CHAPTER VI

IMPLEMENTATION AND RESULT OF IMPLEMENTATION

This chapter presents an analysis of customer complaints and how the ABC Company can improve its customer satisfaction by implementing new quality procedure. Due to the limited of time, the implementation trial phase is only about two months. Therefore, the actual outcome might not be seen during that time. Overall benefits however can be expected after cycles of implementation.

6.1 Customer Complaint Analysis

In regards to the new quality procedure recommendations with selected KQI presented in previous chapter, a detail of how that process can be followed to rectify the problems in two major areas of complaints is presented in this section. Causes of complaints in quality of product and late delivery of product can be classified in the following table.

Table 6.1: Cause of Customer Complaints

Complaint	Cause of Complaint	Corrective/Preventive Action
Late Delivery of Finished Products	Over capacity of production due to improper production plan	Recommended production plan Production revision P and D Ratio to move repeated made-to-order product to made-to-stock product

Table 6.1: Cause of Customer Complaints (continued)

Complaint	Cause of Complaint	Corrective/Preventive Action
	Late delivery of product design for customer approval	Efficient customer contract review process as recommended Recommended design process with guideline on deadline Prototype manufacturing and testing
	Late ordering of raw materials	Supplier evaluation score data Deadline guideline Price quotation obtaining process
	Late delivery of raw materials from suppliers	Supplier evaluation score data Deadline guideline Partnership supplier program
	Inefficient production	Efficient production plan WIP inspection Postponement for Late Delivery of Merchandise Reporting Form
Low Quality of Product	Low standard of raw materials	Supplier evaluation score data Raw materials Quality Control Partnership supplier program
	Mistakes in quality inspection and examination	Efficient quality control procedure Clear quality control guideline Quality Control monitoring
	Defects from product assembly	Efficient production plan RM and WIP inspection Quality Control monitoring

Examples of how KQI can be applied to rectify two major complaints in late delivery of product and low quality of product, are explained below.

6.1.1 Over Capacity of Production due to Improper Production Plan

Over capacity of production leads to a late delivery of finished product to customers. Head of Engineering had reviewed this cause of problem and found that improper production plan is the main cause. Over capacity only happens during the peak period especially when the product is made-to-order product. The production capacity that normally used in manufacturing of made-to-stock product has to use in manufacturing of made-to-order product as well. Therefore, Head of Engineering reviewed the production plan and made it more profitable to the company. Production capacity will be use to manufacture made-to-stock product during off-peak period and utilise capacity more on made-to-order product when necessary. Moreover, Head of Engineering decided to move some products that customer often orders with the same specification and requirements from made-to-order to made-to-stock type of product. This will help the company to shorten customer demand time and to spare more production capacity to the natural made-to-order product.

According to P and D Ratio analysis, there are three different characteristics of products in which require different types of planning and control.

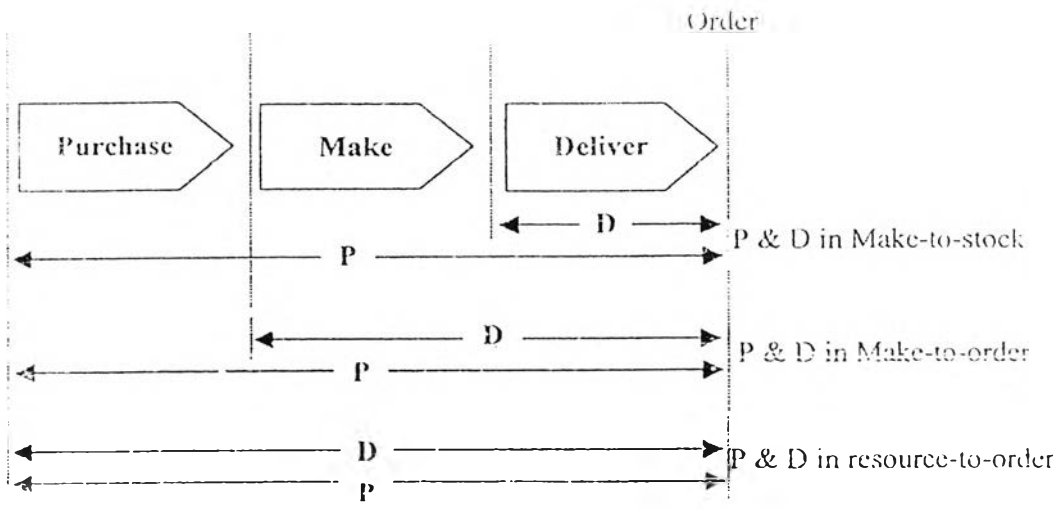
P refers to the total throughput time and,

D refers to demand time

For a typical make-to-stock product, D, is the sum of the times for transmitting the order to the company's warehouse or stock point, picking and packing the order and physically transporting it to customer – the deliver cycle. Behind this visible order cycle, however, lie other cycles. Reduction in the finished goods stock will eventually trigger the decision to manufacture a replenishment batch. This cycle- the make cycle-involves scheduling work to the various stages in the manufacturing process. Behind the 'make' cycle lies the purchase cycle – the time for replenishment of the input stocks – involving transmitting the order to suppliers and awaiting their delivery.

