meaningful support in trying to lead the improvement activities out of a possible im-

passe.

Meeting with Head Office's Management Department

More than one month had passed since the two plans were completed. The budget deadline was drawing near. All of the head office members who prepared Investment Plan No. 2 (including the Executive Director) were scheduled to attend the meeting to be held in ten days. It was certain that they would strongly recommend Investment Plan No. 2, which was more economically attractive. Faced with a difficult task of choosing between Plan No. 1 (plan that would stimulate improvement) and Investment Plan No. 2 (economically attractive plan), Mr. Ishii, Mr. Moriyama and Mr. Hayakawa were contemplating the future of the Iwatsuki plant.

Appendix 1: Fuji Xerox Plants



Appendix 2 : Financial Data (from 1980 to 1984)

PROFIT AND LOSS

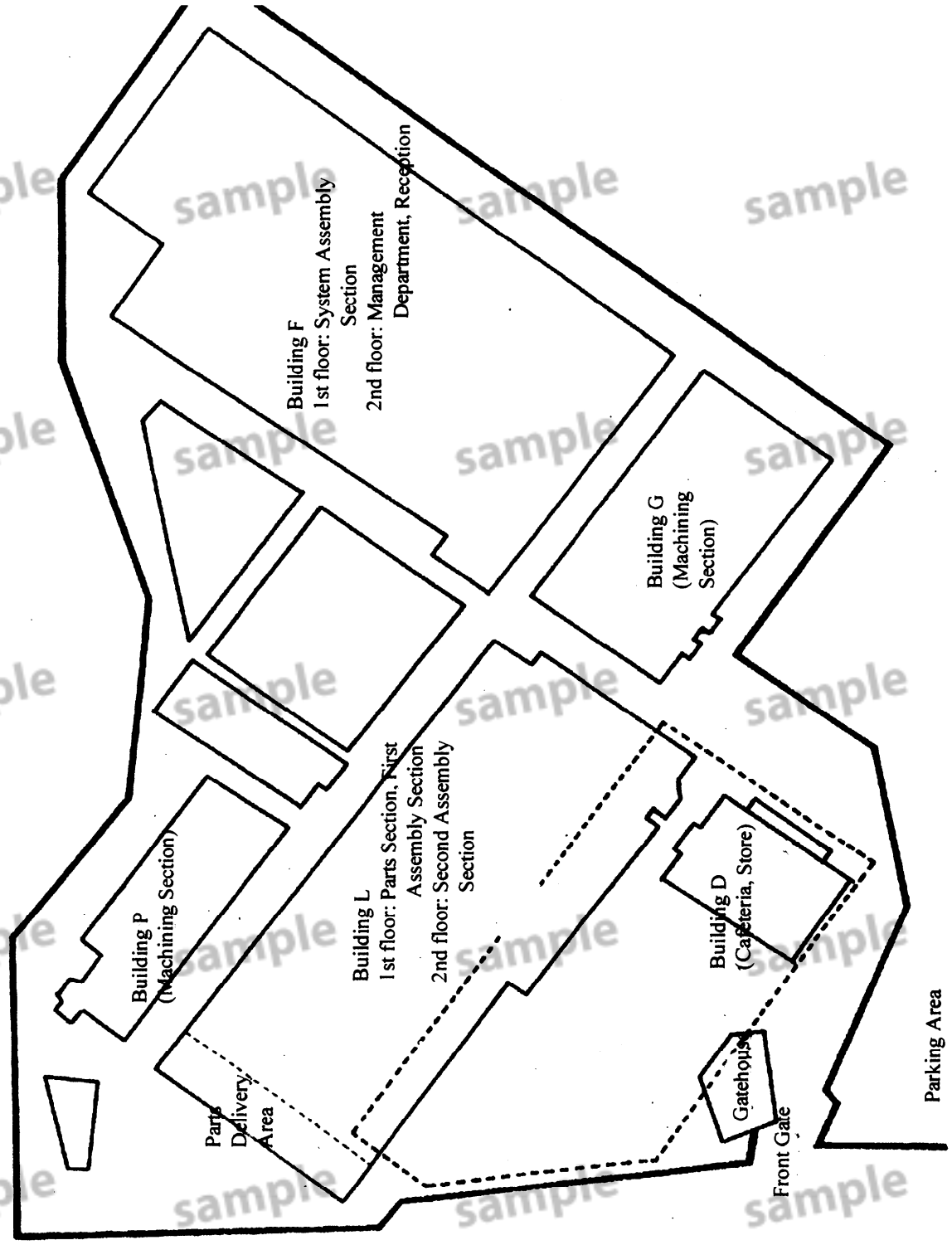
	1980	1981	1982	1983	1984
Sales	159,341	190,154	231,232	248,928	285,923
Cost of Sales	69,326	87,809	105,267	110,026	130,206
Selling, General and Administrative Expenses	71,188	79,062	91,534	108,876	122,677
Operating Income	18,827	23,283	34,430	30,025	33,039
Non-operating Income and Loss	△ 1,223	△ 2,639	△ 7,254	△ 2,603	△ 1,616
Ordinary Income	17,604	20,644	27,175	27,422	31,423
Extraordinary Expenses	500	453	——	——	——
Curent Income before Taxes	18,104	21,097	27,175	27,422	31,423
Provision for Income Taxes	10,020	12,770	16,490	14,800	17,873
Curent Income	8,084	8,327	10,685	12,622	13,550

