CHAPTER 1
INTRODUCTION

1.1. Background

Now a days, world has been growing so fast. There is a new technology every second somewhere in the world. Companies, which are done their business in industries, try to do their best effort in order to compensate with the development of the world, so they can fulfill the demand of the customers at the right time when needed with good quality products.

In order to fulfill demand of the customer at the right time with good quality products, the important thing that a company has to be done is controlling the system of production process, because a good production process has to be supported with a good system of production process. The system of production process consists of, product planning, capacity planning, raw material requirement planning, machinery and labor scheduling, inventory system, facility layout, machinery maintenance management, material handling system, quality control system and safety and hygiene. The control for the system of production process mentioned above should be conducted simultaneously to ensure that the system is good.

Besides the system of production process, there is another thing that a company has to ensure in order to produce some products, which is the plant reliability. Plant reliability is an important thing because it is determine the capacity and the quality of the product being produced. If the plant reliability is high, it

indicates that the production capacity has been reached and the quality of the product being produced is good. Otherwise, if the plant reliability is low, it indicates that the production capacity has not been reached and the quality of the product being produced is poor. The range of reliability is $0 \leq R(t) \leq 1$.

A high reliability of the plant needs a higher reliability of the subsystems. The subsystems of the plant reliability are the machines, which are being operated in the production process. Therefore, in order to obtain high plant reliability, higher machine reliability should be obtained. To ensure the reliability of the machine is still high is by maintaining the machines, so the machines can perform well. Machines maintaining includes the preventive maintenance, repairing, and or replacement.

Machinery maintenance management or usually called as maintenance system is important for the continuity of the production process. It is because the maintenance system has close connection with the machines used in the production process. Machines are the main tools for producing product in the production process. Machines determine the quality of the product and the time needed for the production process. A machine that operated continually would encounter a degradation of reliability and finally would be broken. If there is breakdown for the machines during the production process, then it will make the quality of the product decrease and the time needed for the production process become longer. Nevertheless, this breakdown may prevented by doing maintenance. As doing

maintenance more often, the machine would be more durable, but maintenance incurs cost, as it getting more often, the cost would be higher.

Cooperativa Café Timor (CCT) is one of a company that running a commodity business in East Timor. It has four divisions; one of them is organic coffee. The production process of the organic coffee is done during the coffee season, starts from April until September every year. As mentioned before, in order to do the production process, the important thing is to ensure that the system of the production process is well controlled. In CCT there is still lack of the system, where it gives bad effects, such the breakdowns of the machines, where it can be seen at the data of machine downtime time in the dry processing factory of CCT. The data shows that at year 2008, there were twice breakdowns happen during the coffee season. First, it happened on June, 30th 2008 and second, on July, 22nd 2008. The breakdown of the machines also indicates that the reliability of the plant is not high, because it makes the production rate decrease.

Actually, there is a maintenance system applied in CCT, which is a preventive maintenance, where the maintenance conducted before the coffee season or during the off-season, starts from January until March. Nevertheless, there are still some breakdowns for the machines during the coffee season. This thing happens constantly every year since 2007 until 2010 and affected the production process, because the production process has to be stop in order for repairing the breakdown of the machines and it makes the time needed

for production process become longer. The worst thing that could happen if this thing continues to happen in long period of time is CCT will lose some of their customers, because the production system in CCT is a Make To Order (MTO) production system where the order comes from the customers with the delivery time that is also determined by them. Therefore, maintenance system in a company is an important thing that has to be considered.

1.2. Problem Statement

Referring to the background above, the problems in this research are the unknown plant reliability and the inappropriate maintenance strategy applied in the dry processing factory of CCT.

1.3. Research Objectives

The research objectives are to determine the plant reliability and propose a proper maintenance strategy that can be applied in the dry processing factory of CCT.

