

## **CHAPTER 3**

### **METHODOLOGY**

This research methodology uses some data collected from material handling books and research techniques alike Apple (1972) which develop information for the project. The required data are collected by evaluating some suppliers which produce the racking system to be installed in the cold storage. The dimension and technical specifications will be compared to the cold storage of PT. Bernofarm based on the cold storage's engineering layout. The inventory level will be maximized based on not only the old warehouse layout, but also the warehouse dimension and aisle. Details of the step in the project are explained below.

#### **3.1. Defining a problem**

In this step, problem from a company is being identified. When there is no problem for the current topic, either problem in other aspect inside the company or problem in other company should be sought.

#### **3.2. Collecting Data**

There are two steps for collecting data required to carry out the project, they are interview and survey. Both of the steps are very important for making final decision to improve the warehouse in the future. The methods used are described below.

##### **3.2.1. Interview**

Interview defined as a meeting with people face to face or using other media to hold a conversation required for collecting information. The method is applied to get relevant data from direct users of the warehouse to understand how the warehouse works for the company.

This is the first step to collect the data required from the employees' perspective who actively working in the area of cold storage, because they are the ones who understand the most about the good and the bad sides of the cold storage.

The target of the interview is the warehouse supervisor who directly gets orders from the manager, check the labor's work, and evaluate the work within the warehouse.

### **3.2.2. Survey**

Survey is a general view, examination, or description of someone or something. This method used to collect data and information around the company. Data is taken both from the engineering drawing of the cold storage and from the real measurement at the subject of the project.

The other data needed for analysis are both internal and external factors which affect the workflow in the cold storage itself, so decision to guide the cold storage to be a better place for storing goods in evaluation and analysis can be made.

### **3.3. Evaluation and Analysis**

Evaluation is a term that means to examine and judge carefully. This method is used to examine three types of racking system to be installed in the cold storage. Those racks are evaluated from several factors and the best one will be chosen.

Analysis is done from the data collected and it must be connected to the evaluation of the racking system for the storage. The analysis is using the formula for choosing the racking system and calculating the maximum pallets that can be stored. Basically the project is done based on theories or the real data collected due to the differences that usually occur in the real action. The result of evaluation and analysis then is the final decision from the choices of racking system evaluated above. The plans for evaluation and analysis steps are:

#### **a. Current Racking System Analysis**

The current racking system is being analyzed if it meets the standards and can be improved in terms of capacity for the cold storage. This step is mainly to determine if there is a need to change the racking system.

#### **b. Alternative Racking Systems Selection**

This next step is to select racking system with some alternatives based on theories such as Apple (1972) and Rushton et al (2006). Then all of the possible alternatives, including the installed racking system are compared

using weighting method for a quantitative analysis. Weighting method is used to determine the score of each racking system's characteristic and sum the total score of characteristics which are appropriate for the main objective of the study. The weighting method will eliminate the lowest score, which means eliminating bad alternatives for the company. Weighting method will be based on Rushton et al (2006) which is using the score of 1 to 5.

There is also supplier's selection for each alternative which will be chosen based on some factors of selecting supplier that weighted with scores.

c. Alternative Analysis

After finding the suitable alternatives for the company, each alternative is being analyzed by designing the proper layout for the cold storage. Each layout is designed based on the objectives with a proper dimension explanation.

d. Inventory Level and Cost Analysis

This step is divided into two parts, which explained below.

1. Inventory Level Analysis

In this analysis, quantitative analysis is being used to analyze the numeric data gathered from the company. Then the analyzed data will be compared with the objective and alternative analysis' result using comparative method.

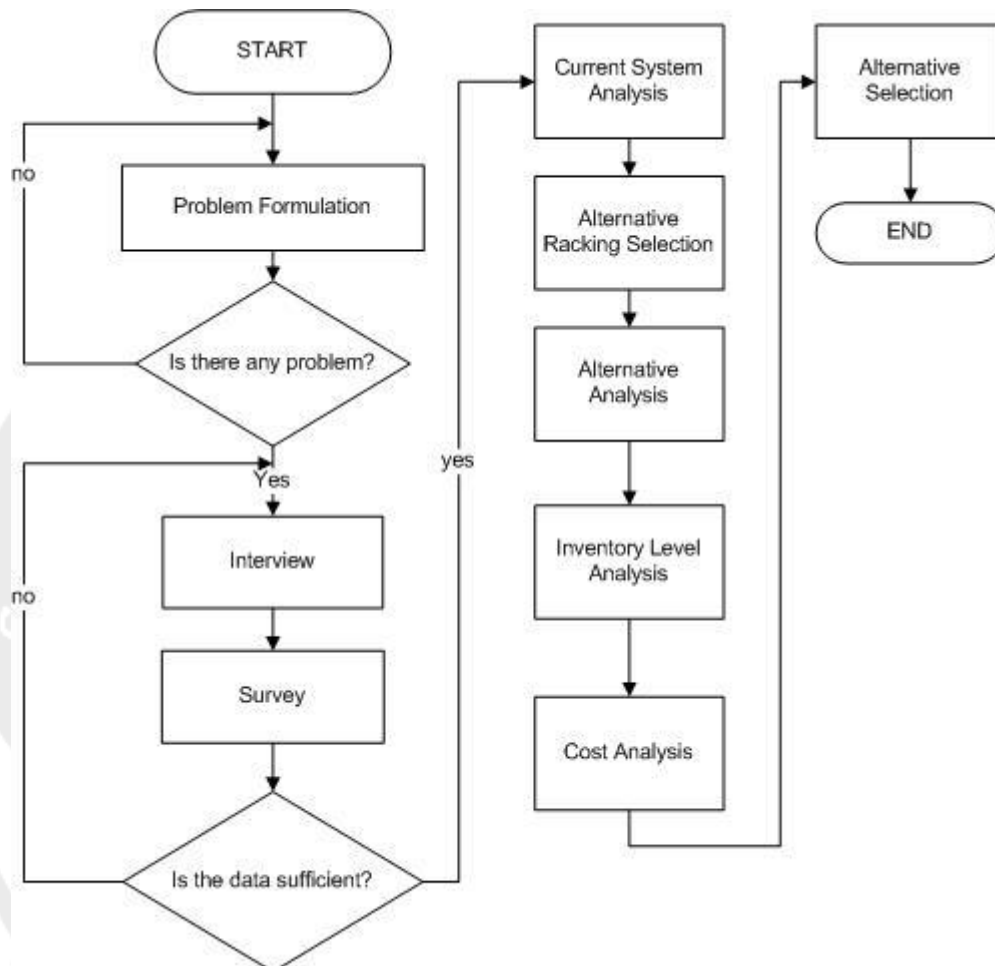
2. Cost Analysis

This step will analyze all equipment and tools, also installation cost needed to support the installation of each alternative. The cost of each equipment and tools also the cost of installation will be calculated in total for each alternative.

e. Alternative Selection

This step will explain about picking the best alternative for the company by comparing all the analysis being done in previous steps with the main objectives of this project.

Figure 3.1 below shows the steps to finish the research from the start of the problem formulation. This flowchart works as the basic theory to finish research with the kind of problem.



**Figure 3.1. Flowchart of methodology**