CHAPTER 3
METHODOLOGY

The research in this thesis focuses on finding an appropriate lot sizing technique in decreasing demand problem that gives minimum total cost. This chapter explains about the methodology used by the researher to do the research. The methodology is started from problem identification, literature review, research preparation, generating 2 solution models, result analysis, and conclusion. Those are explained as follows:

3.1. Problem Identification

This was the first step taken by the author to identify the problem of the research. The author was using the decreasing demand problem happened in hard drive manufacturer as the example problem. There were 5 items of HGA (*Head Gimbal Assembly*) those were assembled by 2 components. There were suspension and slider fabrication. The author focused on suspension component rather than slider fabrication because this component should be bought by the company from suppliers. Materials Department – Suspension Commodity was the department who took the responsibility to buy the suspension. They faced a problem to minimize the total cost from over-buying suspensions. This step was explained in Chapter 1 of this research.

3.2. Literature Review

After identifying the problem of the research, the next step was conducting literature review. This step was conducting by the author to find the possible research in decreasing demand problem. Author had reviewed some papers related to decreasing demand problem, but just a few papers conducting Lot Sizing Technique to solve the problem. One paper from Pujawan and Kingsman (2003) was used as a guideline to do this research. Their paper explained about the properties of lot sizing technique for Lumpy Demand. They conducted 5 different Lot Sizing techniques on his research: Silver Meal 1(SM1); Silver Meal2 (SM2); Least Unit Cost (LUC); Part Period Balancing (PPB); and Incremental (ICR) techniques. They suggested an appropriate lot sizing technique to minimize total cost for Lumpy Demand problem. Author found the gap to conduct the research using Lot Sizing technique for decreasing demand characteristic.

This step was explained in Chapter 2 and added theoretical background of Lot Sizing technique. Figure 2.1 showed the gap analysis of this research.

3.3. Model Development

This step was conducted by the author to make some preparations before conducting the research. First, author checked the data distribution whether it followed the decreasing demand characteristic or not. The data followed decreasing demand pattern and exponentially distributed. Those were explained in Chapter 4. Second, author constructed 2 solution models for the research problem. Considering the research was about inventory policy problem with dependent demand characteristic, author conducted different treatments to parents(HGA) and components(Suspension) of items in order to see the effect in calculating total cost. There were explained as follow:

a) Solution model 1:

   Author constructed MRP sheet in excel for 5 lot sizing techniques. The parent's quantity orders were solved by using Lot For Lot technique and the components were solved by using 5 lot sizing techniques: Silver Meal 1, Silver Meal 2, Least Unit Cost, Part Period Balancing, and Incremental. Then, author calculated the Total Cost for each item per lot sizing technique.

b) Solution model 2:

   Author constructed MRP sheet in excel for 5 lot sizing techniques. The parent's and component quantity orders were solved by using 5 lot sizing techniques: Silver Meal 1, Silver Meal 2, Least Unit Cost, Part Period Balancing, and Incremental. Then, author calculated the Total Cost for each item per lot sizing technique.

Table 3.1. The pairs of Lot Sizing Technique

		Parents					
		LFL	SM1	SM2	LUC	PPB	ICR
Components	LFL						
	SM1	√	√				
	SM2	√		√			
	LUC	√			√		
	PPB	√				√	
	ICR	√					√

3.4. Generating Solution Models.

After defining 2 solution models in this research, author generated the solutions. Start with the first model, author applied Lot for Lot technique for parent's demands and 5 different techniques for the components. Then, author calculated the total cost per component based on inventory on hand and order occurred. Author also generated the second model. Start with determining the quantity order and inventory on hand for each parents and components, then the total cost for each component was calculated. This step was explained in Chapter 5 and Chapter 6.

3.5. Result Analysis

This step was intended to compare the results of each model used. Author compared the total cost occurred from different lot sizing techniques. Total cost occurred from inventory cost and order cost. The results of these calculations were calculated by using simple calculation in Microsoft© Excel 2007. The aim of comparing the results between first and second solution model was to find what kind of lot sizing technique can be used in decreasing demand problem to minimize total cost. The result analysis is discussed in Chapter 7 of this research.

