CHAPTER I   INTRODUCTION

I.1 Research Background

The number of customer needs is increasing that makes company have to able fulfilling in specific time period. Optimal inventory policy will guarantee company in fulfilling customer needs. Company must manage inventory as possible as well to increase service level of customer. Inventory availability is waste so its called as liability that must be eliminated, otherwise its required to guarantee continuity demand fulfillment in order to fulfill customer needs. Shortages of inventory will make profit of company loss because customer unsatisfied for order fulfillment which is not on time and additionally make machine downtime because of unvailability tools. (Bahagia, 2006).

In order to get high level of performance, company must manage the production continuity well. By managing production, it will increase performance of company and reduce failures. The crucial thing of ensuring the production is the availability of spare part itself to do preventive and corrective (Katarzyna,2016). Spare part availability will be used to replace component at the failure time of machine. If machine stops because shortage of spare part, production process will stop. If production process stop, customer needs will not be fulfilled as well as decrease customer service level. Otherwise, if sparepart is overstock, so the company will incur more money. Hence, the inventory of sparepart must be managed to obtain total maximum and minimum needed by machine at the time of failure machine and at the time of preventive machine in order to prevent either stock out or overstock inventory. Shortage or stock out means the unavailability of spare part when machine needed while overstock means the availability of spare parts has been excessive in warehouse.

PT. XYZ is a manufacturing company which runs in the textile industry located in Bandung. It produces raw material in the form of thread to become finished goods in the form of fabric. There are five main steps of production in the of fabric. The thread will be texturized, then twisted together. Each thread is measured in proper sized will be dyed and then used to produce facbric in the weaving stage. Every

process are closely related of each other. Twisting process will start after texturizing process finish to produce, dying process will start after sizing have been done, and so on. It means if twisting process stops, the next process are also stop or having downtime machine. Then if machine downtime, productivity will decline and customer needs is not fulfilled in the right time. So, the continuity of machine will be one of the most important thing to increase performance of company in order to get maximum profit and high service level. To ensure the continuity of machine, so company must manage the availability of spare part properly which is supporting machine fully to work. The total active machine for every process can be seen in Table I.1.

Tabel I. 1 Total Active Machine for Every process

Name of Process (Department)	Number of Active Machine(Unit)
Texturizing	17
Twisting	130
Weaving	144
Sizing	13
DF	38
Total	342

To support all machines, there are 175 SKU (Stock Keeping Unit) spare parts. Every spare parts demand of machine has a unique phenomenon in which there are no demand in some months in of the year to do corrective or preventive machine . This phenomenon also shows there are zero demand of spare part in long term. For example of the phenomenon of spare parts Bearing 6002 ZZR C3 FAG can be seen in Table I.2.

Tabel I. 2 Demand Phenomenon of Bearing 6002 ZZR C3 FAG in 10 months

Name of Spare Part	Month									
	1	2	3	4	5	6	7	8	9	10
Bearing 6002 ZZR C3 FAG	6	9	0	0	4	0	5	0	7	16

The availability of spare parts is one of the important factors to prevent the downtime of the machine. Therefore, the company always consider the fulfillment of spare parts for each machine in order to ensure the continuity of production and

