

CHAPTER III

RESEARCH METHODOLOGY

3.1 Problem Identification

This research takes place at PT. Yoska Prima Inti (YPI) which located in Tangerang. YPI is an automotive component manufacturer. YPI is supported by several suppliers in order to provide the raw material, but the manufacturer only considers the supplier selection and order allocation based on economic criteria, which the economic criteria are not enough to evaluate the suppliers performance. Based on supported literature, sustainability has been considered as the most decisive criteria for selecting the most suitable supplier. As a result, suppliers are being selected according to sustainability criteria. Therefore, not only economic, but also environmental, and supply risk criteria are also considered. The economic aspect is concerned on minimizing total purchasing cost, the environmental criteria is involving the supplier evaluation considering the aspect of environment, and the supply risk criteria is considered to mitigate the supply risk. Hence, this research aims to identify supplier selection and order allocation considering those aspects of criteria. The method in this research is using AHP, multi-objective linear programming, and risk management. The result of this research is selected supplier based on supplier evaluation and optimum revised order allocation of each supplier.

3.2 Problem Formulation

This research focuses on sustainable supplier selection and order allocation considering the aspect of economic, environmental, and supply risk criteria. 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

Deductive and inductive studies were done for the literature review. Deductive study was performed to gain the basic theory of this research. Then, followed by inductive study that conducted to obtain the information on related previous studies. The basic theories are mainly used to learn and to find out the method and formula used in the research. All references from deductive study are obtained with the keyword of sustainable supplier selection, order allocation, and supply risk. Then, the previous studies show the difference and position of this research among the other research to avoid plagiarism.

3.4 Data Collection

Data that being used in this research is a primary and secondary data. Primary data which is obtained from historical data, questionnaire, and interview with the expert. The secondary data is obtained from literatures and books. For the primary data, historical data is applied for obtaining the customer demand, supplier capacity, and other information of purchase cost, transportation cost. Questionnaire is to fulfil the pairwise comparison of alternative, while interview and discussion with the expert is to identify the environmental criteria and supply risk that suitable with current case study. Questionnaires are attached in Appendix A, and Appendix B, which consist of 2 questionnaires. The first questionnaire is the questionnaire of determining the weight of criteria in supplier selection and the second questionnaire is the questionnaire of determining the weight of each supplier corresponding to environmental criteria in supplier selection. Due to research limitation, the standard should be ignored and accept the given expert by the company. The expert of the company is the manager of logistic. An expert is someone with extensive knowledge or ability based on research, experience, or occupation and in a particular area of study. Someone can be considered as an expert by education, training, profession, publication or experience. For the secondary data, literatures and books are used to obtain about the environmental criteria and supply risk criteria.

3.5 Data Processing

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

3.6 Discussion

After all the data processing finished, then discussion was conducted to discuss the predefined criteria, the result of supplier selection considering environment criteria, the result of initial order allocation considering environment and economic, the revised order allocation considering supply risk corresponding to risk rating.

1.7 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.

