Sharp Corporation
It has already been five years since the need for and superiority of supply chain management was debated on in the manufacturing/distribution sector. During this period, we saw the rapid popularization of the Internet. In this regard, a large number of companies have begun discussing how to develop and introduce business models via the Internet, while drawing up plans and deploying supply chain management, which is tailored to each company’s features or strategies, according to a wide variety of definitions and in diverse forms as a “corporate system”.

What serves as the nucleus of such a corporate system can safely be said to be the business model itself and the information system that underpins it. As the Internet spreads and the industrial structure changes due in part to deregulation, the business environment surrounding corporations has been changing drastically. Under such circumstances, it goes without saying that creation of a new profit-earning business model and its introduction to enhance corporate value are required.

Meanwhile, when these activities are viewed from the viewpoint of the information system, they can be paraphrased as the mechanisms that control corporate activities in an optimal manner while keeping information under control.

In actuality, however, in corporate Japan, which has been built up by an extremely sophisticated human network, it has proven to be more difficult to introduce the corporate system and the information system than expected. Thus, in recent years, wariness of efforts to wrestle with supply management has been growing in Japanese corporations.

With this as the backdrop, in this issue of IT@next, we are going to focus on the IC Division of Sharp Corp. (hereafter referred to as Sharp) in our case study. Sharp declared to establish a customer-driven business model as its business strategy and has succeeded in building it as a corporate system despite its extremely complex mode of business that deals with the fabrication of semiconductors. We are going to look into its approach in introducing a corporate system and how the ideal state of the information system as a corporate system should be.

### Sharp Corporation.
#### Company Profile

Sharp develops and manufactures products, such as liquid crystal color televisions, i.e., the “AQUOS” series, or mobile information terminals, i.e., personal digital assistant “Mi-EI,” and devices, such as liquid crystal, IC or electronic parts. It is a general electronics company that aims at becoming “the only one company that creates people’s lives in the 21st century through electronics technology” by returning to the starting point - the firm’s management philosophy “sincerity and creativity.”

As its basic business strategy, Sharp has declared that it will reach the summit of manufacturing by returning to the starting point as a manufacturer.

“I believe that returning to the starting point as a manufacturer to reach the summit of manufacturing is how Japan’s electronics industry should be in the 21st century. Moreover, Japan should continue aiming at being a technologically self-sufficient nation that is based upon manufacturing in the 21st century as well. By doing so, production would be encouraged to return to Japan and a Japan-based upon manufacturing would be restored. Needless to say, I am not saying that Japan should make everything, but those that can only be made in Japan or by our firm have to be entirely done in the nation - from development to production.”

This remark was made as its management policy for fiscal year 2001 by Sharp President Katsuhiro Machida (source: Sharp Corp.’s Web site: http://www.sharp.co.jp). President Machida also commented: “Thanks to the progress of electronics technology, the number of parts has declined, and the manufacturing process has been simplified; thus, the serious problem associated with high personnel expenditure typical of the nation’s manufacturing sector has been solved. With Japan’s innate strong production technology and the use of information technology (IT) or the introduction of supply chain management, I believe that there will be a resurgence of a strong manufacturing sector in Japan.”

Under such management policy, Sharp has developed a wide variety of strategies. In this issue, we are going to cover the IC Division, one of the divisions comprising the Device Business Division that serves as the nucleus in carrying out the strategies.

In the midst of increasingly intensifying competition, the Device Business Division accounts for roughly 40 percent of Sharp’s entire business activities. Given this, it is an urgent task to step up its development and production ability even further in order to expand the firm’s business. Against such a backdrop, Sharp began wrestling with a supply chain management project that we are going to cover in this story.