BLANCE SHEET

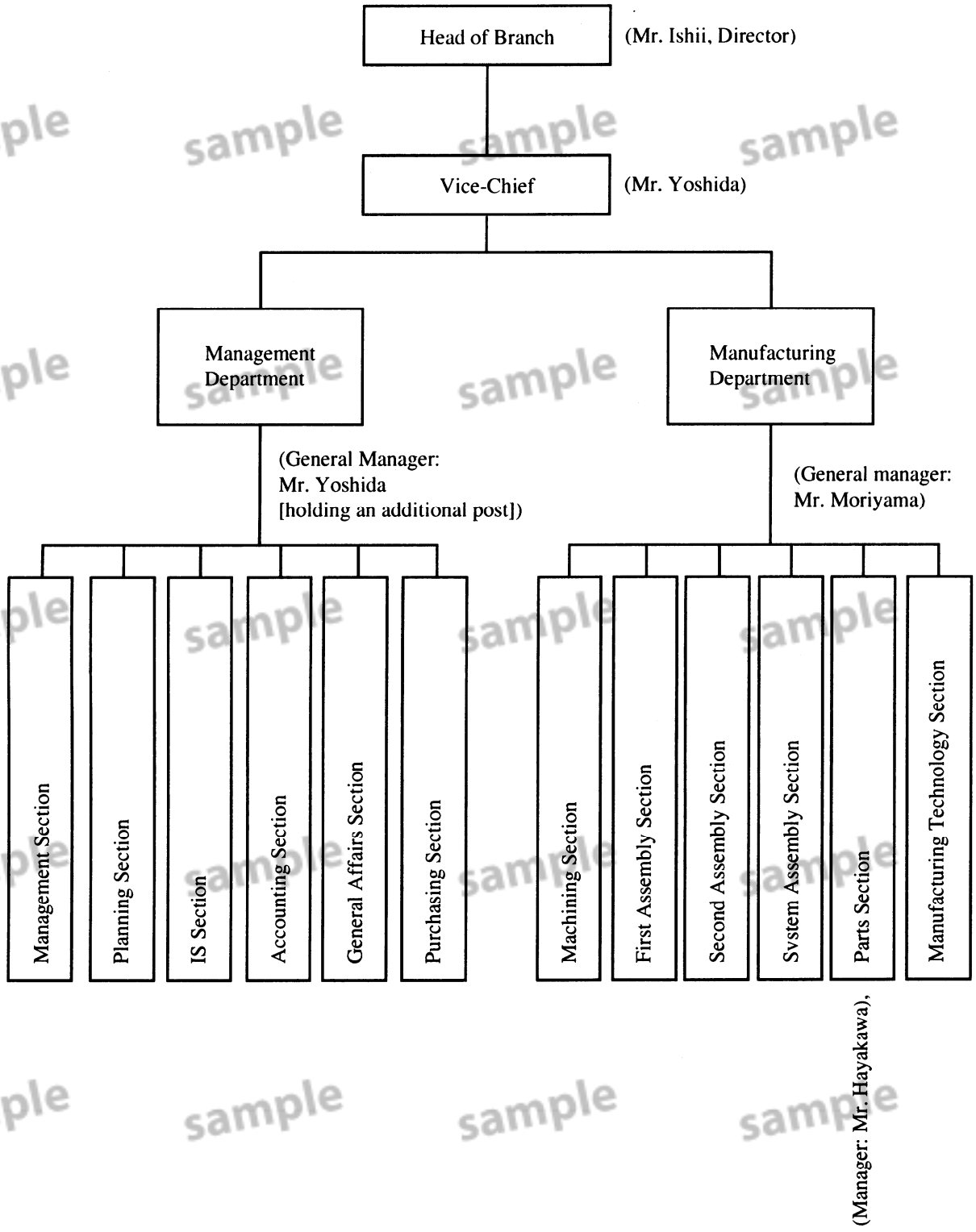
	1980	1981	1982	1983	1984
ASSETS					
Current Assets	70,211	94,485	116,806	118,968	142,898
Fixed Assets	75,405	84,048	92,004	103,843	110,262
Tangible Fixed Assets	67.067	74.443	78.491	88.013	89.660
Intangible Fixed Assets	298	369	379	563	593
Investments and Other Assets	8,040	9,236	13,132	15,267	20,008
Total Assets	145,616	178,533	208,810	222,812	253,160
LIABILITIES					
Current Liabilities	75,854	95,231	113,888	116,694	132,808
Fixed Liabilities	20,557	28,301	31,319	32,002	34,836
Allowance for Special Purposes	998	543	——	——	——
Total Liabilities	97,400	124,075	145,208	148,697	167,644
SHAREHOLDER'S EQUITY					
Capital Stock	10,000	10,000	10,000	10,000	10,000
Legal Reserve	1,758	1,958	2,158	2,358	2,500
Surplus	36,458	42,500	51,444	61,756	73,015
Total Shareholder's Equity	48,216	54,458	63,602	74,114	85,515
Total Liabilities and Shareholder's Equity	145,616	178,533	208,810	222,812	253,160