fulfilling customer demand. However, on the other hand the company does not consider inventory of spare parts, the company only estimates the needs of each spare part by looking at the period of engine damage. The company checks each machine and estimates the number of spare parts to be purchased regardless of warehouse inventory due to the phenomenon of demand that does not always there every month. Hence, inventory of sparepart in warehouse tend to be much more than the use of spare parts to the engine. This can be seen on Figure I.1 Comparison between Stock and Demand.
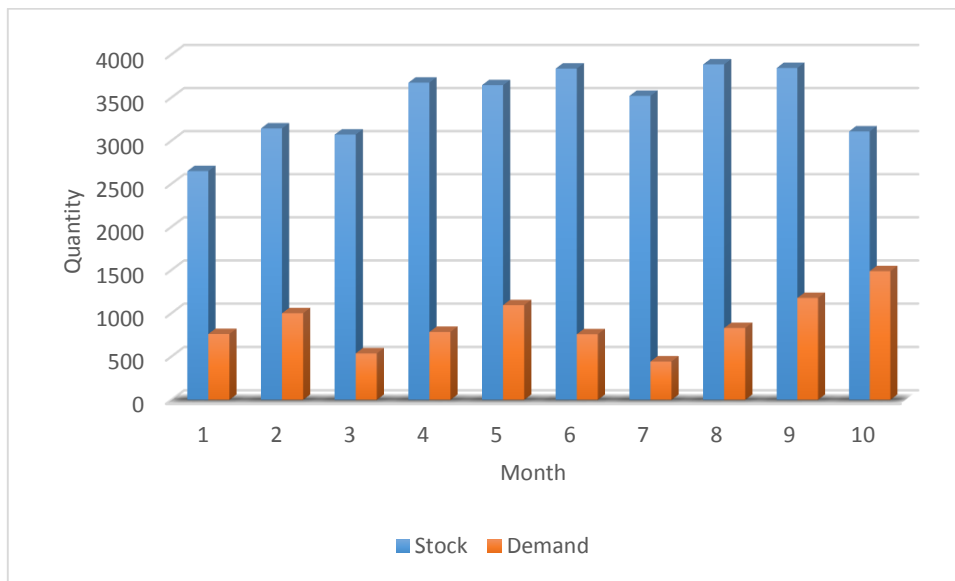

Figure I. 1 Graph of Comparison between Stock and Demand

The phenomenon of fluctuative demand is a major cause of overstock in the spare parts inventory in this company. This can be seen from the inventory of sparepart are always greater than the company's inventory policy itself which is 25% of stock inventory in warehouse. Figure I.2 will show the comparison between inventory and inventory policy of company to indicate that the inventory of sparepart has overstock.
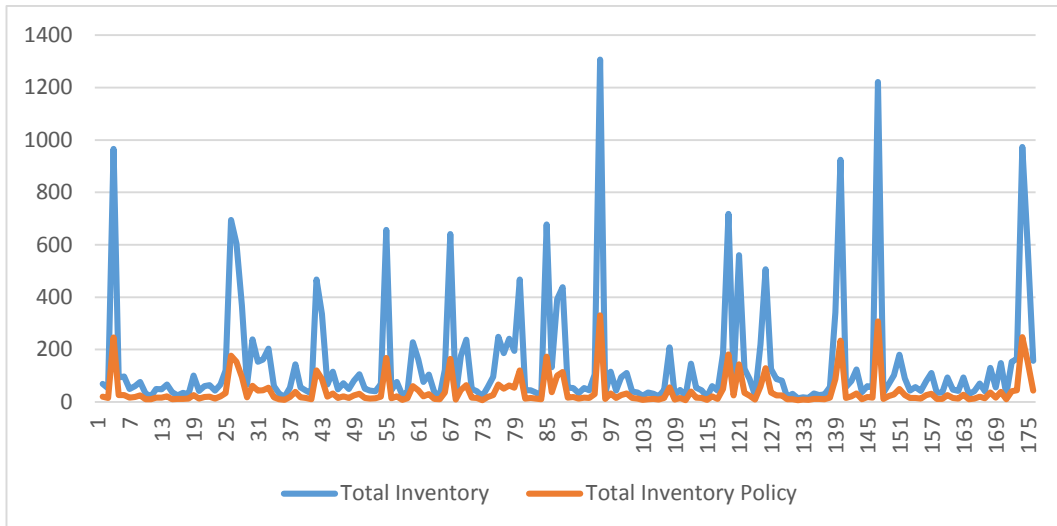
Figure I. 2 Graph of Comparison between Inventory and Inventory Policy