### Business data

**Device Business Division**

Sales: 729,006 million yen
(source: The 107th consolidated sales by the department for 2000)

1) Liquid Crystal Division
2) IC Division
3) Electronic Parts Division
The LSI – the flagship product of Sharp’s Device Business Division – can be positioned as a product in which the firm’s development and production ability is put to the test. By merely extending one’s traditional way of thinking, however, it would be difficult to expand business in actuality. In reference to the basic strategy of the division, Terumasa Yoneda, Corporate Senior Executive Director And Group General Manager of Integrated Circuits Group, said as follows:

“Unlike the times in which sales kept increasing, nowadays, if we just manufacture devices, they won’t sell. Under such circumstances, in order to realize a strong manufacturing industry, it is necessary to strengthen the development or production ability not in individual areas, such as the device, but in a comprehensive area, including merchandise. In our image, a manufacturer should understand the heart of its products before delivering the device to a customer. What I am saying is that we aim at becoming such a device manufacturer. Having said so, however, there are limitations to our funds or resources; thus, we should select businesses in which our forte can be put to use and focus on them, while teaming up with partners in areas we can’t cover on our own. That is our basic strategy. While information spreads throughout the world and so does our business, absolutely necessary is a system that allows us to share data not only among ourselves, but also with our partners. Since the system is an effective tool, the initiative this time around can safely be referred to as the first step toward such a goal. To create an environment that allows us to make use of information of the entire supply chain with its globalization also in view as a tool, while building necessary partnerships actively, and to upgrade our development department from the device level to the professional level covering the entire system; these are the points for us to survive the future race.”

In other words, this initiative we are going to take can be positioned as one that mainly focuses on better establishing the internal information basis first with supply chain management on the basis of partnership to be entered into with those outside the company in view. Needless to say, though the main focus is placed within the company, not an approach of optimizing a certain part, such as streamlining the production control department, but a perspective of optimizing the entire process in consideration of the business process or the characteristics of the whole IC Division, has been introduced.

Speed is required in the IC business and its life cycle is short. Therefore, it will be most important to have a production ability that can meet the customer’s demand accurately and the designated date of delivery to increase product competitiveness. Furthermore, in attaining that, it is well recognized that reducing inventories as much as possible is a critical task to be addressed to improve profit rate of the firm. In other words, Sharp has identified the corporate system to be an ideal one that allows just-in-time production under which with a request from a customer as the starting point, the entire corporate activities operate efficiently and what is needed can be produced when needed. By putting such a corporate system into operation, customer satisfaction, while competitiveness of the product will be enhanced and excess weight of the firm can be eliminated, thereby improving profit rate. In order to bring the corporate system that starts with a customer’s request into reality, however, needed will be an environment in which the entire supply chain that comprises corporate activities can be managed and controlled. Based upon this judgment, it has set out to establish a supply chain management system in this project.

Based upon the judgment that the project has to involve all the departments with the aforementioned Corporate Senior Executive Director Yoneda as the sponsor, a total of 37 people were selected from production control, manufacturing, engineering, production planning, product planning divisions, as well as the computer division to form a project team.

Terumasa Yoneda
Corporate Senior Executive Director
And Group General Manager of
Integrated Circuits Group
Sharp had been working on establishing an information system, that could be referred to as the forerunner of supply chain management under which it drew up a production schedule based upon inventory data and the progress of production could be managed in a centralized manner, since 1989. In those days, when it came to production control business, people were drawing a production schedule by using paper, pencils and calculators. So, it was actually a huge load on a day-to-day-business level. For this reason, they considered whether they could reduce the work-load by making use of computers or give customers and sales department a timely response regarding the designated date of delivery. Thus, they set out to establish an information system to achieve that goal. In establishing the system, because the part number system used in the IC Division was inconsistent, which posed a serious hindrance, as the first step of their effort, they began unifying the part number system. After about a year’s labor, they finished unifying the stock code, which served as the basis for computerization. “Although rewriting all the lots under mass production into a new coding system entailed a big risk, and no mistakes could be allowed, we couldn’t be more careful in working on the project by setting up a follow-up system and others; thus, we were faced with a great deal of difficulty,” Masaaki Yamamoto, Manager SCM Project Team Integrated Circuits Group said. Although this project was promoted by gaining the cooperation of the production and engineering divisions and the IC Computer Center, its success could be attributed to the fact that they worked hard to the bitter end.