Note 1: (PROFIT AND LOSS STATEMENT) Based on data between Oct. 21 (of the year before) and Oct. 20. (Unit: million yen)
Note 2: (BALANCE SHEET) Based on data as of Oct. 20. (Unit: million yen)

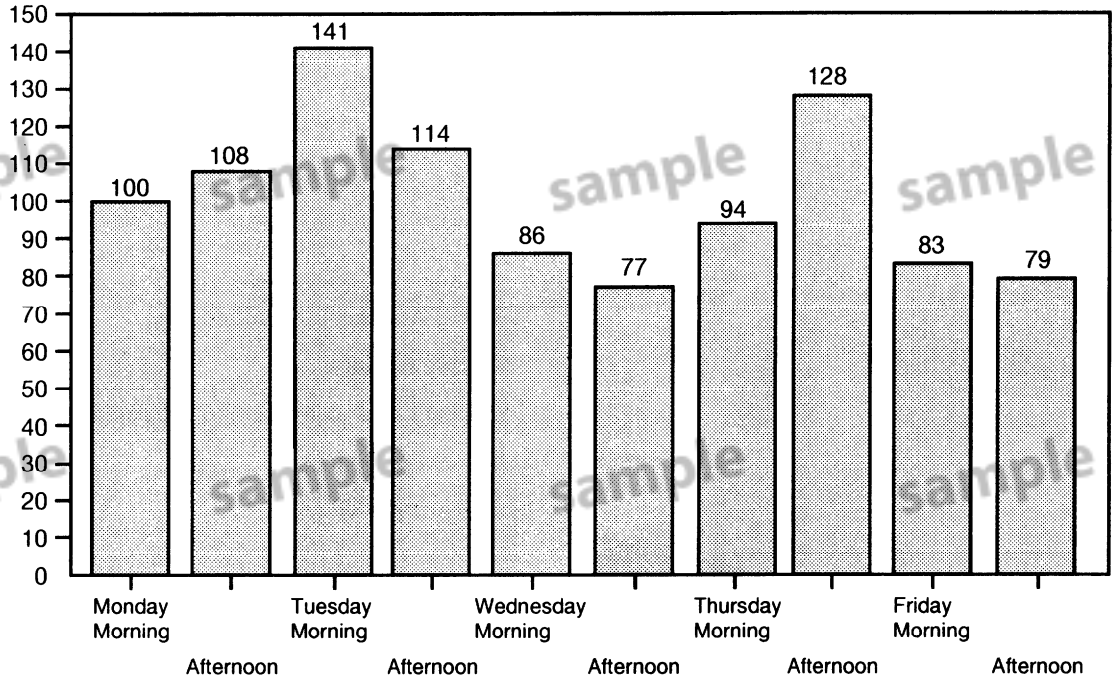
Appendix 3 : Layout of Iwatsuki Plant