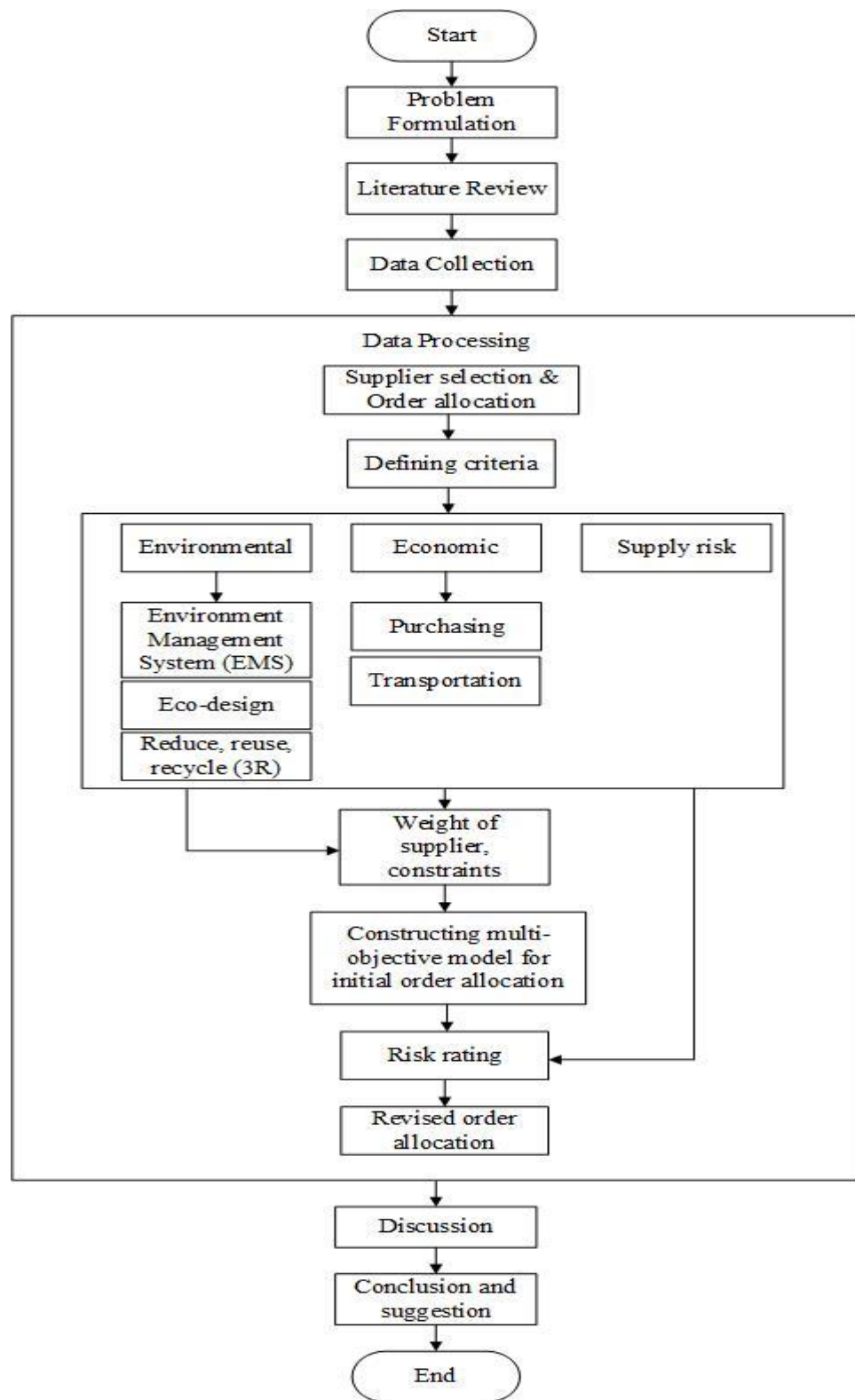


Figure 3.1 The flowchart

The detail descriptions of data processing are as follows:

1. Supplier selection & order allocation : The first step of supplier selection and order allocation is defining the criteria to be considered.
2. Defining criteria : The predefined criteria consist of environmental, economic, and supply risk. The criteria are obtained from literature for sustainable supplier selection.
3. Environmental criteria : Environmental criteria are considered for supplier evaluation and selection. It consists of EMS, Eco-design, and 3R, which are obtained from literature and had been discussed with the expert. The method is using AHP analysis for determining the weight of suppliers. Data are taken from questionnaire that filled by the expert. Then, the weight of suppliers is obtained. Supplier with the highest weight is the best supplier for supplying the material.
4. Economic criteria : Economic criteria are considered for determining the order allocation. The data are taken from historical data. Data are consisting of customer's demand, supplier's capacity, purchasing price and transportation cost.
5. Constructing multi-objective model for initial order allocation : After the weight of suppliers obtained, then constructing a multi-objective mathematical model for determining the order allocation. There are 2 objective function, the first one is minimizing total purchasing cost and the second one is maximizing supplier evaluation. The calculation is done by using Lingo 17.0 software. The result is the optimum initial order allocation.
6. Supply risk : Supply risk is the last criteria to be considered. Incorporating supply risk to order allocation to mitigate the supply risk. Supply risk are obtained from literature and discussion with the expert for identify the suitable supply risk for the case. The method is using risk management and resulted in risk rating. Supplier with the lowest risk rating is the first priority of supplying the material.
7. Revised order allocation : After risk rating is obtained, then the calculation of determining the revised order allocation is using Lingo 17.0 software. The result is the optimum revised order allocation.

