

# CHAPTER I

## INTRODUCTION

### 1.1 Background of the Research

Agricultural and food industries in Thailand are continuously expanding due to the demand of international market and domestic market. There are several kinds of industries which used to transform agricultural products to enhance quality and value-added. The major agricultural and food industries in Thailand can be classified as drying process, spray drying process, freeze drying process, freezing process, canning process, and etc.

Drying process industry is one kind of many important agricultural and food industries that can transform fresh products from the sources to satisfy the market demand on preservative fruits, vegetables, meats, and etc. In Thailand, there are so many existing drying process companies and new entrants who intend to optimize and improve this process to maximize their own benefits. On the other hand, several problems are still required the continuous improvement which exist in each step of the process. Therefore, this process is brought to be considered for an useful research. For this research, the process of the case study factory emphasises on drying process for maize industry which has lots of procedures to concentrate on. This research could be the most beneficial for both maize drying process and other drying processes as well.

According to the improvement of overall maize drying process production lines, the procedures are to understand causes of the problems in each workstation. There are major important problems that consist of high cost of fuel consumption at fuel burner, heat loss in exhausting pipes, and energy consumption in overall processes.

For the reasons above, the improvement of overall efficiencies for this process that needs to be analyzed the problems. Therefore, Failure Mode and Effects Analysis or FMEA technique will be used to analyze and apply for overall improvement. The concentration will be applied at the starting point of unloading maize sheath from the trucks until the end of carrying to the warehouse. Data collection and evaluation will be considered to apply for reaching to new design of process and improving is to fulfil all requirements which will practically improve overall efficiency and benefit more opportunities to solve unforeseen troubles that could be happened in some times.

## 1.2 Company Background

The company is a small-size industry which was established in 2003. The case study factory has the main business in drying process service which can apply several kinds of fruits and foods such as maize, chili, tobacco, rice, longan fruit, tamarind and etc. to input the drying process. However maize is the major concentrated product. The customers normally sign a seasonal contract of hiring in drying service with the company but some of them sign an annual contract. These decisions depend on products and customer's requirements that our major customers are in the maize drying industry as well. The maize sheath loading volume for drying can be approximately 750 tons per month.

The drying process of this factory consists of 24 identical drying rooms which use a hot water boiler to heat water up and push hot water flowing into pipes through each drying room. Then hot water flows through heat exchanger before an inside blower blow down the heat to circulate in each drying room. The products inside rooms are controlled with humidity level which depend on the requirement of customers. Drying time range will be calculated from kinds of products and customer requirements as well.

The processes of this factory consists of 6 major workstation units which are described as followings.

- 1) Loading and inspection workstations unit which is based on the material handling system such as conveyer belts.
- 2) Drying rooms workstation unit which consists of 24 identical pattern rooms.
- 3) Furnace or fuel burner unit that operated by a worker per shift (Two shifts per day). Oil, lignite, and firewood are still used for burning fuel.
- 4) Maize milling workstation unit
- 5) Bag sewing workstation unit
- 6) Warehouse