Appendix 4 : Organization Chart of Iwatsuki Branch

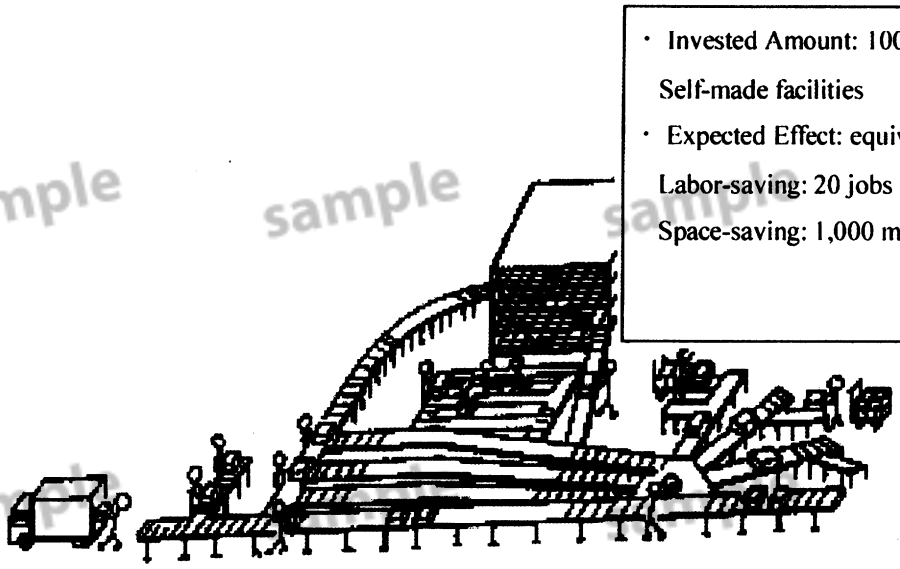


Appendix 5 : Changes in the Amount of Delivered Parts By Day of Week



(Monday morning=100)

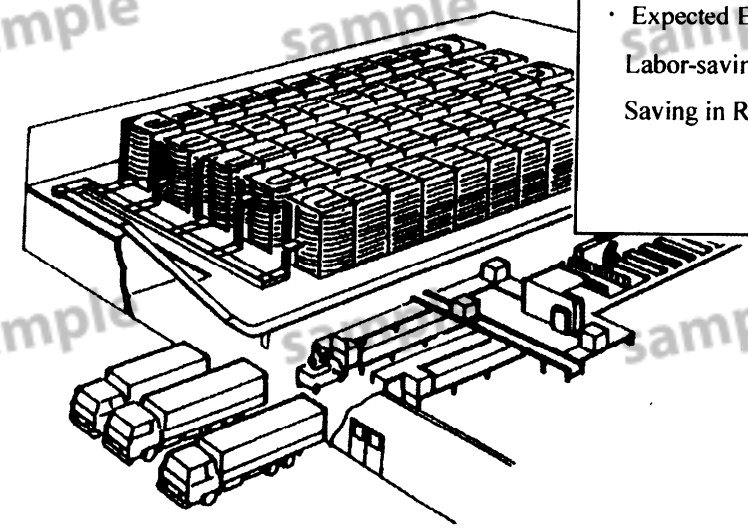
Appendix 6 : Investment Plan No. 1 (Small-Scale Investment Plan)



