

CHAPTER 6

IMPLEMENTATION, COMPARISON AND ANALYSIS

I. INTRODUCTION

This chapter will describe the implementation of HACCP system in the case company. The discussion will focus on each of four CCP from the fumigation process to the plate magnet. The examples of records will be illustrated and explained the procedures within this chapter. Subsequently, the result of the HACCP application will be compared to the past record of the company in order to analyze the benefit of the system.

Prior to the implementation of the plant specific HACCP plan, it is necessary to ensure that senior plant management is in agreement with the plan which was developed. This commitment may be demonstrated by the allocation of necessary resources for process modifications as required. Training of employees will likely be required to facilitate HACCP implementation. Once in place, the HACCP plan needs to be corrected as required to keep it current with changes made in the process (e.g. product formulation, new equipment, plant renovations). The maintenance of the HACCP plan is the responsibility of the HACCP coordinator and it is recommended that an established minimum frequency be set to review the plan for its accuracy and completeness.

II. IMPLEMENTATION

2.1 HACCP Team and HACCP Meeting

As mentioned in the step 1 of the application of HACCP, the HACCP team was assembled to develop HACCP plan. Then, the weekly meeting was set up to develop HACCP plan and to monitor the result of implementation. Thus, a HACCP plan can be improved in such an appropriate way. In the case company, the meeting is set up every Friday from 13.00 to 17.00 p.m. The first meeting was held on August 1999. The major problem from the meeting is that during the first couple months it was high season for exporting rice that cause some participants were not be able to attend the meeting. Some of them were not be able to follow up with the work progress. However, after New Year the task forces have more time to participate and concentrate more with the project.

2.2 Fumigation (CCP1)

According to the HACCP plan, technical supervisor must collect the fumigation record for the two critical limits in the fumigation process, which are fumigation time and the amount of fumigating substances.

The record that is largely used to control and monitoring this CCP is the fumigation record. Whenever raw material arrive at the factory, Production Assistant who responsible for unloading the raw material to the storage tanks will record the quantity, type, date and arrival time of raw material and loaded storage tanks number. Subsequently, these data will be informed to Technical Supervisor for record in the Fumigation records. The records will be kept according to each storage tank in order to control and monitor the critical limit in this process step. Example of this fumigation record is illustrated in Appendix B.

When there is enough quantity of raw material to fumigate Technical Supervisor will start the fumigation by calculate the fumigating substance in the ratio of 1 ton of raw material to 2 pills of fumigating substance. At the fumigation period it is not allowed to loading rice to that storage tank. Technical Supervisor will record date and time of fumigation into the Fumigation records and will calculate the finish time of the fumigating by counting 48 hours after fumigation time. During the fumigation period it is not allowed to release raw material in any production lines.

2.3 De-Stoner (CCP2)

There are 2 types of record used to control each critical limit. The first record is the record of preventive maintenance program of this machine. Preventive maintenance program is developed to maintain the condition of the machine. This program was set by two consultants from Engineering field. This program has been carried out for about two years. Therefore it is easier to add some monitoring tasks rather than create a new document. In this case, the added monitoring tasks will be used to monitor the static pressure of the machine. Frequencies of monitoring are set at one time per week. Technicians use a pressure gauge to measure the static pressure. Nevertheless, the task force found the new issue to add to the preventive maintenance program that is the foreign materials might plug the sieve hole. This may result of the obstruction of the air pressure which lead to unable to blow the rice. It will lead to the same result of low air pressure (less than 90). Hence, the sieve-cleaning schedule is added to preventive maintenance program to have frequency of one time per week. Then the task force will follow up with the result and adjust the frequency schedule to make it more suitable. However, from the last three weeks of the implementation it was found that the frequency of one time per week is the most suitable frequency. The example of de-stoner preventive maintenance program is shown in appendix B.

