

## CHAPTER 3

### METHODOLOGY

#### 3.1. Flowchart Methodology

The flowchart methodology of this research is available in the Figure.3.1.

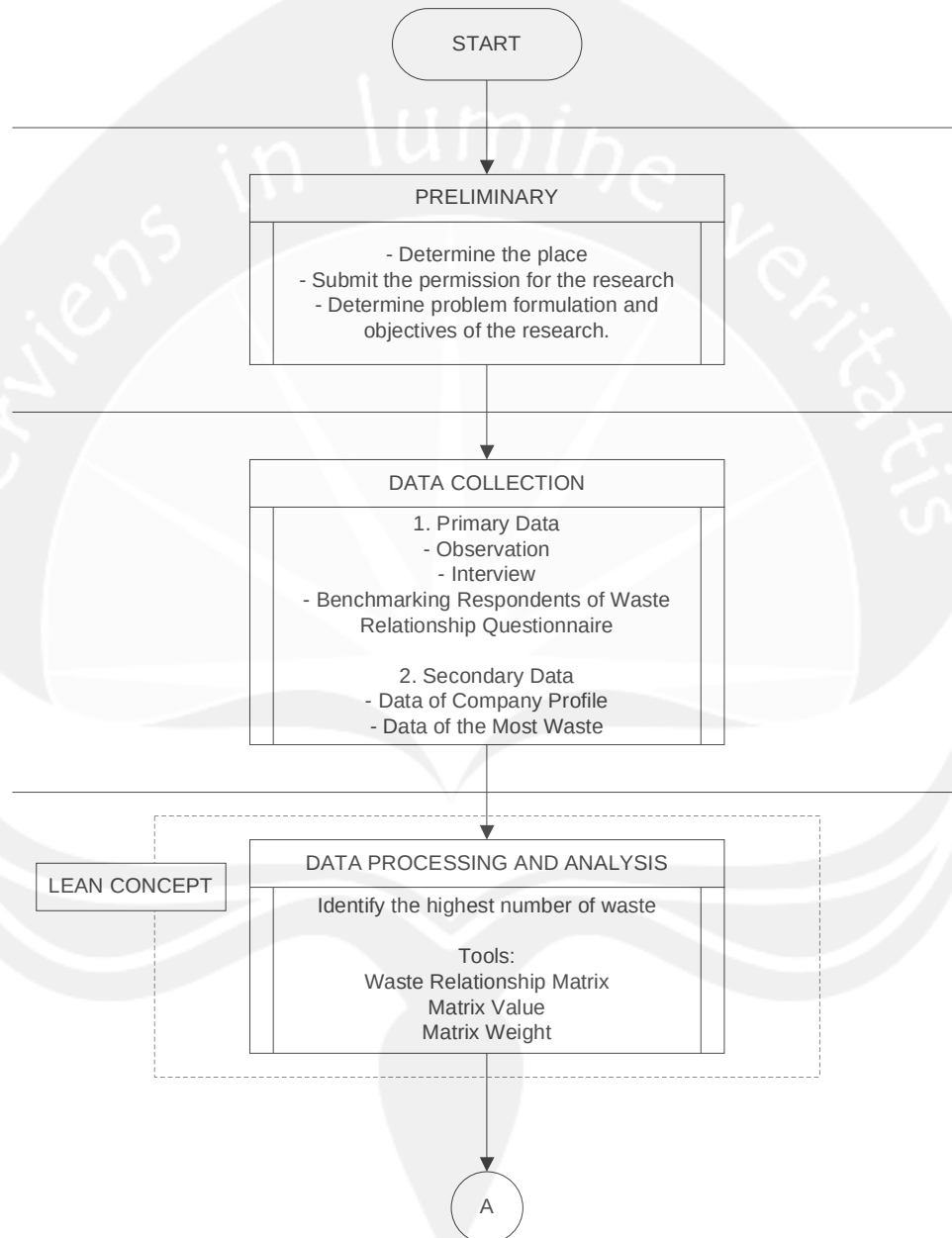
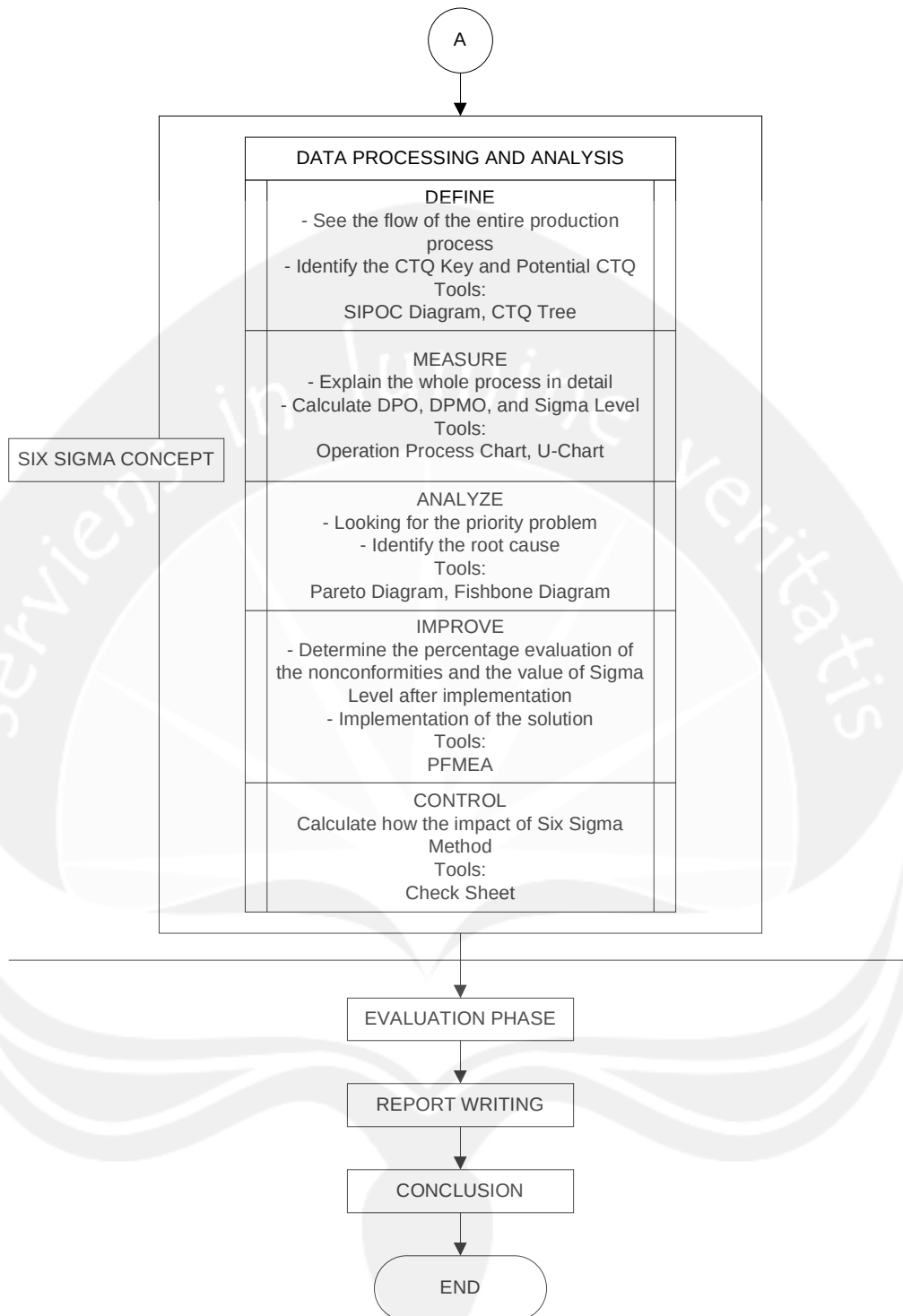