- Invested Amount: 100 million yen
  Self-made facilities
- Expected Effect: equivalent to 100 million yen
  Labor-saving: 20 jobs
  Space-saving: 1,000 m^2

Appendix 7 : Investment Plan No. 2

(Large-Scale Investment Plan for Automation)



- Invested Amount: 1.4 billion yen

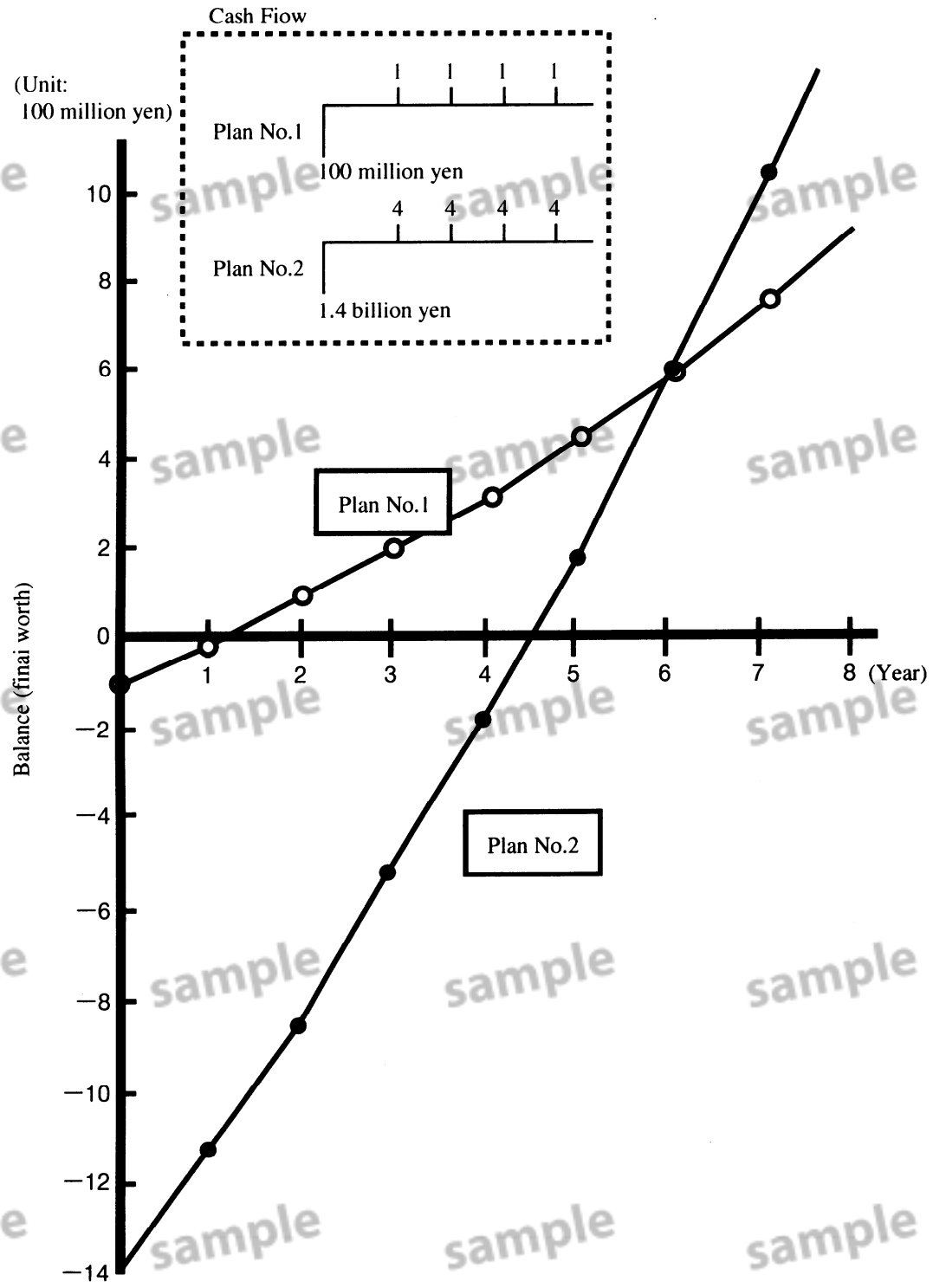
  Building: 7,000 m^2, board-lined ALC, 10 m high, fully automatic warehouse