The second record is stone releasing time. Since the stone releasing time has close interval (every two hours) Rice technician who operate the production line will record the data, as the preventive maintenance program is done weekly. This record will be kept in rice technician logbook as shown in appendix B. The logbook contains the assignment of Rice technician in each shift which Technical Supervisor will assign the task each day. Furthermore, it include the information of such parameter as production capacity, number of raw material storage tank, number of finish product storage tank and etc. Apart from recording of stone releasing time, Rice technician should weight the stone in the tray in order to calculate the production loss. Also he should visually inspect these loss to observe whether the machine operate correctly.

2.4 Color Sorter (CCP3)

There is only one critical limit in this process step. The background value of the machine will be set up every time the machine begins the operation. Rice technician must record all parameters for setting up the color sorter machine in the rice technician logbook as illustrated in appendix B. However, the calibration of the background value is also necessary to prevent the deviation. The frequency of the calibration is set at one time per year and it can be adjusted if necessary. Rice technician will set up and adjust these parameters according to the characteristics of incoming materials. Another objective of using this machine is to get rid of the low quality grains such as chalky grains. In other words, rice technician will adjust the background, flow rate, and the sensitivity of the machine to cope with the incoming materials. If the incoming material contains with the high proportion of the low quality grains, these parameters will be set up in such a way as lower flow rate, higher background and sensitivity. However, the use of this setting will lead to a long time of production, so the factory will lose its productivity. This process step is quite easy to control because of the technology of the machine. The background can be presented in the touch-screen of the machine in a graph format.

2.5 Plate Magnet (CCP4)

In this CCP, there are two records involved, which are technical assistants' logbook and release record of finished product storage tanks. The logbook will be used to monitor the magnet clearing tasks which are belonged to technical assistants. The responsibility of technical assistants is to clean machines and the areas around them. All cleaning tasks including with the task from cleaning schedule will be summarized and re-scheduled to create a schedule task for technical assistants. Therefore, this logbook covers all tasks of technical assistants such as the fumigation in the production line, bucket elevator, and the stocks of finished product. As presented in appendix B, every day technical supervisor must sign to

ensure the verification of the works. At the first time, the magnet cleaning was scheduled at one time per week. After collecting the information for a while, this task is adjusted to become stricter at three times a week.

The second record is the record of releasing finished product from finished product storage tanks to packing tanks. During the product transfer, the product must pass the plate magnet installed over the conveyors. Rice technician will write this record every time he releases the product to a packing tank. The document is put in a clipboard and hung at the neighborhood area to facilitate the work. When rice technician is ordered to fill the product in a packing tank, he will go to the finished product tank and measure the distance between the conveyor and the magnet. The distance must be less than 10 cm., if it is more than 10 cm., he will lower the magnet to the acceptable level.

III. COMPARISON AND ANALYSIS

After the implementation of HACCP system, a comparison will be carried out to evaluate the effectiveness of system. The comparison is made between the percentage of product that has a problem due to impurities and contamination of hazard. Production supervisor reported the number of affected product found at the packing line through the report of rejected product. The example of this report is illustrated in appendix B. The percentage will be calculated from dividing the amount of rejected products by the number of exported products. The exported volume and the rejected volume of the company has been collected since April 1999, and is shown in the following table.

TABLE 6.1 THE EXPORT VOLUME SINCE APRIL 1999 TO OCTOBER 1999

Month	Packing Volume (tons)	Rejected Volume (kg)
April 1999	3,520.82	3,750
May 1999	3,594.24	877
June 1999	3,506.61	720
July 1999	3,310.61	98.16
August 1999	5,321.60	150
September 1999	5,792.60	70.39
October 1999	4,299.70	21,134.08

According to table 6.1, the percentage of rejected product equals to 0.0914%. The calculation of this figure comes from the following formula.

$$\text{The percentage of rejected product} = \frac{\text{Sum of packing volume} \times 100}{\text{Sum of rejected volume}}$$