Figure.3.1. Flow Chart of Methodology Research



**Figure.3.1. (Continued)**

## **3.2. Research Methodology**

### **3.2.1. Preliminary**

Introduction phase is the first phase in this observation. In the introduction phase, the activities are below:

- a. Determine place for the research.
- b. Submit the permission letter for the company.
- c. Observation

The observation can be performed based on the sources, such as field study or literature review. Field study is used to find out the condition in the company directly. Only then, the potential problem found out. In other hand, in this phase the interview process with the supervisor or quality control department is available to happen. The interview result is important to find out the image of the first condition and the problem occurred in the company.

Furthermore, the objectives of the literature review are to assist conceiving the topic of the observation and to find out the other information related to the observation. The information is available in the books, journals, articles, internet, and the other thesis.

- d. Determine the problem formulation and the objectives of the research.

In this phase the problem in the PT. SLP will be identified. The identification held after the directly observation has been done. Based on the problem identification, the purposes of this observation are to minimize the waste and to increase the quality level using Lean and Six Sigma principle.

### **3.2.2. Data Collection**

Data which is used in the observation is primary and secondary data. Primary data is the data which is procure from the source directly without expediter.

- a. Kind of products based on the interview and observation with the employee.

- b. Machine specification, production slot, specification standard of product based on the interview and the observation with the quality control department.
- c. Production machine, raw material, and photo of implementation when observe in the production process with the operator.
- d. Number of waste and the most waste in the production floor which are based on the questionnaire's result.

Secondary data is the data which is procure from the other source. Secondary data is procure from the document in the company, such as kinds of uniformities, data of reject products, number of productions per days, company profile, and organizational structure.

### **3.3. Data Processing and Analysis**

The data processing and analysis are divided into two large concepts which are Lean Manufacturing and Six Sigma. The first concept is Lean Manufacturing. In order to identify the highest number of waste which is appear in the production floor, the observation's tool which is used is Benchmarking Respondents of Waste Relationship Questionnaire. In the data processing and analysis, the results of the questionnaire are going to be measured in order to determine the highest number of wastes.

After the highest number of waste has been selected, the data is going to be processed and analyzed by using Six Sigma's concept. In this method there are 5 phases, such as Define, Measure, Analyze, Improve, and Control. DMAIC used as the problem solving method because this method is appertain as repaired process and the process which is effective to improve the quality. The phase of DMAIC explains below:

#### **a. Define**

In this phase, there are two tools which are used. They are SIPOC Diagram and CTQ Tree. SIPOC diagram (supplier, inputs, processes, outputs, customers) is the diagram which is used to identify the flow of material from the supplier until the customer. The next activity which is used in the define phase is identify the critical to quality (CTQ) and the potential of CTQ which have impact to evoke the reject product.

#### b. Measure

Measure phase is the second operational step which is used to increase the quality based on the DMAIC method. The first tool is Operation Process Chart (OPC). OPC shows the steps of RH Roll production process. OPC is completed with the time for every process. The processing time for every process is obtained from the observations. The observations data for every process are going to be processed by using Normality Test and Uniformity Test. The Normality Test and Uniformity Test are calculated by using Minitab Software.

The second tool in this phase is mapping process. Mapping process is used to see if the whole process in detail. To ensure that the process is still in control limit, the tool which is used is U-chart.

The other activities in this phase are calculates the DPO, DPMO, and Sigma Level of the company. This calculation is executed for the data in December 2015.

#### c. Analyze

Analyze is the phase which is used to look for the main problem and the root cause of the problem. This analysis is used Pareto Diagram as the tool. The result of the Pareto Diagram is going to be analyzed by using brainstorming. Brainstorming is performed with the discussion process. The discussion process is performed with the Quality Control Department. The result of the discussion is going to be shown in the Fishbone Diagram.

#### d. Improve

Improve phase is use to improve the process and omit the cause of defect. In the improve phase, the first step is determine the cause of defect which become the priority defect based on PFMEA (Process Failure Modes and Effects Analysis), after that implement the solution for the cause of defect. PFMEA consist of many value of Severity, Occurence, and Detection. Severity is the seriousness value which is caused of the fault in process and consumer. Occurence is the frequency of error. Detection is the seriousness because of the fault in control tools which is caused by potential cause.

The scoring process of PFMEA is the result from the brainstorming with the Quality Control Department, Section Chief of Production, Operational Manager, and Operational Director. This objective is to achieve the best solution based on the company problem. That solution will be implemented in the company.

e. Control

Control phase is the main phase in Six Sigma, because in this phase the impact of Six Sigma implementation will be known. The steps in this phase are standardization the requirement of the process and system. Moreover, inspect the process by using check sheet process for certain process.

**3.4. Evaluation Phase**

Evaluation phase is use to compare the Sigma value and the defect's percentage before and after the implementation.