- Expected Effect: equivalent to 400 million yen

  Labor-saving: 60 jobs

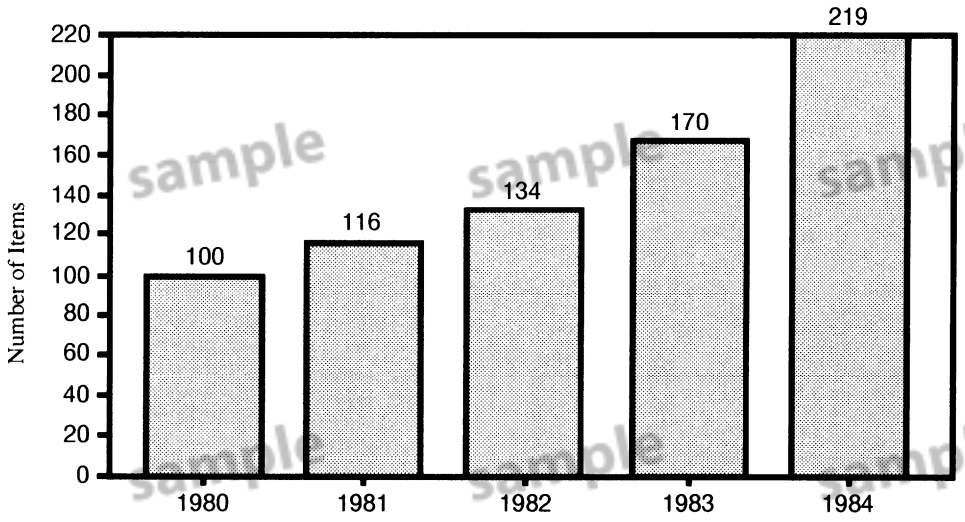
  Saving in Rent for Leased Warehouses: 130 million yen

Appendix 8 : Cash Flows and Cost Effectiveness of Plan No. 1 and Plan No. 2

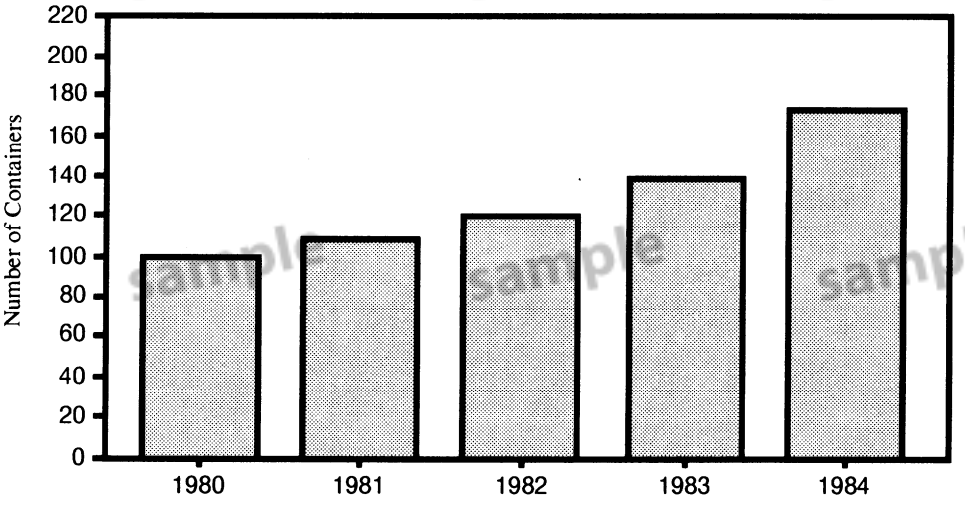


Appendix 9: Changes in Distributed Amount in Recent Five Years

(1) Chaanges in the number of items



(2) Chaanges in the number of containers



(Average in 1980=100 in both cases)