Therefore, D is very short compared with the total throughput cycle for make-to-stock product, in contrast to a resource-to-order operation where D is the same as P. The make-to-order product the lies in between these two (see figure 6.1)

Figure 6.1: P&D Ratio for Different Types of Planning and Control



In this case, the D time for some products that have been moved from make-to-order product to make-to-stock product will shorten and the operations risk can be minimised in operations planning and control. The finished products will therefore be delivered to customer faster.

KQI Deployment: In addition to the changing of product type from made-to-order to made-to-stock type of product for the repetitive order, ABC's production plan formulation should follow guideline of KQI mentioned in the chapter 5. The proportion of number of finished product manufactured to the number of finished product to be manufactured as planned is expected to increase, and the number of days in manufacturing product that deviated from plan is expected to decrease.

6.1.2 Late Delivery of Product Design for Customer Approval

There are total of six complaints regarding late delivery of product design for customer approval. Head of Design had investigated and found out that a cause of late delivery derived from an ineffectiveness of design operations of the section.

With KQI implementation, salesperson has to clearly mention in the customer contract of useful details such as product type, product specification and expected delivery date. The Design officer should follow the guideline presented in previous section of how to deploy KQI into design process. Moreover, the Head of Design had cascaded

the target of KQI implementation to all staff and set the follow up schedule in weekly basis during the implementation period. This resulted in higher staff contribution and effort in completing their tasks leads to an efficient product design operations.

With KQI implementation, the number of days in late delivery of product design for customer approval is expected to be shortening. Hence, delivery of finished products is expected to be as planned. Consequently, customer satisfaction score should be improved.

6.1.3 Late Ordering of Raw Materials

There are four complaints regarding late ordering of raw materials. Head of Administration explained that more time is used for price comparison in order to get raw materials at the lowest price as possible. With KQI implementation, the author proposed the Head of Administration a solution of maintaining optimal number of reliable suppliers or it is so called "a partnership supplier". The relationship between ABC and supplier will be then strengthening and the good cooperation in providing useful information will be foreseen. With partnership supplier, efficient information exchange is a fundamental of operations. The use of inquiries and bids for sourcing decision will be eliminated. Searching time of Factory Purchasing Officer can be shortening. In addition to this, the consistent evaluation of supplier performance will enable the company to shorten the ordering lead time in searching for the most suitable supplier. Moreover, with the solution of Head of Engineering to move some products from make-to-order to make-to-stock product will ease the raw materials ordering process.

The speed of raw materials ordering is expected to be faster, in which the delivery of finished products is expected to be as planned. Also, the number of complaints from other sections due to unavailability of raw materials is expected to decrease. Therefore, the internal customer satisfaction level as well as the external customer satisfaction will then be improved.

6.1.4 Late Delivery of Raw Materials from Suppliers

There are six complaints regarding late delivery of raw materials from suppliers. As mentioned earlier that the Head of Administration decided to reduce number of suppliers to the optimal number of suppliers in order to maintain good

relationship with suppliers with a purpose of getting high cooperation from them. From doing this, ABC's bargaining power will be higher so that service from suppliers can be indirectly assured. Also, the supplier evaluation will record supplier performance in the past. Moreover, the KQI implementation will lead to staff involvement in achieving overall target.

The effectiveness in raw materials ordering is expected to increase with a decrease in number of late delivery date of raw materials. Once the raw materials is delivered as schedule, the production can follow the schedule setting in the production plan which lead to the prompt delivery of finished products

6.1.5 Number of Days in Production that Deviated from Plan

There are ten complaints regarding production efficiency in terms of number of days in production. The KQI deployment suggested in chapter 5 will enable the company to formulate an efficient production plan. Once the schedule in production plan is set and regularly monitored, the off-schedule production can only be found with the sound reason. The strict WIP inspection procedure mentioned in chapter 5 will also enable the company to follow the production plan with the quality of product. Moreover, the Postponement for Late Delivery of Merchandise Form is another tool to control a deviation date in production, and is another staff performance monitoring tool.

