

CHAPTER III

RESEARCH METHODOLOGY

3.1 Problem Identification

This research was taken place in PT. Gula Putih Mataram (PT. GPM) which located in Lampung Tengah. PT. GPM is the national sugar industry that specializes in creating sugar cane-based products. One of the obstacles that often arise in improving quality and productivity is the failure of the system. In Gulaku production, there are several defects that occur the product. It caused by insufficient and unreliable application of quality control in the company.

Hence, this research is aimed to analyse product defect to improve the quality of product on Gulaku department. The methods used in this research are Failure Mode and Effect Analysis (FMEA), Fuzzy Analytical Hierarchy Process (F-AHP), and Six Sigma through phases of Define, Measure, Analyse, Improve and Control (DMAIC). The result suggests to develop suitable improvements and controls considering ranking system of Risk Priority Number (RPN).

3.2 Problem Formulation

This research focuses on product defect analysis. The problem formulation is set as a basis to limit the research area and clearly define the issues that the researcher tries to address.

3.3 Literature Review

Inductive and deductive study were done for the literature review. Inductive study to obtain the information of related previous studies and deductive study to obtain the basic

theory of this research. The previous studies show the difference and position of this research among the other researches to avoid plagiarism and basic theory are mainly used to learn and to find out the method and formula used in the research. All references from inductive and deductive study are obtained with the keyword of product defect, improve quality, quality control, Fuzzy AHP-FMEA, and Six Sigma.

3.4 Data Collection

Data that being used in this research are primary and secondary data. Primary data would be mentioned in the Table 3.1.

Table 3.1 Primary and Secondary Data

Type of Data	Source	Data
Primary Data	Historical data	Product type, amount of production, defect type, amount of total defect.
	Questionnaire	Pairwise comparison of FMEA criteria.
	Interview & discussion with the experts	Potential of failure mode, potential effect of failure, potential causes of failure mode, FMEA criteria rating and scale.
Secondary Data	Literatures	Pair-wise comparison rating, Fuzzy Scale.

Due to research limitation, PT. Gula Putih Mataram, especially Gulaku department allowed the research to have their historical data for one-year production time, which is from the 1st of October 2017 until 30th of September 2018. The experts of Gulaku department are the manager and shift officer.

3.5 Data Processing

The data processing flow is shown in the Figure 3.1. The research flow follows the flow of method that is being used from the beginning until the end of the research.

3.6 Discussion

After all the data processing finished, then discussion would be conducted to discuss the result of Defect Per Million Opportunities (DPMO) and Sigma level, the result of risk priority number after being calculated by Fuzzy AHP-FMEA method, improvements and controls to prevent the product defect.

3.7 Conclusion and Suggestion

In conclusion and suggestion, the problem formulations which are formulated are being answered. There are also several suggestions made for the company and future related researches.

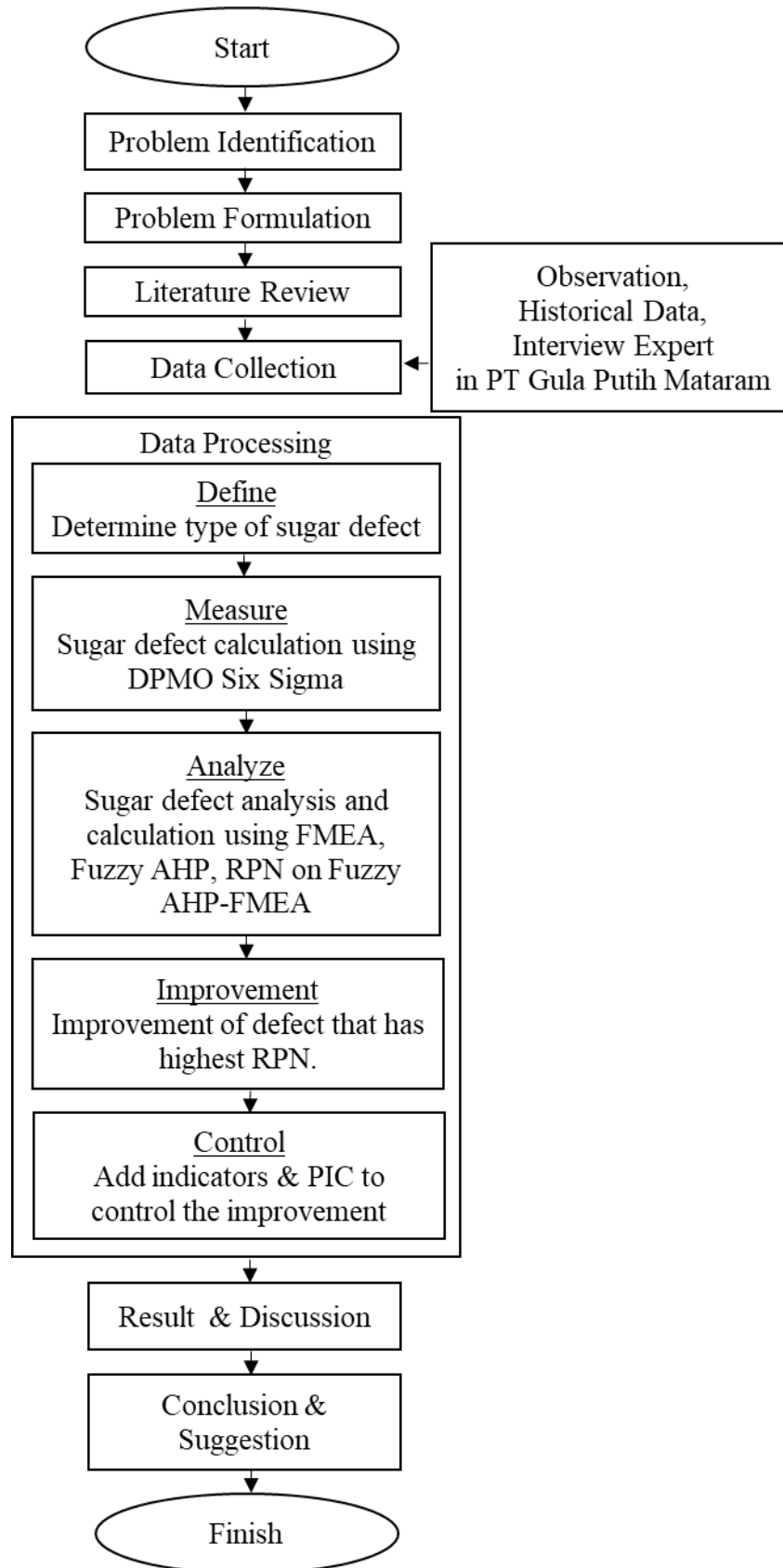


Figure 3.1 The Flowchart