1.4. Scope of Research and Assumptions

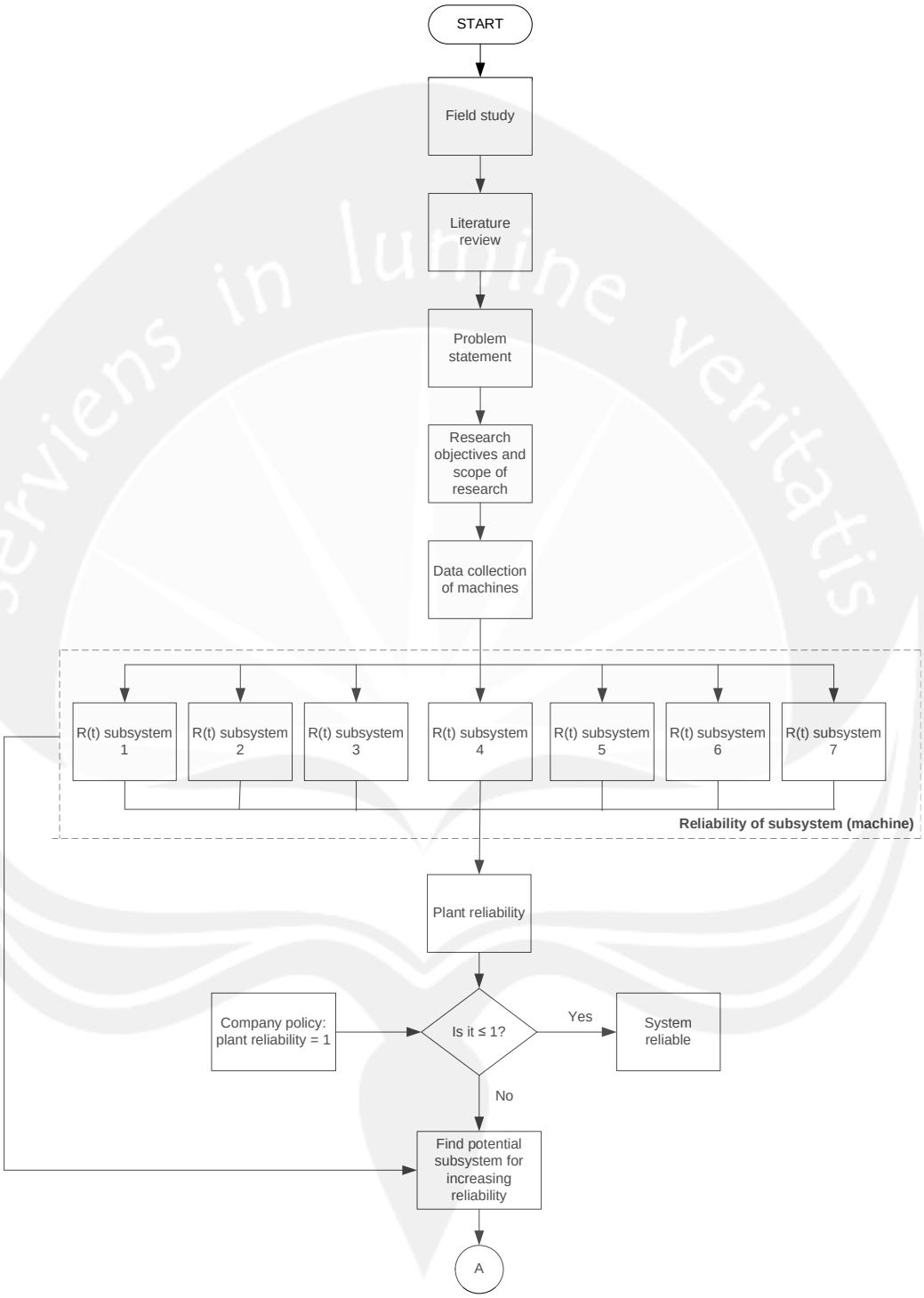
To prevent the misunderstanding about the content and conclusion on this thesis, the boundaries of the research should be existed. The limitations and assumptions on this research are:

a) This research is conducting in Dry Processing Factory of Cooperativa Café Timor (CCT), East Timor.

b) The machines observed are peeler polisher, elevator, catador, dencimetric table, and grader.
c) The respond measured is the downtime of each machine during the coffee season of year 2007 until 2010.
d) The historical data is limited in period.
e) Policies of the company determined the plant reliability is 1.
f) Spare part replacement with the new one.
g) There are no defect products when machines have breakdowns.
h) There is no overtime during the coffee season.