Therefore, number of days in manufacturing product that deviated from plan in quarterly is expected to reduce. The prompt delivery of finished products can therefore be expected.

6.1.6 Low Standard of Raw Materials

There are seven complaints regarding low standard of raw materials. Head of Administration explained that the company currently applies low cost raw materials ordering strategy in which the quality of raw materials might not be assured at all times. With KQI, the new strategy of partnership supplier is proposed, the supplier evaluation form is regularly conducted, and the effective raw materials inspection procedure is implemented.

Therefore, the standard of raw materials is expected to improve. The proportion of value of low quality raw materials to the total value of raw materials is also expected to improve. With a good quality of raw materials, the good quality of work-in-process and finished goods can also be expected.

6.1.7 Mistakes in Quality Inspection and Examination

There are five complaints regarding mistakes in quality inspection and examination. This revealed that the efficiency of Quality Control is not at the standard level. Head of Quality Control had investigated and explained that a cause of these five complaints is the competency of quality control staff. Head of Quality Control proposed to set up immediate training for his staff regarding job related knowledge and staff motivation. Moreover, a reminder of KQI deployment into the inspection process regularly to all staff is crucial. The monitoring of QC inspection is recommended to conduct to ensure the result of inspection.

With KQI deployment into the inspection process, the mistake is expected to decrease which lead to a higher quality of finished products.

6.1.8 Defects from Product Assembly

There are six complaints regarding defects from product assembly. Head of Assembly has investigated and found out that cause of defects derived from the damage of o-ring sealing kits. This can be easily rectified by changing the sealing kits. However, assembly staff has to follow the production plan, design plan and assembly guideline mentioned in chapter 5 with KQI deployment to ensure that the quality of components and finished product is as what customer needs.

With KQI implementation, the defect from product assembly is expected to decrease as well as number of customer claims regarding quality of product.

6.1.9 Mistakes in Obtaining Information from Customer Regarding the Product Specification

There are eight complaints regarding the incorrect specification due to mistakes in obtaining information customer. Recently, Head of Engineering is

responsible for reviewing customer contract prior to pass it to the Design Section. Then, the Design Section is responsible for preparing a product design. In case of more information is required from customer, Design staff has to ask directly to the salesperson. Therefore, these three sections including Engineering, Design and Marketing have to work closely and the cross-product training should be provided to these three sections' staff so that at least they know what kind of information need to be obtained from customer at the first time for design and production purpose.

With KQI deployment, Head of Engineering, in liaison with Head of Design, prepared a guideline in obtaining customer information and had asked the salesperson to ensure that all required information is filled in the customer contract form. Also, the customer contract review guideline presented in chapter 5 is implemented. Design and Engineering staff has to check whether or not all information is provided and the guess for customer's specification requirement is prohibited. These enable manufacturing process smoother in terms of correct specification.

By doing this, external customer satisfaction regarding the specification of product is expected to improve with less number of customer claims.

6.1.10 Product has not been Fully Inspected by Quality Control Section

There are four customer complaints regarding the quality of product derived from mistakes of Quality Control staff. This is a simple problem that can be rectified by emphasis on staff knowledge on the inspection method, staff motivation and morale in job responsibility, along with KQI deployment into the inspection process as mention in chapter 5. A strict measurement and rewards can be used as a monitoring and control tool.

As a result, efficiency of quality control is expected to increase with the number of mistakes in quality inspection decreased. Customer claims regarding the incorrect product specification is expected to decrease.

From the implementation mentioned in part 6.1.1 to 6.1.10, the overall improvement in delivery of finished products, quality of product and incorrect specification of product can be measured by using the following measurement.