## Production Process Chart

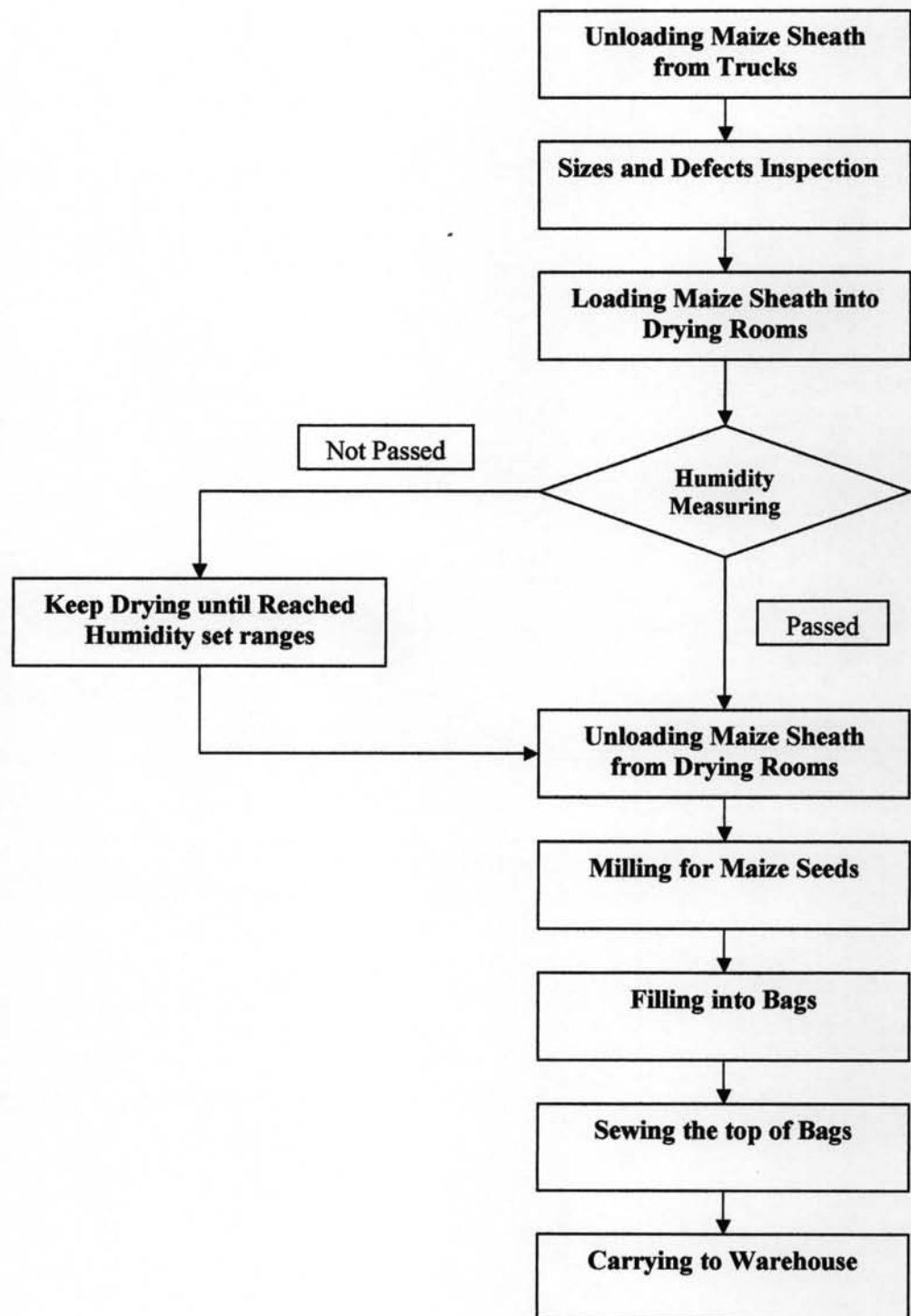


Figure 1.1: Production process chart of the case study factory

### **1.3 Statement of the problem**

The maize drying industry involves in several processes before finishing of dried maize seeds. In each workstation and operation are always faced with some troubles. To eliminate loss of time and revenue, systematical strategy will enhance overall performance of the factory. There will be included to effectively utilize of raw material, energy consumption, and fuel consumption and so on.

The main problems of this factory can be defined as followings :

- 1) Energy consumption in overall drying process presents a high value comparing with the outputs from the quantity of finished products.
- 2) At hot water boiler and exhausting pipe stations presents too much heat loss when heat is transferred to the environments. Here, heat should be utilized as much as possible.
- 3) The current fuel consumption of heating up hot water at fuel burner depends on oil, lignite, or firewood which are still high cost of purchasing and sometimes are difficult to search for.

### **1.4 Objective of the Research**

The objective of this research is to improve the efficiency and productivity of the case study factory by improving the energy and fuel consumption processes and applying new related technologies with systematical analysis and implementation by using FMEA technique.

### **1.5 Scope of the Research**

This research is aimed to be conducted within the scope as followings.

- 1) The research will involve in problem solving of temperature which occurs in boiler and exhausting pipes that presents too much heat loss. There might need a new design of heat recycling system which comes from a cyclone tank. Overall is to improve for the optimized efficiency and productivity.

- 2) Focus on the cost reduction of fuel consumption by replacing new kind of more economical fuel instead of oil, lignite, or firewood.

### **1.6 Expected Results**

The benefits which this research expected to achieve are

1. Reduce cost of production on fuel consumption that leads to the increasing efficiency and productivity.
2. Reduce heat and energy loss in transferring pipes and other processes.
3. Research will be an useful guideline for other factories.

### **1.7 Research Procedure**

1. Study the related literatures and the characteristics of each process for each method of products.
2. Develop FMEA tools for applying in maize drying process and collect data for each problem.
  - Energy and fuel consumption development.
  - Parameters of improvement in cost reduction.
3. Analyze data according to determine the goal and objectives for the performance in implementing new strategy.
4. Develop a new system, new operation methodologies, and improve of each workstation.
5. Implement action plans into every process.
6. Evaluate overall results and summarize benefits for further development plans.
7. Conclusion and recommendation.
8. Write up the thesis.
9. Thesis examination