1.5. Research Methodology

The research methodology of this research will likely shown on Figure 1.1.


START
Field study
Literature review
Problem statement
Research objectives and scope of research
Data collection of machines
R(t) subsystem 1
R(t) subsystem 2
R(t) subsystem 3
R(t) subsystem 4
R(t) subsystem 5
R(t) subsystem 6
R(t) subsystem 7
Reliability of subsystem (machine)
Plant reliability
Company policy: plant reliability = 1
Is it ≤ 1?
Yes
System reliable
No
Find potential subsystem for increasing reliability
A

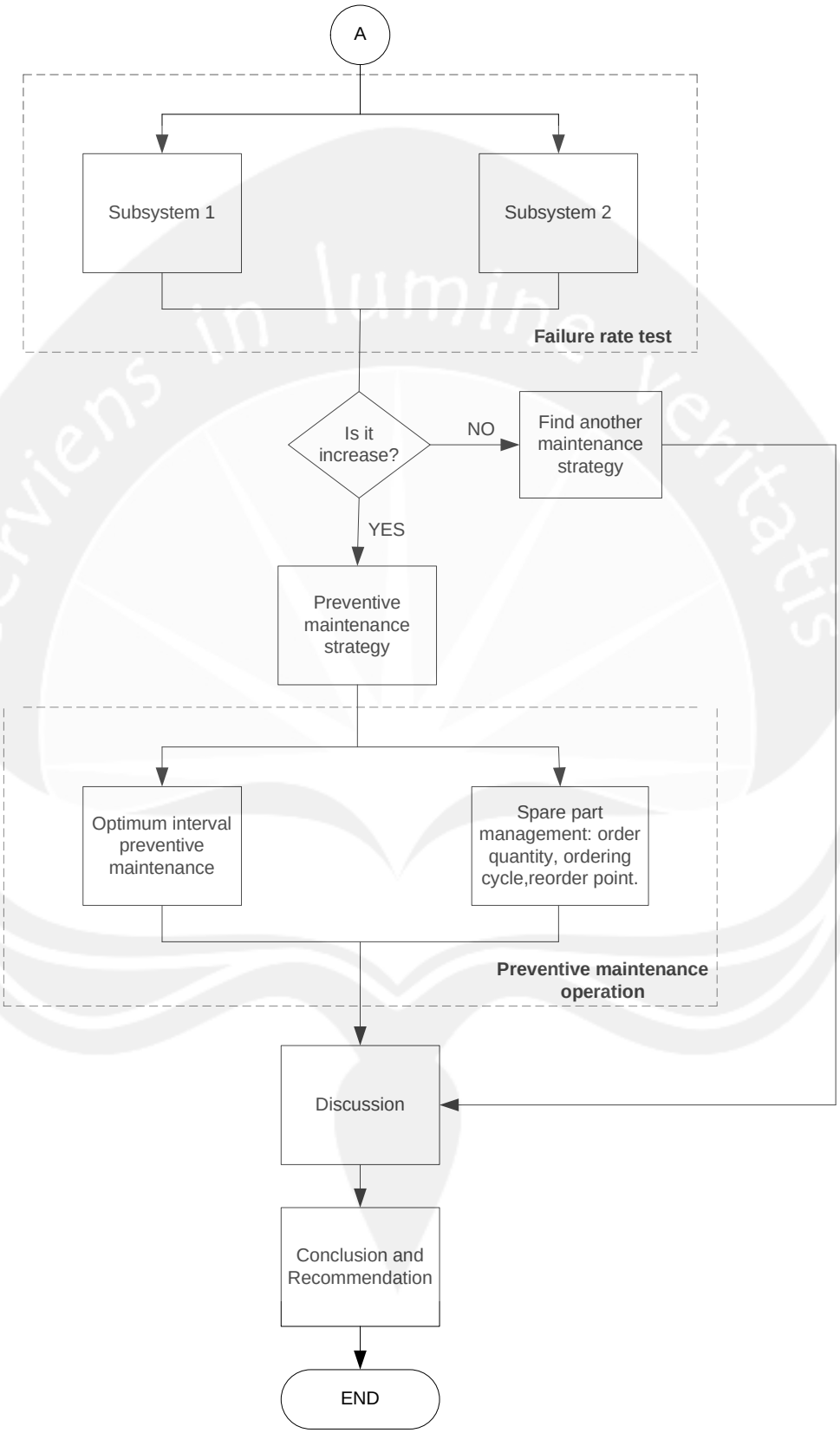


Figure 1.1. Flow Chart of Research Methodology

Based on flow chart of research methodology shown on Figure 1.1., there are some steps in solving the problem of this research.

a) Field study

Field study is done with purpose to know the background of the problem and the problem occurs.

b) Literature Review

Literature review is done in order to gives understanding about the method that will be used for analyzing and solving the research problem.

c) Determining the Problem Statement

Problem statement can be determined after knowing the background of the problem and the problem occurs.

d) Determining Research Objectives and Scope of Research

After determining the problem statement, then the research objectives and the scope of the research can be determined. These things are done with purpose to ensure that the discussion of the research will still in the scope to achieve the research objectives.

e) Data Collection of Machines

Gain the data needed for analyzing and solving the research problem.

f) Analysis

Analysis is done after gained the data. In order to solve the research problem, there some analysis should be done, such as calculating subsystem (machine) reliability, then plant reliability. If plant reliability is below one, the next step is

finding potential subsystem for increasing reliability of the plant. Otherwise, if no, the research is finish, because the system reliability of the plant is reliable.