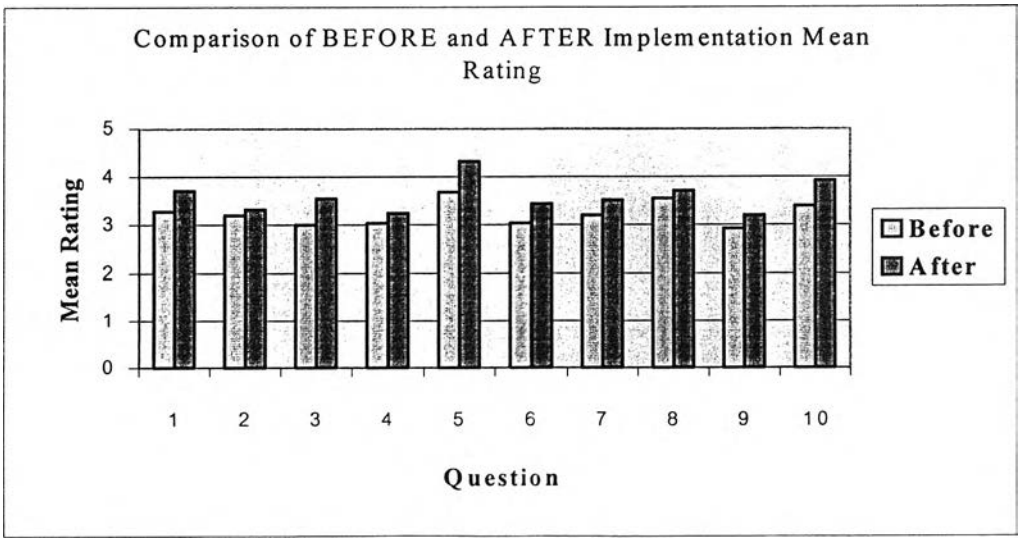
- Quality of finished product: Number of defects due to quality of product decreased from 40 in 4Q04 to 25 after the KQI deployment.
- Reliability of delivery time: Number of on-time delivery lot to number of total delivery lot increased from 87% in 4Q04 to 90% after KQI deployment.

6.2 Result of Implementation

Apart from the expected result of increase in customer satisfaction level from implementation of new quality procedure presented in previous section, a proof of whether or not the proposed solutions are effective in the way it helps improve and reduce customer complaint problems.

A customer survey has been conducted before and after two months of KQI implementation by sending customer survey questionnaire to top 25 customers (see Questionnaire Form in Appendix H). Result of the survey and a summary of questionnaire of BEFORE and AFTER KQI implementation is as the followings.

Figure 6.2:Comparison of BEFORE and AFTER Implementation of Mean Rating



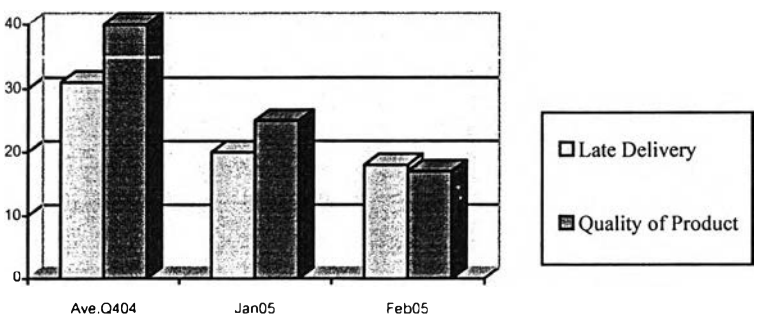
Findings from the survey reveal that the overall performance regarding the quality of product and on-time delivery has been improved during the implementation period. The average mean rating increased from 3.24 to 3.60. Major improvements are quality of delivery time, quality of product, quality of design and company effort on improvement of product quality and delivery time. The improvement in terms of mean rating is not much different in each question. Only two month implementation period might be the main factor. Some problems can be rectified and see the improvement in a shorter time such as quality of product design. However, it can assure an increase in customer satisfaction level that arising from the revised procedure at a certain level.

Moreover, result of survey in major two customer complaint areas comparing monthly result of two-month implementation period to the average result of last quarter of year 2004 in monthly is shown in the following table.

Table 6.2: Improvement in Two Customer Complaint Areas

Implementation	**Time**	**Frequency**	
		Late Delivery	Low Quality of Product
Before	Q42004 (average for monthly result)	31	40
After	Jan 2005	20	25
	Feb 2005	18	17

Figure 6.3: Reduction in Number of Customer Complaints



The data obtained from customer survey regarding customer complaints is another evidence of how efficient the revised procedure is. The number of complaints decreased to less than half of total complaints in two main areas after the implementation of revised procedure. The increase in customer satisfaction level then can be achieved with the developed quality procedures as stated in the objective of the study.

6.3 Summary of Questionnaire Result

Summary of questionnaire result of BEFORE and AFTER KQI implementation is shown below.