The system they established was made up of two SILICONS (Sharp Ic and Lsi Information CONtrol System) that managed the actual results and inventories in the front-end and back-end processes, respectively, and the PSI decision system that drew up a production schedule, which was established on a mainframe. However, because these systems were aimed at managing each process semi-automatically and each individual system was functioning separately, for instance, regarding the actual results of each process, a person in charge was putting them together by using personal computers or manually based upon data from each individual system. For this reason, it was difficult to get the entire picture of inventories in process, which hindered them from giving an accurate response regarding the designated date of delivery, for example. “In those days, what troubled the production control department most was that because they were unable to get hold of the entire picture of inventories in process, they spent long hours on drawing a schedule, which gave rise to a considerable time lag that affected even productive action. They were feeling a sense of crisis that if things remained as they were, they would not be able to carry out even the production control business itself,” Masami Murotani, Department General Manager, Integrated Circuits Computer Center, Information Systems Development Group, said.
Furthermore, the production scheduling function (scheduling/allocation processing function) at that point in time was developed on its own because there was no package software available on the market; however, it was so complicated to cope with the complexity of the semiconductor fabrication process, so due in part to the capacity of computers used in those days, it took more than half a day to get a job done in actuality. At that time, partly because daily businesses using computers or the environment for that were not mature, it was difficult for systematization to be penetrated. Against such a background, they began drawing a production plan on a weekly cycle by making use of this system and giving a response regarding the designated date of delivery to sales department in January 1997. This system had been in use in its day-to-day business activities until the SCM system was introduced. During that time, however, a variety of issues surfaced. In the end, 40 major issues were dug up. In order to work them out, they decided to introduce the new system.

The purpose of systematization this time around was not to think about mere automation of the manufacturing process or sophistication of the production control function, but to reestablish the structure in which various business processes were optimized as a whole with customer inquiry as the starting point. With such a goal in mind, the project called “Device Production/Sales Integrated Customer Handling System” was started in 1997. After that, in consideration of improving its recognition internally and other factors, the name was changed to SPEED (Supply-chain Planning for Excellent Electronics Device) and it was carried out.

Once the project started, they took about half a year to discuss what corporate system Sharp should establish thoroughly. As a result of extensive discussions, a system that allowed them to get hold of inventories in process at a single stroke by integrating the two SILICONS, which were divided into the front-end process and back-end process, and the chip warehouse and inspection warehouse on the system as well; and another that allowed flexible scheduling and allocation by sophisticating the PSI decision system were singled out as the targets of the information system. In line with this, they decided to work on establishing the system.

“To be able to draw up a production plan with short process time that will not produce excessive inventories is important. Naturally, we have to maintain the highest possible value in terms of quality, which is the major premise,” Yasuhiro Ikejiri, Manager, SCM Project Team, Integrated Circuits Group, said. And on January 15, 2001, the system with the originally perceived information system as the core was put into operation.
The SPEED project is a large-scale project that is very closely related to the production control business, involving even the user sector. In such a large-scale project, or a project to build an information system in which more than two departments or organizations are involved as a corporate system, in particular, due to external factors, such as changes in the environment or strategies, or overlapping of interests of the respective departments or sections, there may be cases in which specifications for such a system cannot be determined or change drastically. Thus, more often than not, it is extremely difficult to promote the project in general.

A number of unsuccessful cases of projects of this kind reported by various media in recent years can be attributed to the above-mentioned factors. In propelling this project, Sharp took about half a year to draw up a blueprint of how the system should be. On the basis of the blueprint, the project to establish the system was carried out. In the analysis in Study 1, we are going to take up its approach in drawing up this blueprint and what was discussed in the process, as well as, how the project was propelled on the basis of the blueprint and others, and look into the reasons for success.

Analysis

Lead time under LSI production is as long as 60 days, while the production process is extremely complicated, with the number of processes amounting to as much as 400 to 500. Moreover, at Sharp, the front-end and back-end processes are handled by its own five factories, four affiliates (one of them is in Indonesia) and a partner. Under such a complicated setup, with its mission of “coming out with an optimal form as a whole with the customer as the starting point” as declared by top management, activities to propel the project started. What was discussed first in response to this mission was the vision of how Sharp should be.

In Fig. 1, from the standpoint of P (production), S (sales) and I (inventories), which serve as the core of a corporate system in the manufacturing industry, how the ideal state should be is indicated in the form of “10 rules to boost sales and profits.” At a glance, due in part to its expression, it sounds like “instructions” or “orders,” but all of these can be read as “Why don’t we be this way?” 7. “We will tie up an order and a production lot with a string and take care of it to the bitter end. Thank you very much for your patronage” – though stated in a very humorous way, this is the starting point of the ideal state Sharp has to aim at in this project. There are various ways of expressing it, but in a large-scale project in which wide-ranging organizations are involved, it is necessary to define a vision like this and to share it among the members. These 10 rules appear to still serve as the bible for members of the project at Sharp.