The failure rate test is done in order for finding a proper maintenance strategy than can be applied the plant. If the failure rate test is increasing, apply the preventive maintenance strategy. Otherwise, if no, find another maintenance strategy.

The optimum interval preventive maintenance being calculated after knowing that the preventive maintenance strategy can be applied.

Last, does the spare part management by calculating the spare part inventory to ensure that the spare part is available when needed.

g) Discussion

Discuss the analysis that has been done in order for giving an explanation.

h) Conclusion and Recommendation

The last step is making the conclusion of the research problems that has been analyzed and solved. Conclusion will show the achievement of the research objectives. Besides that, some recommendations are giving to the company.

1.6. Report Outline

The systematic ways of writing the report can be describe as follows:

CHAPTER 1 : INTRODUCTION

Introduction contains background, problem statement, research objectives, scope of research and assumptions, research methodology, and systematic writing.

CHAPTER 2 : LITERATURE REVIEW

Literature review contains short descriptions of the previous researches about maintenance and the differences with this current research.

CHAPTER 3 : BASIC THEORY

Basic theory contains systematic descriptions of maintenance and other things related with maintenance.

CHAPTER 4 : COMPANY OVERVIEW AND DATA

This chapter contains the profile of the company, the production process, the production system of the company and data needed for analyzing the problem.

CHAPTER 5 : ANALYSIS

This chapter contains data analysis of machines in order for solving the research problems.

CHAPTER 6: DISCUSSION

This chapter is the discussion of data analysis of the research problems to achieve the research objectives.

CHAPTER 7 : CONCLUSION AND RECOMMENDATIONS

This chapter is the conclusion from the analysis, which is appropriate with the research objectives and some

recommendations for the company related with maintenance.