3.6. Conclusion

The results from analytical model calculation and analysis were used in taking the conclusion. This step was intended to check if the objective of the research had been achieved. The conclusion of this research is presented in Chapter 8. The details of the research methodology can be seen in Figure 3.1 to Figure 3.4.

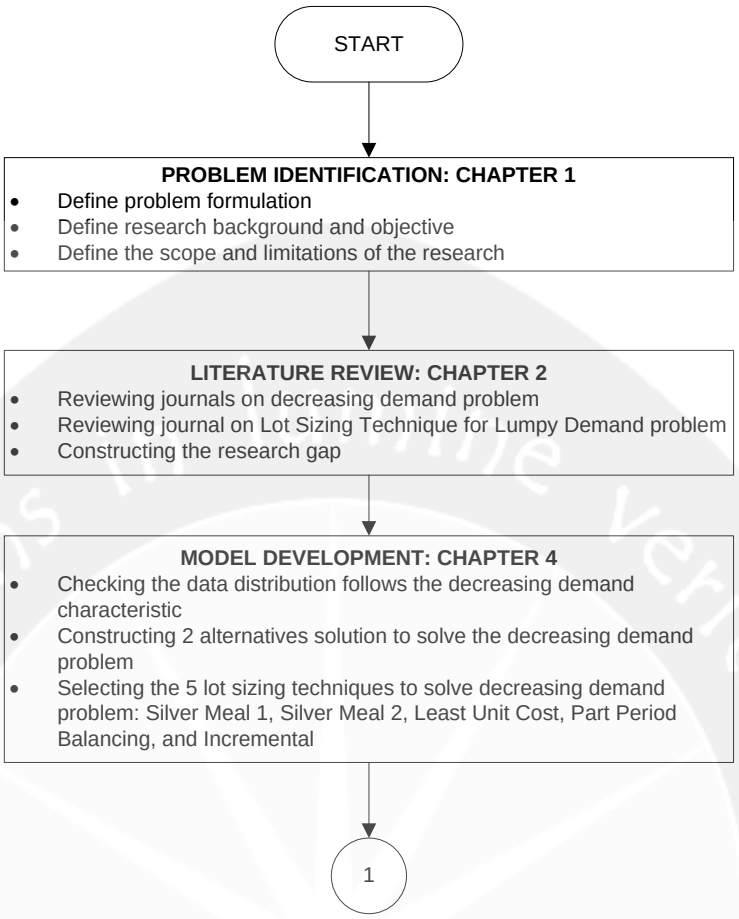

Figure 3.1. Methodology - 1