After the vision was created, they discussed the objectives of drawing up a plan to realize the ideal state. This work was facilitated and executed by a consultant from HP. When a plan is drawn up like this, and when many interested members from different departments take part, in particular, more often than not, it is desirable for a third party to facilitate it. If individual parties concerned draw up a plan, it will give rise to subjective opinions from the standpoint of the respective departments they come from, which makes it very difficult to iron out differences in opinion in order to strike out a basic plan for the company. Thanks to the HP consultant who served as a facilitator, they were able to define the objectives as a company in a more objective manner, thereby draw up the plan. Fig. 2 shows a summary of how the objectives were discussed.

A clear definition of what should be aimed at, what should be implemented and what should be established as a corporation will play a pivotal role in promoting a large-scale project such as this. In the case of a supply chain project, in particular, without recognizing the objectives as a company and the purpose of implementing and realizing it, it would end up making a great fuss about nothing by the information system department, which would prevent the project from progressing smoothly. Here, we would like to pay attention to following main points revealed by this discussion of the objectives.
1) There are more than two factories responsible for the front-end process, while there are more than two factories responsible for the back-end process as well. In other words, a large number of transactions are being made among these factories. From the standpoint of delivering products to the customer, it is necessary to keep an accurate track of what process or state a customer order is in at a particular moment. Under the old system, because data was managed on a process-by-process basis, they were unable to get hold of the order from such a perspective. In order to establish a supply chain that starts with the customer, needed will be a system in which data of dispersed processes can be managed horizontally from the standpoint of the order number.

2) It is necessary to establish a system that allows them to respond to an inquiry regarding the designated date of delivery and deliver an order according to the response. By establishing a system that allows it to produce products according to the prescribed lead time and yield, it will become easier to draw up a production plan, give an accurate response to an inquiry regarding the designated date of delivery, and deliver an order according to the response. In order to give an accurate response regarding delivery and meet the designated date of delivery strictly, scheduling and allocation have to be automated.

3) Real-time information management. The LSI manufacturing process is extremely long, stretching by as much as 60 days (see Fig. 3). In addition, there are a large number of uncertain elements, such as changes in yield or order from sales department; thus, it is necessary to draw up an even more flexible and accurate production plan for semiconductor fabrication. To do so, needed will be accurate data on the present state. Under the new system, a system that makes use of data of respective processes in real time will be needed.

4) Management of inventories in process should be done in a centralized manner, making sure that excessive inventories and products are not produced.

As mentioned above, the firm discussed the objectives, and clarified what to do for the sake of improving business, and how the future should be. Based upon those, Sharp worked on clarifying what system would be necessary or how the organization should be managed in order to bring the discussed objectives into reality. They have been promoting the project by having the respective departments or sections share the objectives and plan to meet them.

**Fig. 1. 10 rules to boost sales and profits**

- **1.** Do not release products into markets that will not lead to sales.
- **2.** Products other than definite orders are not allowed to be stored in a warehouse.
- **3.** Do not fall behind others in responding to an inquiry about the designated date of delivery. Go one step ahead.
- **4.** Do not talk big, saying “operation, operation.” All you have to do is to manage the bottleneck.
- **5.** Do not swallow input by sales. Determine whether it is “prospective” or “definite” first.
- **6.** Let’s cut lead time drastically by forecasts by sales and in-process stand-by by production.
- **7.** We will tie up an order and a production lot with a string and take care of it to the bitter end. Thank you for your patronage.
- **8.** Selling products is also part of the inventory. However, too much of it is no good.
- **9.** Manage freshness properly (which affects future customer satisfaction: fresh from the garden).
- **10.** Do not let bottleneck parts grieve you.
Fig. 2. Objectives of Sharp IC SCM System

- Get an accurate grasp of the plant’s production capacity and inventory level
- Maintain the proper inventory level
- Manage the progress at the manufacturing site thoroughly
- Draw up an appropriate production plan
- Improve accuracy of supply-demand plans and arrangements