Table 6.3: Summary of Customer Questionnaire Result (Before KQI Implementation)

Question	Feedback
1. What is your opinion on our quality of product?	10 customer rated level 4
	14 customer rated level 3
	1 customer rated level 2
2. What is your opinion in receiving the right product as ordered?	9 customer rated level 4
	13 customer rated level 3
	2 customer rated level 2
	1 customer rated level 1
3. What is your opinion on quality of product design?	7 customer rated level 4
	12 customer rated level 3
	5 customer rated level 2
	1 customer rated level 1
4. What is your opinion on durability of product?	5 customer rates level 4
	17 customer rated level 3
	2 customer rated level 2
	1 customer rated level 1
5. What is your opinion on on-time delivery?	5 customer rated level 5
	7 customer rated level 4
	13 customer rated level 3
6. What is your opinion on product ordering lead time? (Period from placing order until receiving product)	7 customer rated level 4
	14 customer rated level 3
	2 customer rated level 2
	2 customer rated level 1

Question	Feedback
7. What is your opinion on design time?	9 customer rated level 4
	12 customer rated level 3
	4 customer rated level 2
8. Will you continue to purchase our product?	3 customer rated level 5
	10 customer rated level 4
	10 customer rated level 3
	2 customer rated level 2
9. Will you introduce friends to purchase our product?	5 customer rated level 4
	13 customer rated level 3
	7 customer rated level 2
10. How would you rate company for the effort in trying to improve quality of product and delivery time?	5 customer rated level 5
	4 customer rated level 4
	12 customer rated level 3
	4 customer rated level 2

Summary of the questionnaire result of BEFORE implementation will then be compared with that of AFTER implementation. The mean rating is a comparable tool. The sum of each question's rating and the mean rating of BEFORE implementation is shown in the following table (see Appendix H-1 for Questionnaire Result and Mean Rating Calculation)

Table 6.4: Summary of Mean Rating for BEFORE Implementation

	Question									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Sum of Rating	84	80	75	77	92	78	79	89	73	85
Mean	3.36	3.2	3	3.04	3.68	3.04	3.20	3.56	2.92	3.4

Table 6.5: Summary of Customer Questionnaire Result (After KQI Implementation)

Question	Feedback
1. What is your opinion on our quality of product?	5 customer rated level 5
	8 customer rated level 4
	12 customer rated level 3
2. What is your opinion in receiving the right product as ordered?	12 customer rated level 4
	10 customer rated level 3
	2 customer rated level 2
	1 customer rated level 1
3. What is your opinion on quality of product design?	3 customer rated level 5
	9 customer rated level 4
	12 customer rated level 3
	1 customer rated level 2
4. What is your opinion on durability of product?	8 customer rates level 4
	15 customer rated level 3
	2 customer rated level 2
5. What is your opinion on on-time delivery?	10 customer rated level 5
	13 customer rated level 4
	2 customer rated level 3
6. What is your opinion on product ordering lead time? (Period from placing order until receiving product)	3 customer rated level 5
	7 customer rated level 4
	13 customer rated level 3
	2 customer rated level 2
7. What is your opinion on design time?	2 customer rated level 5
	11 customer rated level 4
	10 customer rated level 3
	2 customer rated level 2
8. Will you continue to purchase r our product?	3 customer rated level 5
	12 customer rated level 4
	10 customer rated level 3
9. Will you introduce friends to purchase our product?	9 customer rated level 4
	12 customer rated level 3
	4 customer rated level 2
10. How would you rate company for the effort in trying to improve quality of product and delivery time?	8 customer rated level 5
	7 customer rated level 4
	10 customer rated level 3

The sum of each question's rating and the mean rating of AFTER implementation is shown in the following table(see Appendix H-2 for Questionnire Result and Mean Rating Calculation)

Table 6.6: Summary of Mean Rating for AFTER Implementation

	Question									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Sum of Rating	93	83	89	81	108	86	88	93	80	98
Mean	3.72	3.32	3.56	3.24	4.32	3.44	3.52	3.72	3.2	3.92

Mean rating of BEFORE and AFTER implementation result will be then compared by using the average of each mean rating to see a sign of improvement after two-month implementation of the suggested procedure. The comparison of BEFORE and AFTER result is shown in the following table.

Table 6.7: Comparison of BEFORE and AFTER Implementation Result

Question	**Mean Rating**	
	Before	**After**
1. What is your opinion on our quality of product?	3.36	3.72
2. What is your opinion in receiving the right product as ordered?	3.20	3.32
3. What is your opinion on quality of product design?	3.00	3.56
4. What is your opinion on durability of product?	3.04	3.24
5. Does the product normally deliver to you as agreed on the contract?	3.68	4.32
6. What is your opinion on product ordering lead time?	3.04	3.44
7. What is your opinion of design time?	3.20	3.52
8. Will you continue to purchase our product?	3.56	3.72
9. Will you introduce friends to purchase our product?	2.92	3.2
10. How would your rate company for the effort in trying to improve quality of product and delivery time?	3.40	3.92
Average of Mean Rating	**3.24**	**3.60**