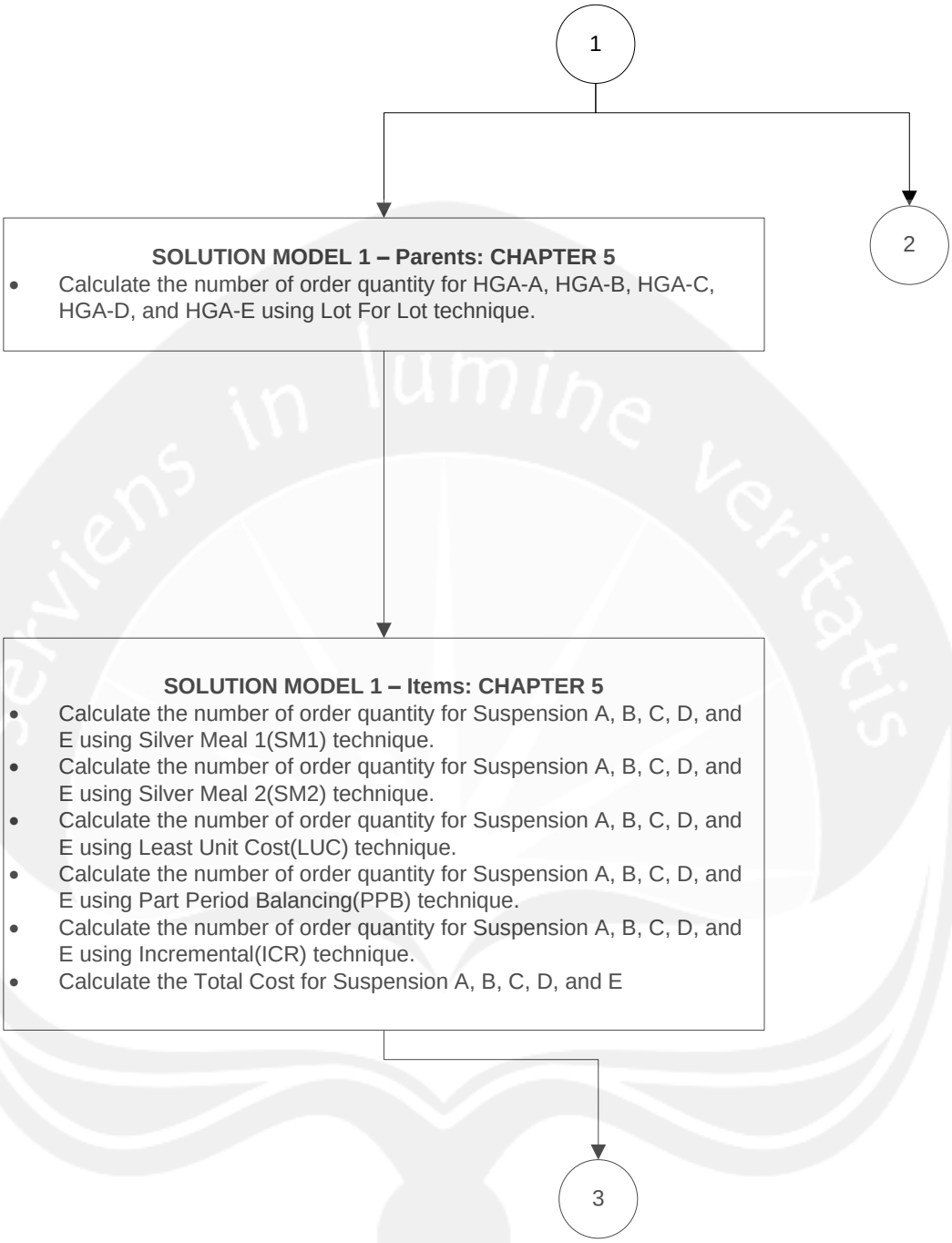

Figure 3.2. Methodology – 2

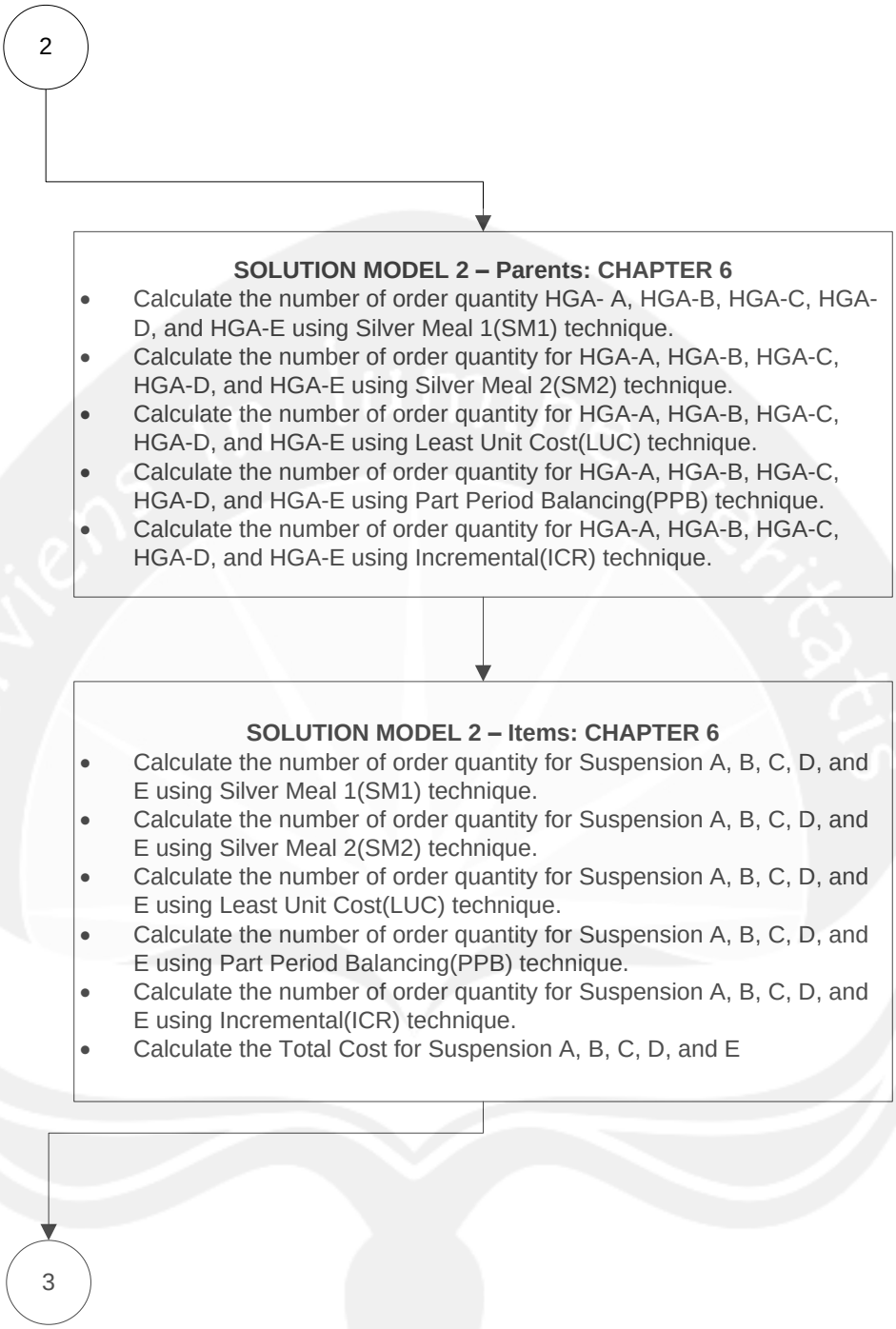

Figure 3.3. Methodology – 3

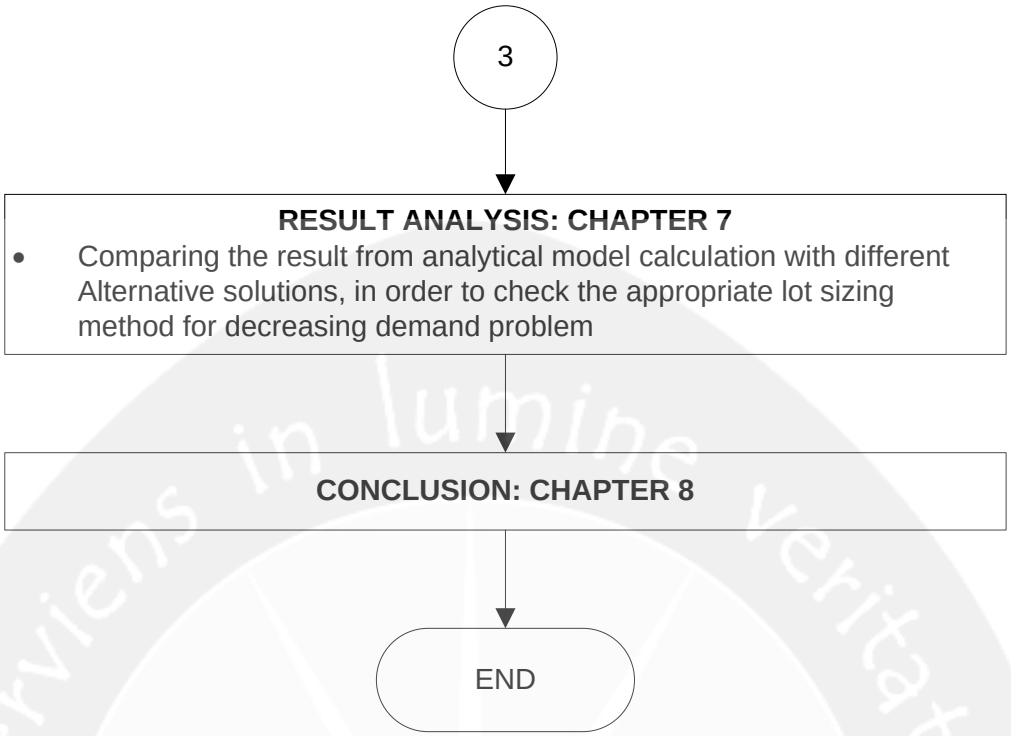

Figure 3.4. Methodology – 4