- Ensure the appropriate level of plant capacity
- Respond to an inquiry regarding the designated date of delivery promptly – quickly and accurately
- Realize an environment that allows stable supply/manufacture in compliance with a plan
- Ensure stable suppliers

- Boost up sales force
- Improve customer satisfaction
- Realize collaboration and globalization

Mold Package Type Process

- After going through any of the processes, it is repeated 10-15 times

Film Carrier Type Process

- Mask alignment
  An LSI pattern is photoprinted on the wafer. A series of steps including coating of photosensitizer, mask alignment and development, etc., are carried out automatically by a water transportation robot and others.

VLSI Process Flow Chart

- Diffusion
  A silicon wafer is heated to approximately 1000 °C. At this temperature, gas is injected to transform it into a transistor.

- Wafer test
  Before separating the completed LSI, an electric test is conducted automatically.

- Wire bonding process
  A pad of an LSI chip is connected to a wire of the lead frame automatically. The process after dicing (the latter half of the process) is handled by an affiliate factory.

Fig. 3. Representative pattern of IC fabrication

VLSI Process Flow Chart
Sharp designed the necessary system after discussing the objectives and digging up the items to be implemented to realize it under the aforementioned Study 1. In drawing up a plan for systematization, it decided to make the most of what is usable under the existing systems, including those at factories or mission-critical ones, so that the extent of the project could be minimized and it might be implemented smoothly. In discussing the objectives, it identified the parts that needed to be newly developed and focused on them in carrying out the project. In Study 2, based upon the objectives discussed under Study 1, we are going to pay attention to, and study how the system architecture was designed and composed.

Analysis
1) Architecture of the entire system

The system architecture designed to realize the objectives determined under Study 1 is shown in Fig. 4. The new SILICONS is positioned as a system to collect and manage inventory data at each point from the existing process management systems. In other words, it is a system that gathers information of the MES (Manufacturing Execution System), which controls the situation in each process, and clarifies the relationship with each manufacturing process time, thereby identifying what is where and in which state it is in a centralized manner. Conventionally, since data on the progress of each process was managed solely on each MES, it was extremely difficult to get hold of which lot was currently in what state. However, the realization of this system enabled grasping the state of each lot at a single glance. Furthermore, through cooperation with the allocation function of the new PSI system to be described later, it allowed a customer order and a lot to be tied up, which made it possible to calculate the date of delivery accurately. This comprises the basic part of the supply chain system. It is the new PSI system under which a production plan is drawn up in response to data from the new SILICONS. Based upon data from the new SILICONS and standard data that indicates the process or composition of a product, the most appropriate schedule is drawn up and the allocation is processed. Information about a production plan, which is calculated by the new PSI system and managed, will be communicated to those in charge of production control through a graphical user interface.

The following is detailed description of each system.

2) New SILICONS

The new SILICONS can be positioned as a system that gathers and manages data that go through the respective MES and warehouse management system in the wafer process, the wafer test process, chip warehouse, assembly process and receiving/inspection warehouse and device warehouse (Fig. 5). In addition, it is designed to get hold of the state of being in the process of transportation. Therefore, even data that is in the process of transportation between processes or factories; i.e., data that is not under the control of the respective MES, can be managed as well. Under such a series of processes, it collects data at roughly 100 points (as it stands, still 50 points or so), allowing data on inventories and actual production to be gathered in real time and with no human intervention. In terms of how real
In the semiconductor fabrication process, there exists a parts table that is a reversal of that used in the regular assembly industry. In other words, in the regular assembly process, parts are assembled, going through each process with the part number of the final product as ID; thus, it can be managed with the ever-consistent ID. As opposed to this, in the semiconductor fabrication process, more than two product categories will be produced from the same wafer, the part number to be managed in the process keeps changing with the process. In this way, therefore, it was necessary to come out with a parts table that is a complete reversal of that of the ordinary assembly process in which the progress of a process needed to be managed in a consistent manner. In the old system, a system of managing progress like this was not available; thus, it was managed by human hands.

