

CHAPTER 1 - INTRODUCTION

This thesis is a collaboration between Swiss German University and *PT. Coco*, one of the largest food industries in Indonesia.

1.1 Background

One of the main commodities in Indonesia is coconut, with an average production of 18,300,000 metric tonnes (mt) between the year 2010-2014 from the total area of 3 million hectares coconut farms. This number puts Indonesia as the world's most coconut producing country, with the percentage of 35.8% of world total coconut production in the year 2014 itself, overcoming Philippines (15,353,200 mt, 30.0%) and India (11,930,000 mt, 23.3%). (Food and Agriculture Organization of the United Nations, 2014)

Coconut water is the clear liquid inside coconuts and can be fermented using *Acetobacter aceti* subsp. *xylinum* to produce a chewy, translucent, and gelatinous dessert named *nata de coco*. Being the largest coconut producer, Indonesia also contributes a lot in exporting *nata de coco* around the world. The latest data taken by Indonesian Ministry of Industry shows that in 2011, Indonesia exported 44,452 mt of *nata de coco* (Kementrian Perindustrian Indonesia, 2011).

Initially originated in the Philippines during the 1990s, *nata de coco* was introduced to Japan in 1991 (Gama, et al., 2016). *Nata de coco* fits the Japanese canons of taste and bears similarity in terms of its color, texture, and taste with *kanten*, the traditional Japanese jelly that has long culinary tradition and often connected to sweet accompaniments for Tea Ceremony in Japan. *Nata de coco* also associated with “young” culture and considered as “*kawaii-mono*” (cute things) which Japanese young women are extremely fond. Those previous reasons made possible the transition of *nata de coco* from a traditional Philippine dish to a modern Japanese fad. (Jacob & Ashkenazi, 2013)

In South Lampung Regency of Indonesia, *Nata de coco* is one of the most reliable export commodities. One of the biggest companies is *PT. Coco*, which obtains 32,000 liters of coconut water every day from 96,000 coconuts for *nata de coco* production. (Gama, et al., 2016). *PT. Coco* is currently exporting their products mainly to Japan.

However, Japanese are well known for their perfectionist character. They demanded the *nata de coco* (which they imported from *PT. Coco*) to be precisely cubic, without depending but also considering the dimension, meaning the dimension itself is not very important, but the length, width, and height of the *nata de coco* cubes must be the same and perpendicular each other. Therefore, *PT. Coco* wants to develop a new method for cutting their product into perfect cubes.

The current method is very traditional. *PT. Coco* utilizes a sliding table where the *nata de coco* was put onto, then both the table and the *nata de coco* are pushed through the cutting blades – rotary blades positioned in a linear pattern with particular uniform space one to another. The whole process is manually done and some problems often arise: cube dimension and *cubicness* are not accurate enough (the length and width are not symmetry and perpendicular); and cutting chips often contaminate the product (because of the blades touching the table). Hence, the additional workforce is necessary for quality control to ensure its sterility and to sort them by dimension accuracy. This current method is very ineffective and labor intensive.

1.2 Research or Design Problems

1. The inaccuracy of cube dimension of the finished *nata* product.
2. The contamination of chip because the blades make contact with other material.
3. The cycle time per process is relatively long.
4. The necessity of intensive workforce to operate the process.
5. The inability of the supervisor to know the exact production rate and quantity.

1.3 Objectives

This study will have to build a prototype scale machine that will have these objectives as a matter of improvement:

1. To increase the accuracy of cube dimension after cutting process.
2. To prevent contamination of chip by adding sensors.
3. To shorten the cycle time for the process.
4. To automate the whole process hence minimum workforce is necessary.
5. To count, take note, and save the history log of production rate and quantity.

Then, the result will be studied from every aspect of *nata de coco* production process, including from food safety, industrial and financial point of view.

1.4 Significance of Study

This study is significant for three reasons.

1. *PT. Coco* as the task giver can reduce their cost for cutting process and increase their production if this study succeed.
2. The study will address the issue of barriers and obstacles to adequate *nata de coco* cutting process.
3. The study is significant because of its implications for food processing education, cutting tool dullness early detection, and automation in the food industry.

1.5 Scope and Limitations

1. The processes undertaken by *nata* before and after the cutting process are not to be studied.
2. Contaminant from any other foreign material but blades and clamp chips are not to be prevented and/or detected.
3. The machine is meant to process a particular *nata* sample from *PT. Coco*.
4. The allowed budget for this prototype scale model is up to IDR 20 million.
5. The time schedule for building the machine is September 2016 – June 2017.

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