CHAPTER 1
INTRODUCTION

This chapter explains research background including a short review of the previous researches and the differences to this research in *Lot Sizing Technique* with different characteristic of demand. In addition, problem formulation and the objective of this research are explained. Furthermore, this chapter explains about the scope and limitations of this research.

1.1. Background

In a supply chain, Materials Department of manufacturing company has responsibility to provide materials or components for production. Demand for marerials from Production Control Department are always fluctuated by weekly, daily, or even hourly. Production Control Department as an internal customer always checks the requirements of the components and asks the Materials Department to provide the requirements. In certain condition, the demands form internal customer is high for certain components. But, sometime the demand is low or following lumpiness pattern. Pujawan and Kingsman (2003) explain that lumpy demand is used to represent the situation where a demand for an item or component does not occur every period, but rather, there is a large proportion of periods having zero demand. In other case, there is a situation where demand of the component is always decreasing by time and at certain time there will be no more demand anymore. It becomes a critical situation for Materials Department. Materials Department always purchases the materials from supplier periodically. If Materials Department has purchased high numbers of components A but at following week there is no requirement for component A to build Item A, Materials Department will suffer a lost from that purchase. A situation that would be happened is high total cost from ordering cost and holding cost form the component.

In order to anticipate high total cost from ordering and holding cost of the components, Materials Department has to manage the matarials purchased according to the characteristic of the materials. Author uses an example of decreasing demand problem from hard drive manufacturing to illustrate the real situation. Inventory problem classifications from Tersine (1994) represents the decreasing demand problem example can be solved using Material

Requirements Planning (MRP) method. The aim of MRP is to determine how many components should be purchased in the right time (Tersine, 1994). Pujawan and Kingsman (2003) did a research about an appropriate lot sizing technique for a lumpy demand problem. They suggest an appropriate lot sizing technique which provides the lowest total cost by trying 5 different lot sizing techniques. From that research, author adapts the model and try to solve the decreasing demand problem by using different lot sizing techniques. The results from the calculation will be compared. A suggestion of an appropriate technique for decreasing demand problem will also be provided in this thesis.

1.2. Problem Formulation

The Problem of this research is to find an appropriate lot sizing technique on dependent demand problem for 5 items with decreasing demand trend that minimize total cost (TC).

The objective is to minimize the Total Cost (TC) which covers:
a) Holding Cost
b) Ordering Cost

$$Total\ Cost\ (TC) = \sum_0^j (A + (h . S_{ij})) \tag{1.1}$$

where:

i	: item index, i = 1,2,3,4, and 5
j	: time index j = 1,2,3,..., n
h	: holding cost per item i ($/unit/week)
A	: ordering cost, it has the same value for each item ($/order)
S_{ij}	: inventory on hand per item i per time j (unit/week)
TC	: Total Cost ($)

1.3. Research Objective

The objective of this research is to suggest an appropriate lot sizing technique for decreasing demand trend which is providing minimum total cost.

1.4. Scope and Limitations

The scope and limitations of this research are as follows:

a) There are 5 parents with different 5 items or components for the example in Lot Sizing Analysis.

b) The demands of the items are depended to the demand of the parent's demand.

c) The demands of the items are 6 times of the parent's demands because one parent requires 6 numbers of the items.

d) The demands of the parents are decreasing which are following Exponential Distribution.

e) The demands of the items are based on Planned Order Release from the parents demand.

f) The demands of the parents cover 130 weeks.

g) The holding cost is assumed to have the same value for all items.

h) The ordering cost is a fix cost that will be occurred if there is an order for the item or component.

i) Total cost is the summation from holding cost and ordering cost which is respected to the number of stock item and order item.

j) The performance measure is according to the total cost of the items because the parents are assumed to be produced in current week directly. There is no projected on hand for the parents.

k) There are 5 lot sizing techniques in heuristic characteristic which are conducted to this research, Silver Meal 1 (SM1), Silver Meal 2 (SM2), Least Unit Cost (LUC), Part Period Balancing (PPB), and Incremental (ICR) technique.