Under the new SILICONS and the new PSI system for planning, a standard data management subsystem was set up to manage the composition of this parts table in a centralized manner in order to coordinate the part number that varies from one process to another, which has formed the basis of management. In addition, the entire process ranging from injecting wafers to delivery is complex and the number of processes is large at Sharp. In this way, therefore, it was necessary to come out with a parts table that is a reversal of that of the ordinary assembly process in which the progress of a process needed to be managed in a consistent manner. In the old system, a system of managing progress like this was not available; thus, it was managed by human hands.

3) New PSI System

The new PSI System (Fig. 5) is a supply chain planning system under which based upon data on total inventories in process from the new SILICONS, total demand from sales department and standard data that links the two, a production plan is drawn up via a package software or a scheduling engine (Adexa), and a response to inquiries regarding the date of delivery is made.

Data on total demand to be input into this new PSI system is created under the total demand management system through input of data on sales plans (definite orders, estimated data by sales department, etc.) sent from the host system of sales department as well as estimates by the division and others. In terms of estimates by the division, should there be no sales plans coming from sales department, or a sales plan falls short of the factories’ production capacity, the estimates by the division will be input. The estimates by the division will become definite after a certain period of time; however, if a sales plan is input by sales department, the estimates will be offset. Therefore, it is designed with day-to-day business activities in mind. The reason is that basically, under supply chain planning (SCP), accuracy of data on demand holds the key to whether it becomes a success or not.

Meanwhile, when SCP is considered for application in a corporation that is composed of more than two manufacturing plants such as Sharp, normally a production plan is drawn up at the center (headquarters), which will be forwarded to each factory. Then, a detailed schedule is drawn up and allocation is done on a factory-by-factory basis. In the case of Sharp, it has had its scheduling package have the manufacturing planning function as well at the center; therefore, it has been able to allocate the lot and manage a production schedule at a single stroke. With the lot allocation function, as Fig. 6 shows, a customer order is uniquely allocated to a production lot. The ability of dynamically allocating an order to a lot making progress in a process has allowed them to make a definite response regarding the date of delivery.

Under a system like this, a production plan is drawn up on a daily basis by taking into consideration fluctuations in demand, the capacity of production facilities or inventories. A system has been established in which a new order is reflected upon a production
plan, allowing them to set the date of delivery within 24 hours. Moreover, data on changes, such as new orders or changes to orders received, is communicated to the respective factories and the affiliate factories within half a day to 48 hours as changes to the production schedule (however, due to cooperation with the internal sales system, a series of business cycles - ranging the receipt of a new order and presenting a production plan to setting the date of delivery - are updated once a week). In the device industry, including semiconductors, although there are cases in which BTO (Built To Order) has been realized, it can be safely said that this case in which a system that sets the date of delivery, which is linked with a production plan, has been established as an information system covering all the products and orders, is a very advanced one.

"The most difficult part, or the part that required particular attention in establishing the system was the improvement and maintenance of accuracy of various data, including inventory data, and holding fast to the initiative of working together with those doing the actual work, promoting teamwork in the division and teaching staff how to use the system." Mr. Murotani said. In order for a system like this to take root at the site where the actual work is being done, the accuracy of data (results) output by the system will be critical. This is because if the accuracy of data output by the system is judged to be low, confidence in the system will not improve at the job site, thereby ending up with a system that is not used at the site. With their experience in building the former PSI system in mind, the members of the project worked very carefully on preparing highly accurate data with the aim of producing highly accurate output.

With these efforts to build the new SILICONS and the new PSI system, the corporate system starting with customer order has been put into operation.
Sharp has already introduced the SCM system as mentioned above. As Mr. Murotani said, “We will have to make use of it first in our business activities, and then in our business administration,” in such a system, though the introduction of the system itself is of great significance, it can safely be referred to as no more than the first step of the entire process. In actuality, it will not produce real value until production control operation is improved, leading to even more strategic decision-making by getting hold of the actual state from many different angles. In Study 3, we are going to study the perspectives of how to make use of data.

**Analysis**

As Fig. 7 indicates, under the new PSI system, as an external system, various user interfaces are available. These user interfaces have roughly two meanings:

One is, as Fig. 8 shows, as basic data to improve production control operations, or to run the PDCA cycle. In other words, it is to get an accurate grasp of a gap between the plan and the actual results and to formulate the action needed there. As Mr. Murotani said, “Though the accuracy of planning has been improved, it always gives rise to a gap between the plan and the actual results. We have not been able to absorb such a gap thus far, but we are hoping to add a function to analyze the cause, or what is to blame, a bad yield or process time, for example.” The firm will carry out activities to improve operations like these from this point on.