After implementing HACCP system starting from the beginning of 1 to 20 November, the daily packing volume and rejected volume is shown in the following table

TABLE 6.2 THE EXPORT VOLUME AFTER IMPLEMENTATION

Date	Packing Volume (tons)	Rejected Volume (kg)
01-Nov-1999	115.57	-
02-Nov-1999	141.27	-
03-Nov-1999	144.79	-
04-Nov-1999	157.14	-
06-Nov-1999	156.75	-
08-Nov-1999	184.90	-
09-Nov-1999	178.71	-
10-Nov-1999	193.13	-
11-Nov-1999	189.22	-
12-Nov-1999	135.51	-
13-Nov-1999	138.14	-
15-Nov-1999	196.39	-
16-Nov-1999	140.47	113.60
17-Nov-1999	75.10	-
18-Nov-1999	138.09	-
19-Nov-1999	131.95	-
20-Nov-1999	142.79	-

The summation of packing volume equals to 2,559.62 tons. Moreover, there are 113.60 kg of rejected product in 16-Nov due to the contamination of grease. The report of this contamination shown in Appendix B. Thus, the percentage of rejected product after implementation will be calculated as follows.

$$\text{Percentage of rejected products after implementation} = 113.60 \times 100 / (2,559.62 \times 1000) = 0.0044 \%$$

From the percentage of rejected product, we can see that the percentage of rejected product at packing line was reduced. In other words, the number of products that are sent to rework or reproduction will be decreased. However, there are some points that should be concerned for the analysis.

- The amount of rejected product in October is very high because there is an error from the operation of rice technician. About 21 tons of products must be sent to rework due to the contamination of impurities from the color sorter machine. Rice technician forgot to look after the production line so that the bucket elevator adjacent to color sorter was overloaded. Subsequently, he decided to release the affected product into the finished product storage tanks due to ease of clearing affected products. Therefore, about 21 tons of rice in two finished storage tanks were contaminated and must be reproduced. If the volume in October is not used in the calculation, the percentage of rejected product is calculated from April to October, which equals to

$$\text{Percentage of rejection} = (5,665.55 \times 100) / (25,046.48 \times 1000) = 0.023\%$$

Therefore, the percentage of rejection between before and after implementation is not distinctively different. However, this system can reduce the rework from the uncleanness due to physical impurities such as metals, and other kinds of seeds. The rejection occurring after implementation came from the contamination of grease. Although the grease used in the production process is food-grade grease, the contamination of grease will lead to the poor quality of product and should be cut from the finished goods.

- Another factor that influences the analysis is a characteristic of incoming material. The product's quality had largely changed during the end of October because new rice crop has arrived. The quality of new crop is better and it has only a few insects in new crop. Therefore, this may lead to the lower volume of rejected product.

In addition to the reduction of rework, HACCP system can create other benefits after implementation as followings.

Operator awareness: The implementation of HACCP makes all employees and staffs concern about the food safety and the hygienic operating methods. Moreover, employees will get knowledge of how to operate in a sanitary way and prevent food contamination from human. After implementation and training, most of employees not only concern about the cleaning of the product, but also the cleanliness of the working environment. Furthermore, they will take care of their health for their daily livings so that they are healthier and can work with lower rate of sickness.

System Control: According to the principles of HACCP, the control and monitoring procedure need to be recorded. Therefore, it is easier for the management to monitor and evaluate the work and efficiency of the employees. Moreover, this will ensure the management that the operation in the factory is controllable and can decentralize the power of making decision to

the lower management. Thus, the factory will operate faster and be flexible for facing the problems.

Customer Recognition: Since HACCP is popularly known for many customers in Europe, the company will gain more benefits after implementation. After informing customers about the implementation of HACCP, many customers respond in a good way. Most of them tend to increase their orders due to the increase of the confidence of the company's product. Because it is the very first company in rice business that implemented the system for food safety, the company can expand its market to new customers easier.