Inventory of spare parts are always excessive which leads to increase total investment of spare parts while if spare parts are stock out, the performance of machine will decline. Therefore, spare parts inventory is very important (Huang, 2011). Inventory spare parts of company are overstock every month, so the total invesment of company due to the inventory can be seen in Figure I.3 which shows that every month the company must invest more than 200 million to almost 600 million rupiahs.
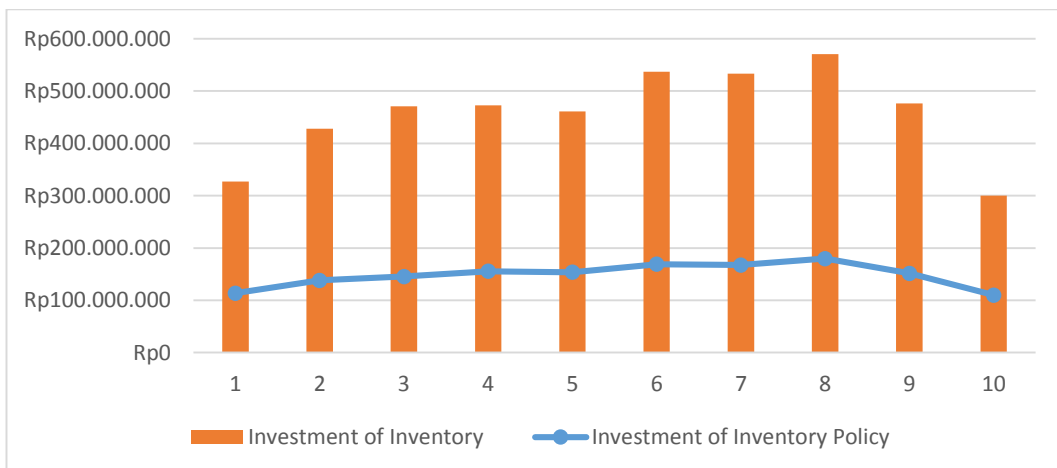

Figure I.3 Graph of Comparison of Total Investment

Considering the large amount of total investment due to the excess inventory of spare parts, then the company must be able to control inventory. It means the company have to know the maximum inventory level of spare part and proper replenishment time to get optimal order quantity. Well-planned inventory will

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minimize holding cost, fulfillment demand and element that associated with supply chain operations (John, 2010). In this research, global optimum inventory will be conducted by using periodic review approach (R,s,S) in order to minimize total inventory cost. By using this method, according Scarf (1960), periodic review (R,s,S) are the best system based on the demand pattern and cost factors. It can produces a lower total replenishment, carrying, and shortage cost.

I.2 Problem Identification

Based on research of background above, problem can be identified as follows.

1. How to determine optimal order quantity of spare part at PT XYZ?
2. How to determine minimum total inventory cost of spare part at PT XYZ?

I.3 Research Objectives

Objectives of research based on problem identification as follows.

1. Obtain optimal order quantity of spare part at PT XYZ using periodic review approach (R,s,S) method
2. Obtain minimum total inventory cost of spare part at PT XYZ using periodic review (R,s,S) approach method

I.4 Benefits of Research

Following research objectives, benefit of this research as follows.

1. PT XYZ obtain a recommendation of the optimal order quantity of spare parts in order to minimize total inventory cost.

I.5 Research Limitations

The research limited in order to focus to the purpose of research, so detail research limititations as follows.

1. Hystorical data of spare parts analized is on January 2016 – October 2016
2. Demand will be used are probabilistic and lead time is deterministic static
3. Inventory policy is not influenced by maintenance policy
4. Order cost is known and constant
5. Total working time of machine in one period is constant

6. Data processing is not influenced by inflation

7. The exchange rate used is based on the rate of Bank Indonesia

I.6 Writing Systematics

This research is decribed through writing systematic as follows:

Chapter I   Introduction

This chapter contains brief description of the research background, problem identification, research objectives, benefits of research, research limitations, and systematics of writing.

Chapter II   Theoritical Basis

This chapter discuss a relevant theory and method to the research conducted as supporting references that will be used to solve the problem.

Chapter III   Research Methodology

This chapter discuss the conceptual model and research systematic for mapping the problem of research in detail including the stages: formulating problem and hypotheses, collecting and processing, conducting solution and suggestion for the company.

Chapter IV   Data Collection and Processing

This chapter discuss data used to the next data processing. Data primer and data secondary collected to support this research. Data processing will be done by conceptual method in previous chapter using stochastic inventory method. Data demand categorized by ADI-CV analysis.

Chapter V   Analysis

This chapter contains the analysis of previous chapter faced to the data resulting to be compared with existing condition and proposed condition.