The other meaning is to put these interfaces to use in strategic business management. In other words, it is to obtain the maximum return with limited resources available, or the increase in ROA (return on asset) is what the corporation should do. It can be safely referred to as an extremely important management strategy in the device industry where the economy changes drastically. The basis for maximizing ROA is to invest resources in the most efficient place, while necessary decision-making for anticipatory investment of resources becomes necessary for a corporation. As for the former, in particular, now that it has become possible to manage data with the customer as the starting point and detailed data on manufacturing, i.e., cost data, based upon such data, it becomes possible to specify strategic customers or products it should focus on and make a strategic decision thereby moving the business forward.

On top of these, it becomes possible to define an evaluation model for the production plan itself and manage it thereby allowing it to make a decision regarding strategic investment as well. As these strategic activities get started, Sharp will be able to gain true strength as a corporation. With respect to its use in future business management, Corporate Senior Executive Director Yoneda said, “Because there are a number of uncertain factors in predicting the future, how to turn this into information and make use of it is one of the key points. Not only information in which we have direct interest, but ultimately, information, such as weather information, may be needed as well. Though we are looking at things from a very narrow perspective right now, unless we make it possible to predict the future, we will not become strong in strict sense,” expressing the firm’s ambition.

---

**Fig. 8. PDCA Cycle**

- **Plan**
  - Review of estimate (demand)
  - Review of process time and yield
  - Review of production instructions
  - Review of designated date of delivery

- **Do**
  - Production instructions
  - Scheduling

- **Check**
  - Agreement between the division and sales department
  - Response regarding the delivery date

- **Action**
  - Management of estimates vs. actual results (production limits vs. definite orders)
  - Progress management (production instructions vs. processes under way)

- **What-If simulation**
We have studied Sharp IC Division’s project to establish a supply chain system. Due in part to the complexity of the semiconductor fabrication process, it is generally considered to be very difficult to establish a system that allows setting the date of delivery accurately and swiftly, and leads it to production with the customer’s request as the starting point. Sharp has succeeded in achieving its objectives by taking a very careful approach. It is safe to think that the key to success lies in getting hold of various issues and taking proper approaches through efforts exerted since 1989. It is too soon to measure the quantitative effects and evaluate the results of the system since the system has recently been introduced, but it has begun producing results, they say. 1) The actual state of production has become visible; 2) the awareness shared by the production control group has begun to change gradually; 3) the system base for cutting inventories in process and meeting the designated date of delivery has been established; and 4) the speed of making use of data and getting a job done has increased. In this way, workers’ awareness and the way of conducting business have begun to change.

In addition, it can be said that continued sponsorship and leadership by top management is one major reason for its success as well. Sharp, which has gained such an environment, is considered to have been able to clearly set itself apart from its competitors in the industry.

The future tasks to be undertaken by Sharp as part of its plan to expand business further include: 1) the creation of business by working together with other divisions within Sharp; 2) the realization of supply chain management, which even includes distribution to the customer; 3) the application to such new product forms as cards, circuit boards, panels, kits and modules; 4) the correspondence to business models for outsourcing production, which is likely to continue increasing; and 5) business management by making use of simulation and analysis of estimates and actual results. Mr. Yoneda stressed the importance of not only the system, but the reform of Sharp employees’ awareness as well. “In order to maximize such a system, it is necessary to foster talented people who can figure out how to put information to use via computers, or how to create such a system as well. To step up our SCM from this point on, people have to change and we have to build a system to change them,” he added.

We would be happy if this case serves as a reference for companies that consider introducing the supply chain management as part of their corporate strategy.

Last but not least, we would like to take this opportunity to thank the members of Sharp’s IC Division and Information System Promotion Business Headquarters for their help in covering this story.

Summary of Best Practice Study at Sharp

**Key Points**

- Promote a project based upon a corporate vision
- Supply chain system with the customer as the starting point
- Carry out PDCA by means of data from the system and its reflection on business strategies